Sin

Notations

Traditional name

Sine

Traditional notation

$\sin(z)$

Mathematica StandardForm notation

`Sin[z]`

Primary definition

01.06.02.0001.01

$$\sin(z) == \frac{e^{i z} - e^{-i z}}{2 i}$$

Specific values

Specialized values

01.06.03.0001.01

$$\sin(\pi m) == 0 \;/;\; m \in \mathbb{Z}$$

01.06.03.0002.01

$$\sin\left(\pi \left(\frac{1}{2} + m\right)\right) == (-1)^m \;/;\; m \in \mathbb{Z}$$

Values at fixed points

01.06.03.0003.01

$$\sin(0) == 0$$

01.06.03.0004.01

$$\sin\left(\frac{\pi}{12}\right) == \frac{\sqrt{3} - 1}{2 \sqrt{2}}$$

01.06.03.0005.01

$$\sin\left(\frac{\pi}{12}\right) == \left(z;\, 16 z^4 - 16 z^2 + 1\right)_3^{-1}$$

01.06.03.0006.01

$$\sin\left(\frac{\pi}{10}\right) = \frac{\sqrt{5}-1}{4}$$

01.06.03.0007.01

$$\sin\left(\frac{\pi}{9}\right) = -\frac{i\left(\left(-1+i\sqrt{3}\right)^{4/3}-\left(-1-i\sqrt{3}\right)^{4/3}\right)}{4\sqrt[3]{2}}$$

01.06.03.0008.01

$$\sin\left(\frac{\pi}{9}\right) = \left(z;\, 64z^6-96z^4+36z^2-3\right)_4^{-1}$$

01.06.03.0009.01

$$\sin\left(\frac{\pi}{9}\right) = -\frac{1}{2}(-1)^{7/18}\left(-1+(-1)^{2/9}\right)$$

01.06.03.0010.01

$$\sin\left(\frac{\pi}{8}\right) = \frac{\sqrt{2-\sqrt{2}}}{2}$$

01.06.03.0011.01

$$\sin\left(\frac{\pi}{8}\right) = \left(z;\, 8z^4-8z^2+1\right)_3^{-1}$$

01.06.03.0012.01

$$\sin\left(\frac{\pi}{8}\right) = -\frac{1}{2}(-1)^{3/8}\left(-1+\sqrt[4]{-1}\right)$$

01.06.03.0013.01

$$\sin\left(\frac{\pi}{7}\right) = -\frac{1}{24}i\left(2\left(i+\sqrt{3}\right)i\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}} + \frac{2\sqrt{7}\left(i+\sqrt{3}\right)}{\sqrt[3]{7-\frac{i\sqrt{7}}{2}-\frac{3\sqrt{21}}{2}}} + \sqrt[3]{7-\frac{i\sqrt{7}}{2}-\frac{3\sqrt{21}}{2}}\left(2+2i\sqrt{3}\right)-4\sqrt{7}\,i-\frac{2\sqrt{7}\left(-i+\sqrt{3}\right)}{\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}}}\right)$$

01.06.03.0014.01

$$\sin\left(\frac{\pi}{7}\right) = \left(z;\, 64z^6-112z^4+56z^2-7\right)_4^{-1}$$

01.06.03.0015.01

$$\sin\left(\frac{\pi}{7}\right) = -\frac{1}{2}(-1)^{5/14}\left(-1+(-1)^{2/7}\right)$$

01.06.03.0016.01

$$\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$$

01.06.03.0017.01

$$\sin\left(\frac{\pi}{5}\right) == \frac{1}{2}\sqrt{\frac{5-\sqrt{5}}{2}}$$

01.06.03.0018.01

$$\sin\left(\frac{\pi}{5}\right) == \left(z;\, 16\, z^4 - 20\, z^2 + 5\right)_3^{-1}$$

01.06.03.0019.01

$$\sin\left(\frac{2\,\pi}{9}\right) == \frac{i\left(\sqrt[3]{-1-i\sqrt{3}} - \sqrt[3]{-1+i\sqrt{3}}\right)}{2\sqrt[3]{2}}$$

01.06.03.0020.01

$$\sin\left(\frac{2\,\pi}{9}\right) == \left(z;\, 64\, z^6 - 96\, z^4 + 36\, z^2 - 3\right)_5^{-1}$$

01.06.03.0021.01

$$\sin\left(\frac{2\,\pi}{9}\right) == -\frac{1}{2}\,(-1)^{5/18}\left(-1+(-1)^{4/9}\right)$$

01.06.03.0022.01

$$\sin\left(\frac{\pi}{4}\right) == \frac{\sqrt{2}}{2}$$

01.06.03.0023.01

$$\sin\left(\frac{2\,\pi}{7}\right) == \frac{1}{12\, 2^{2/3}\sqrt[3]{7-21\, i\sqrt{3}}}\left(-2\sqrt{7}\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}} - 2\, i\sqrt{21}\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}} + 4\sqrt{7}\sqrt[3]{7-\frac{i\sqrt{7}}{2}-\frac{3\sqrt{21}}{2}} + 2\, 2^{2/3}\, 7^{5/6}\sqrt[3]{1-3\, i\sqrt{3}} + \sqrt{3}\sqrt[3]{14+i\sqrt{7}+3\sqrt{21}}\left(14-i\sqrt{7}-3\sqrt{21}\right)^{2/3} + 2\left(14+i\sqrt{7}+3\sqrt{21}\right)^{2/3}\sqrt[3]{14-i\sqrt{7}-3\sqrt{21}}\; i + \sqrt[3]{14+i\sqrt{7}+3\sqrt{21}}\left(14-i\sqrt{7}-3\sqrt{21}\right)^{2/3} i\right)$$

01.06.03.0024.01

$$\sin\left(\frac{2\,\pi}{7}\right) == \left(z;\, 64\, z^6 - 112\, z^4 + 56\, z^2 - 7\right)_5^{-1}$$

01.06.03.0025.01

$$\sin\left(\frac{2\,\pi}{7}\right) == -\frac{1}{2}\,(-1)^{3/14}\left(-1+(-1)^{4/7}\right)$$

01.06.03.0026.01

$$\sin\left(\frac{3\,\pi}{10}\right) == \frac{\sqrt{5}+1}{4}$$

01.06.03.0027.01

$$\sin\left(\frac{\pi}{3}\right) == \frac{\sqrt{3}}{2}$$

01.06.03.0028.01

$$\sin\left(\frac{3\pi}{8}\right) = \frac{\sqrt{2+\sqrt{2}}}{2}$$

01.06.03.0029.01

$$\sin\left(\frac{3\pi}{8}\right) = \left(z;\, 8z^4 - 8z^2 + 1\right)_4^{-1}$$

01.06.03.0030.01

$$\sin\left(\frac{3\pi}{8}\right) = -\frac{1}{2}\sqrt[8]{-1}\left(-1 + (-1)^{3/4}\right)$$

01.06.03.0031.01

$$\sin\left(\frac{2\pi}{5}\right) = \frac{1}{2}\sqrt{\frac{5+\sqrt{5}}{2}}$$

01.06.03.0032.01

$$\sin\left(\frac{2\pi}{5}\right) = \left(z;\, 16z^4 - 20z^2 + 5\right)_4^{-1}$$

01.06.03.0033.01

$$\sin\left(\frac{5\pi}{12}\right) = \frac{1+\sqrt{3}}{2\sqrt{2}}$$

01.06.03.0034.01

$$\sin\left(\frac{5\pi}{12}\right) = \left(z;\, 16z^4 - 16z^2 + 1\right)_4^{-1}$$

01.06.03.0035.01

$$\sin\left(\frac{3\pi}{7}\right) = \frac{1}{12\, 2^{2/3}\sqrt[3]{7 - 21\, i\sqrt{3}}}\left(4\sqrt{7}\sqrt[3]{7 + \frac{i\sqrt{7}}{2} + \frac{3\sqrt{21}}{2}} + 2\, 2^{2/3}\, 7^{5/6}\sqrt[3]{1 - 3\, i\sqrt{3}} - \right.$$
$$2\, i\left(14 - i\sqrt{7} - 3\sqrt{21}\right)^{2/3}\sqrt[3]{14 + i\sqrt{7} + 3\sqrt{21}} + \sqrt{3}\left(14 + i\sqrt{7} + 3\sqrt{21}\right)^{2/3}\sqrt[3]{14 - i\sqrt{7} - 3\sqrt{21}} -$$
$$\left. i\sqrt[3]{14 - i\sqrt{7} - 3\sqrt{21}}\left(14 + i\sqrt{7} + 3\sqrt{21}\right)^{2/3} + 2\sqrt{7}\sqrt[3]{7 - \frac{i\sqrt{7}}{2} - \frac{3\sqrt{21}}{2}}\left(i + \sqrt{3}\right) i\right)$$

01.06.03.0036.01

$$\sin\left(\frac{3\pi}{7}\right) = \left(z;\, 64z^6 - 112z^4 + 56z^2 - 7\right)_6^{-1}$$

01.06.03.0037.01

$$\sin\left(\frac{3\pi}{7}\right) = -\frac{1}{2}\sqrt[14]{-1}\left(-1 + (-1)^{6/7}\right)$$

01.06.03.0038.01

$$\sin\left(\frac{4\pi}{9}\right) = \frac{\left(-i + \sqrt{3}\right)\sqrt[3]{-1 + i\sqrt{3}} + \left(i + \sqrt{3}\right)\sqrt[3]{-1 - i\sqrt{3}}}{4\sqrt[3]{2}}$$

01.06.03.0039.01

$$\sin\left(\frac{4\pi}{9}\right) == \left(z;\, 64 z^6 - 96 z^4 + 36 z^2 - 3\right)_6^{-1}$$

01.06.03.0040.01

$$\sin\left(\frac{4\pi}{9}\right) == -\frac{1}{2}\sqrt[18]{-1}\left(-1 + (-1)^{8/9}\right)$$

01.06.03.0041.01

$$\sin\left(\frac{\pi}{2}\right) == 1$$

01.06.03.0042.01

$$\sin\left(\frac{5\pi}{9}\right) == \frac{\left(-i + \sqrt{3}\right)\sqrt[3]{-1 + i\sqrt{3}} + \left(i + \sqrt{3}\right)\sqrt[3]{-1 - i\sqrt{3}}}{4\sqrt[3]{2}}$$

01.06.03.0043.01

$$\sin\left(\frac{5\pi}{9}\right) == \left(z;\, 64 z^6 - 96 z^4 + 36 z^2 - 3\right)_6^{-1}$$

01.06.03.0044.01

$$\sin\left(\frac{5\pi}{9}\right) == -\frac{1}{2}(-1)^{17/18}\left(1 + \sqrt[9]{-1}\right)$$

01.06.03.0045.01

$$\sin\left(\frac{4\pi}{7}\right) == \frac{1}{12\, 2^{2/3}\sqrt[3]{7 - 21\, i\sqrt{3}}}\Bigg(4\sqrt{7}\sqrt[3]{7 + \frac{i\sqrt{7}}{2} + \frac{3\sqrt{21}}{2}} + 2\, 2^{2/3}\, 7^{5/6}\sqrt[3]{1 - 3\, i\sqrt{3}} -$$
$$2\, i\left(14 - i\sqrt{7} - 3\sqrt{21}\right)^{2/3}\sqrt[3]{14 + i\sqrt{7} + 3\sqrt{21}} + \sqrt{3}\left(14 + i\sqrt{7} + 3\sqrt{21}\right)^{2/3}\sqrt[3]{14 - i\sqrt{7} - 3\sqrt{21}} -$$
$$i\sqrt[3]{14 - i\sqrt{7} - 3\sqrt{21}}\left(14 + i\sqrt{7} + 3\sqrt{21}\right)^{2/3} + 2\sqrt{7}\sqrt[3]{7 - \frac{i\sqrt{7}}{2} - \frac{3\sqrt{21}}{2}}\left(i + \sqrt{3}\right) i\Bigg)$$

01.06.03.0046.01

$$\sin\left(\frac{4\pi}{7}\right) == \left(z;\, 64 z^6 - 112 z^4 + 56 z^2 - 7\right)_6^{-1}$$

01.06.03.0047.01

$$\sin\left(\frac{4\pi}{7}\right) == -\frac{1}{2}(-1)^{13/14}\left(1 + \sqrt[7]{-1}\right)$$

01.06.03.0048.01

$$\sin\left(\frac{7\pi}{12}\right) == \frac{1 + \sqrt{3}}{2\sqrt{2}}$$

01.06.03.0049.01

$$\sin\left(\frac{7\pi}{12}\right) == \left(z;\, 16 z^4 - 16 z^2 + 1\right)_4^{-1}$$

01.06.03.0050.01

$$\sin\left(\frac{3\pi}{5}\right) = \frac{1}{2}\sqrt{\frac{5+\sqrt{5}}{2}}$$

01.06.03.0051.01

$$\sin\left(\frac{3\pi}{5}\right) = \left(z;\, 16 z^4 - 20 z^2 + 5\right)_4^{-1}$$

01.06.03.0052.01

$$\sin\left(\frac{5\pi}{8}\right) = \frac{\sqrt{2+\sqrt{2}}}{2}$$

01.06.03.0053.01

$$\sin\left(\frac{5\pi}{8}\right) = \left(z;\, 8 z^4 - 8 z^2 + 1\right)_4^{-1}$$

01.06.03.0054.01

$$\sin\left(\frac{5\pi}{8}\right) = -\frac{1}{2}(-1)^{7/8}\left(1+\sqrt[4]{-1}\right)$$

01.06.03.0055.01

$$\sin\left(\frac{2\pi}{3}\right) = \frac{\sqrt{3}}{2}$$

01.06.03.0056.01

$$\sin\left(\frac{7\pi}{10}\right) = \frac{\sqrt{5}+1}{4}$$

01.06.03.0057.01

$$\sin\left(\frac{5\pi}{7}\right) = \frac{1}{12\, 2^{2/3}\sqrt[3]{7-21\, i\sqrt{3}}}\left(-2\sqrt{7}\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}} - 2\, i\sqrt{21}\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}} + 4\sqrt{7}\sqrt[3]{7-\frac{i\sqrt{7}}{2}-\frac{3\sqrt{21}}{2}} + 2\, 2^{2/3}\, 7^{5/6}\sqrt[3]{1-3\, i\sqrt{3}} + \sqrt{3}\sqrt[3]{14+i\sqrt{7}+3\sqrt{21}}\left(14-i\sqrt{7}-3\sqrt{21}\right)^{2/3} + 2\left(14+i\sqrt{7}+3\sqrt{21}\right)^{2/3}\sqrt[3]{14-i\sqrt{7}-3\sqrt{21}}\, i + \sqrt[3]{14+i\sqrt{7}+3\sqrt{21}}\left(14-i\sqrt{7}-3\sqrt{21}\right)^{2/3} i\right)$$

01.06.03.0058.01

$$\sin\left(\frac{5\pi}{7}\right) = \left(z;\, 64 z^6 - 112 z^4 + 56 z^2 - 7\right)_5^{-1}$$

01.06.03.0059.01

$$\sin\left(\frac{5\pi}{7}\right) = -\frac{1}{2}(-1)^{11/14}\left(1+(-1)^{3/7}\right)$$

01.06.03.0060.01

$$\sin\left(\frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2}$$

01.06.03.0061.01

$$\sin\left(\frac{7\pi}{9}\right) == \frac{i\left(\sqrt[3]{-1-i\sqrt{3}} - \sqrt[3]{-1+i\sqrt{3}}\right)}{2\sqrt[3]{2}}$$

01.06.03.0062.01

$$\sin\left(\frac{7\pi}{9}\right) == \left(z;\, 64 z^6 - 96 z^4 + 36 z^2 - 3\right)_5^{-1}$$

01.06.03.0063.01

$$\sin\left(\frac{7\pi}{9}\right) == -\frac{1}{2}(-1)^{13/18}\left(1+(-1)^{5/9}\right)$$

01.06.03.0064.01

$$\sin\left(\frac{4\pi}{5}\right) == \frac{1}{2}\sqrt{\frac{5-\sqrt{5}}{2}}$$

01.06.03.0065.01

$$\sin\left(\frac{4\pi}{5}\right) == \left(z;\, 16 z^4 - 20 z^2 + 5\right)_3^{-1}$$

01.06.03.0066.01

$$\sin\left(\frac{5\pi}{6}\right) == \frac{1}{2}$$

01.06.03.0067.01

$$\sin\left(\frac{6\pi}{7}\right) == -\frac{1}{24} i \left(2\left(i+\sqrt{3}\right) i \sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}} + \frac{2\sqrt{7}\left(i+\sqrt{3}\right)}{\sqrt[3]{7-\frac{i\sqrt{7}}{2}-\frac{3\sqrt{21}}{2}}} + \sqrt[3]{7-\frac{i\sqrt{7}}{2}-\frac{3\sqrt{21}}{2}}\left(2+2 i\sqrt{3}\right) - 4\sqrt{7}\, i - \frac{2\sqrt{7}\left(-i+\sqrt{3}\right)}{\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}}}\right)$$

01.06.03.0068.01

$$\sin\left(\frac{6\pi}{7}\right) == \left(z;\, 64 z^6 - 112 z^4 + 56 z^2 - 7\right)_4^{-1}$$

01.06.03.0069.01

$$\sin\left(\frac{6\pi}{7}\right) == -\frac{1}{2}(-1)^{9/14}\left(1+(-1)^{5/7}\right)$$

01.06.03.0070.01

$$\sin\left(\frac{7\pi}{8}\right) == \frac{\sqrt{2-\sqrt{2}}}{2}$$

01.06.03.0071.01

$$\sin\left(\frac{7\pi}{8}\right) == \left(z;\, 8 z^4 - 8 z^2 + 1\right)_3^{-1}$$

01.06.03.0072.01

$$\sin\left(\frac{7\pi}{8}\right) = -\frac{1}{2}(-1)^{5/8}\left(1+(-1)^{3/4}\right)$$

01.06.03.0073.01

$$\sin\left(\frac{8\pi}{9}\right) = -\frac{i\left(\left(-1+i\sqrt{3}\right)^{4/3}-\left(-1-i\sqrt{3}\right)^{4/3}\right)}{4\sqrt[3]{2}}$$

01.06.03.0074.01

$$\sin\left(\frac{8\pi}{9}\right) = \left(z;\, 64z^6-96z^4+36z^2-3\right)_4^{-1}$$

01.06.03.0075.01

$$\sin\left(\frac{8\pi}{9}\right) = -\frac{1}{2}(-1)^{11/18}\left(1+(-1)^{7/9}\right)$$

01.06.03.0076.01

$$\sin\left(\frac{9\pi}{10}\right) = \frac{\sqrt{5}-1}{4}$$

01.06.03.0077.01

$$\sin\left(\frac{11\pi}{12}\right) = \frac{\sqrt{3}-1}{2\sqrt{2}}$$

01.06.03.0078.01

$$\sin\left(\frac{11\pi}{12}\right) = \left(z;\, 16z^4-16z^2+1\right)_3^{-1}$$

01.06.03.0079.01

$$\sin(\pi) = 0$$

01.06.03.0080.01

$$\sin\left(\frac{13\pi}{12}\right) = -\frac{\sqrt{3}-1}{2\sqrt{2}}$$

01.06.03.0081.01

$$\sin\left(\frac{13\pi}{12}\right) = \left(z;\, 16z^4-16z^2+1\right)_2^{-1}$$

01.06.03.0082.01

$$\sin\left(\frac{11\pi}{10}\right) = -\frac{\sqrt{5}-1}{4}$$

01.06.03.0083.01

$$\sin\left(\frac{10\pi}{9}\right) = -\frac{i\left(\left(-1-i\sqrt{3}\right)^{4/3}-\left(-1+i\sqrt{3}\right)^{4/3}\right)}{4\sqrt[3]{2}}$$

01.06.03.0084.01

$$\sin\left(\frac{10\pi}{9}\right) = \left(z;\, 64z^6-96z^4+36z^2-3\right)_3^{-1}$$

01.06.03.0085.01

$$\sin\left(\frac{10\pi}{9}\right) = \frac{1}{2}(-1)^{11/18}\left(1+(-1)^{7/9}\right)$$

01.06.03.0086.01

$$\sin\left(\frac{9\pi}{8}\right) = -\frac{1}{2}\sqrt{2-\sqrt{2}}$$

01.06.03.0087.01

$$\sin\left(\frac{9\pi}{8}\right) = \left(z;\, 8z^4-8z^2+1\right)_2^{-1}$$

01.06.03.0088.01

$$\sin\left(\frac{9\pi}{8}\right) = \frac{1}{2}(-1)^{5/8}\left(1+(-1)^{3/4}\right)$$

01.06.03.0089.01

$$\sin\left(\frac{8\pi}{7}\right) = -\frac{1}{24}\,i\left(2\left(1-i\sqrt{3}\right)\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}} - \left(2+2i\sqrt{3}\right)\sqrt[3]{7-\frac{i\sqrt{7}}{2}-\frac{3\sqrt{21}}{2}} + \frac{2\sqrt{7}\left(-i+\sqrt{3}\right)}{\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}}} + 4\sqrt{7}\,i - \frac{2\sqrt{7}\left(i+\sqrt{3}\right)}{\sqrt[3]{7-\frac{i\sqrt{7}}{2}-\frac{3\sqrt{21}}{2}}}\right)$$

01.06.03.0090.01

$$\sin\left(\frac{8\pi}{7}\right) = \left(z;\, 64z^6-112z^4+56z^2-7\right)_3^{-1}$$

01.06.03.0091.01

$$\sin\left(\frac{8\pi}{7}\right) = \frac{1}{2}(-1)^{9/14}\left(1+(-1)^{5/7}\right)$$

01.06.03.0092.01

$$\sin\left(\frac{7\pi}{6}\right) = -\frac{1}{2}$$

01.06.03.0093.01

$$\sin\left(\frac{6\pi}{5}\right) = -\frac{1}{2}\sqrt{\frac{5-\sqrt{5}}{2}}$$

01.06.03.0094.01

$$\sin\left(\frac{6\pi}{5}\right) = \left(z;\, 16z^4-20z^2+5\right)_2^{-1}$$

01.06.03.0095.01

$$\sin\left(\frac{11\pi}{9}\right) = -\frac{i\left(\sqrt[3]{-1-i\sqrt{3}}-\sqrt[3]{-1+i\sqrt{3}}\right)}{2\sqrt[3]{2}}$$

01.06.03.0096.01

$$\sin\left(\frac{11\pi}{9}\right) == \left(z;\, 64 z^6 - 96 z^4 + 36 z^2 - 3\right)_2^{-1}$$

01.06.03.0097.01

$$\sin\left(\frac{11\pi}{9}\right) == \frac{1}{2} (-1)^{13/18} \left(1 + (-1)^{5/9}\right)$$

01.06.03.0098.01

$$\sin\left(\frac{5\pi}{4}\right) == -\frac{\sqrt{2}}{2}$$

01.06.03.0099.01

$$\sin\left(\frac{9\pi}{7}\right) == -\left(-2\sqrt{7}\sqrt[3]{7 + \frac{i\sqrt{7}}{2} + \frac{3\sqrt{21}}{2}} - 2 i \sqrt{21}\sqrt[3]{7 + \frac{i\sqrt{7}}{2} + \frac{3\sqrt{21}}{2}} + 4\sqrt{7}\sqrt[3]{7 - \frac{i\sqrt{7}}{2} - \frac{3\sqrt{21}}{2}} + 2\, 2^{2/3}\, 7^{5/6}\sqrt[3]{1 - 3 i \sqrt{3}} + \sqrt{3}\sqrt[3]{14 + i\sqrt{7} + 3\sqrt{21}}\left(14 - i\sqrt{7} - 3\sqrt{21}\right)^{2/3} + 2\left(14 + i\sqrt{7} + 3\sqrt{21}\right)^{2/3} \sqrt[3]{14 - i\sqrt{7} - 3\sqrt{21}}\, i + \sqrt[3]{14 + i\sqrt{7} + 3\sqrt{21}}\left(14 - i\sqrt{7} - 3\sqrt{21}\right)^{2/3} i\right) \Big/ \left(12\, 2^{2/3}\sqrt[3]{7 - 21 i \sqrt{3}}\right)$$

01.06.03.0100.01

$$\sin\left(\frac{9\pi}{7}\right) == \left(z;\, 64 z^6 - 112 z^4 + 56 z^2 - 7\right)_2^{-1}$$

01.06.03.0101.01

$$\sin\left(\frac{9\pi}{7}\right) == \frac{1}{2} (-1)^{11/14} \left(1 + (-1)^{3/7}\right)$$

01.06.03.0102.01

$$\sin\left(\frac{13\pi}{10}\right) == -\frac{\sqrt{5} + 1}{4}$$

01.06.03.0103.01

$$\sin\left(\frac{4\pi}{3}\right) == -\frac{\sqrt{3}}{2}$$

01.06.03.0104.01

$$\sin\left(\frac{11\pi}{8}\right) == -\frac{\sqrt{2 + \sqrt{2}}}{2}$$

01.06.03.0105.01

$$\sin\left(\frac{11\pi}{8}\right) == \left(z;\, 8 z^4 - 8 z^2 + 1\right)_1^{-1}$$

01.06.03.0106.01

$$\sin\left(\frac{11\pi}{8}\right) == \frac{1}{2} (-1)^{7/8} \left(1 + \sqrt[4]{-1}\right)$$

01.06.03.0107.01

$$\sin\left(\frac{7\pi}{5}\right) = -\frac{1}{2}\sqrt{\frac{5+\sqrt{5}}{2}}$$

01.06.03.0108.01

$$\sin\left(\frac{7\pi}{5}\right) = \left(z;\, 16z^4 - 20z^2 + 5\right)_1^{-1}$$

01.06.03.0109.01

$$\sin\left(\frac{17\pi}{12}\right) = -\frac{\sqrt{3}+1}{2\sqrt{2}}$$

01.06.03.0110.01

$$\sin\left(\frac{17\pi}{12}\right) = \left(z;\, 16z^4 - 16z^2 + 1\right)_1^{-1}$$

01.06.03.0111.01

$$\sin\left(\frac{10\pi}{7}\right) = \frac{1}{6\,2^{2/3}\sqrt[3]{7-21\,i\sqrt{3}}}\left(\left(\sqrt{7}-i\sqrt{21}\right)\sqrt[3]{7-\frac{i\sqrt{7}}{2}-\frac{3\sqrt{21}}{2}} - 2^{2/3}\,7^{5/6}\sqrt[3]{1-3\,i\sqrt{3}} + \frac{1}{2}\left(i\sqrt[3]{14-42\,i\sqrt{3}}\left(\left(1+i\sqrt{3}\right)\sqrt[3]{14+i\sqrt{7}+3\sqrt{21}} + 2\sqrt[3]{14-i\sqrt{7}-3\sqrt{21}}\right) - 4\sqrt{7}\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}}\right)\right)$$

01.06.03.0112.01

$$\sin\left(\frac{10\pi}{7}\right) = \left(z;\, 64z^6 - 112z^4 + 56z^2 - 7\right)_1^{-1}$$

01.06.03.0113.01

$$\sin\left(\frac{10\pi}{7}\right) = \frac{1}{2}(-1)^{13/14}\left(1+\sqrt[7]{-1}\right)$$

01.06.03.0114.01

$$\sin\left(\frac{13\pi}{9}\right) = -\frac{\left(-i+\sqrt{3}\right)\sqrt[3]{-1+i\sqrt{3}} + \left(i+\sqrt{3}\right)\sqrt[3]{-1-i\sqrt{3}}}{4\sqrt[3]{2}}$$

01.06.03.0115.01

$$\sin\left(\frac{13\pi}{9}\right) = \left(z;\, 64z^6 - 96z^4 + 36z^2 - 3\right)_1^{-1}$$

01.06.03.0116.01

$$\sin\left(\frac{13\pi}{9}\right) = \frac{1}{2}(-1)^{17/18}\left(1+\sqrt[9]{-1}\right)$$

01.06.03.0117.01

$$\sin\left(\frac{3\pi}{2}\right) = -1$$

01.06.03.0118.01

$$\sin\left(\frac{14\pi}{9}\right) = -\frac{\left(-i+\sqrt{3}\right)\sqrt[3]{-1+i\sqrt{3}} + \left(i+\sqrt{3}\right)\sqrt[3]{-1-i\sqrt{3}}}{4\sqrt[3]{2}}$$

01.06.03.0119.01

$$\sin\left(\frac{14\pi}{9}\right) = \left(z;\, 64z^6 - 96z^4 + 36z^2 - 3\right)_1^{-1}$$

01.06.03.0120.01

$$\sin\left(\frac{14\pi}{9}\right) = \frac{1}{2}\sqrt[18]{-1}\left(-1+(-1)^{8/9}\right)$$

01.06.03.0121.01

$$\sin\left(\frac{11\pi}{7}\right) = \frac{1}{6\, 2^{2/3}\sqrt[3]{7-21i\sqrt{3}}}\left(\left(\sqrt{7}-i\sqrt{21}\right)\sqrt[3]{7-\frac{i\sqrt{7}}{2}-\frac{3\sqrt{21}}{2}} - 2^{2/3}\, 7^{5/6}\sqrt[3]{1-3i\sqrt{3}} + \frac{1}{2}\left(i\sqrt[3]{14-42i\sqrt{3}}\right.\right.$$
$$\left.\left.\left(\left(1+i\sqrt{3}\right)\sqrt[3]{14+i\sqrt{7}+3\sqrt{21}} + 2\sqrt[3]{14-i\sqrt{7}-3\sqrt{21}}\right) - 4\sqrt{7}\sqrt[3]{7+\frac{i\sqrt{7}}{2}+\frac{3\sqrt{21}}{2}}\right)\right)$$

01.06.03.0122.01

$$\sin\left(\frac{11\pi}{7}\right) = \left(z;\, 64z^6 - 112z^4 + 56z^2 - 7\right)_1^{-1}$$

01.06.03.0123.01

$$\sin\left(\frac{11\pi}{7}\right) = \frac{1}{2}\sqrt[14]{-1}\left(-1+(-1)^{6/7}\right)$$

01.06.03.0124.01

$$\sin\left(\frac{19\pi}{12}\right) = -\frac{\sqrt{3}+1}{2\sqrt{2}}$$

01.06.03.0125.01

$$\sin\left(\frac{19\pi}{12}\right) = \left(z;\, 16z^4 - 16z^2 + 1\right)_1^{-1}$$

01.06.03.0126.01

$$\sin\left(\frac{8\pi}{5}\right) = -\frac{1}{2}\sqrt{\frac{5+\sqrt{5}}{2}}$$

01.06.03.0127.01

$$\sin\left(\frac{8\pi}{5}\right) = \left(z;\, 16z^4 - 20z^2 + 5\right)_1^{-1}$$

01.06.03.0128.01

$$\sin\left(\frac{13\pi}{8}\right) = -\frac{\sqrt{2+\sqrt{2}}}{2}$$

01.06.03.0129.01

$$\sin\left(\frac{13\pi}{8}\right) = \left(z;\, 8z^4 - 8z^2 + 1\right)_1^{-1}$$

01.06.03.0130.01

$$\sin\left(\frac{13\pi}{8}\right) = \frac{1}{2}\sqrt[8]{-1}\left(-1 + (-1)^{3/4}\right)$$

01.06.03.0131.01

$$\sin\left(\frac{5\pi}{3}\right) = -\frac{\sqrt{3}}{2}$$

01.06.03.0132.01

$$\sin\left(\frac{17\pi}{10}\right) = -\frac{\sqrt{5}+1}{4}$$

01.06.03.0133.01

$$\sin\left(\frac{12\pi}{7}\right) = -\left(-2\sqrt{7}\sqrt[3]{7 + \frac{i\sqrt{7}}{2} + \frac{3\sqrt{21}}{2}} - 2i\sqrt{21}\sqrt[3]{7 + \frac{i\sqrt{7}}{2} + \frac{3\sqrt{21}}{2}} + 4\sqrt{7}\sqrt[3]{7 - \frac{i\sqrt{7}}{2} - \frac{3\sqrt{21}}{2}} + 2\, 2^{2/3}\, 7^{5/6}\sqrt[3]{1 - 3i\sqrt{3}} + \sqrt{3}\sqrt[3]{14 + i\sqrt{7} + 3\sqrt{21}}\left(14 - i\sqrt{7} - 3\sqrt{21}\right)^{2/3} + 2\left(14 + i\sqrt{7} + 3\sqrt{21}\right)^{2/3}\sqrt[3]{14 - i\sqrt{7} - 3\sqrt{21}}\, i + \sqrt[3]{14 + i\sqrt{7} + 3\sqrt{21}}\left(14 - i\sqrt{7} - 3\sqrt{21}\right)^{2/3} i\right) \Big/ \left(12\, 2^{2/3}\sqrt[3]{7 - 21 i\sqrt{3}}\right)$$

01.06.03.0134.01

$$\sin\left(\frac{12\pi}{7}\right) = \left(z;\, 64z^6 - 112z^4 + 56z^2 - 7\right)_2^{-1}$$

01.06.03.0135.01

$$\sin\left(\frac{12\pi}{7}\right) = \frac{1}{2}(-1)^{3/14}\left(-1 + (-1)^{4/7}\right)$$

01.06.03.0136.01

$$\sin\left(\frac{7\pi}{4}\right) = -\frac{\sqrt{2}}{2}$$

01.06.03.0137.01

$$\sin\left(\frac{16\pi}{9}\right) = -\frac{i\left(\sqrt[3]{-1 - i\sqrt{3}} - \sqrt[3]{-1 + i\sqrt{3}}\right)}{2\sqrt[3]{2}}$$

01.06.03.0138.01

$$\sin\left(\frac{16\pi}{9}\right) = \left(z;\, 64z^6 - 96z^4 + 36z^2 - 3\right)_2^{-1}$$

01.06.03.0139.01

$$\sin\left(\frac{16\pi}{9}\right) = \frac{1}{2}(-1)^{5/18}\left(-1 + (-1)^{4/9}\right)$$

01.06.03.0140.01

$$\sin\left(\frac{9\pi}{5}\right) == -\frac{1}{2}\sqrt{\frac{5-\sqrt{5}}{2}}$$

01.06.03.0141.01

$$\sin\left(\frac{9\pi}{5}\right) == \left(z;\, 16 z^4 - 20 z^2 + 5\right)_2^{-1}$$

01.06.03.0142.01

$$\sin\left(\frac{11\pi}{6}\right) == -\frac{1}{2}$$

01.06.03.0143.01

$$\sin\left(\frac{13\pi}{7}\right) == -\frac{1}{24}\, i \left(2\left(1 - i\sqrt{3}\right)\sqrt[3]{7 + \frac{i\sqrt{7}}{2} + \frac{3\sqrt{21}}{2}} - \left(2 + 2 i\sqrt{3}\right)\sqrt[3]{7 - \frac{i\sqrt{7}}{2} - \frac{3\sqrt{21}}{2}} + \frac{2\sqrt{7}\left(-i + \sqrt{3}\right)}{\sqrt[3]{7 + \frac{i\sqrt{7}}{2} + \frac{3\sqrt{21}}{2}}} + 4\sqrt{7}\, i - \frac{2\sqrt{7}\left(i + \sqrt{3}\right)}{\sqrt[3]{7 - \frac{i\sqrt{7}}{2} - \frac{3\sqrt{21}}{2}}}\right)$$

01.06.03.0144.01

$$\sin\left(\frac{13\pi}{7}\right) == \left(z;\, 64 z^6 - 112 z^4 + 56 z^2 - 7\right)_3^{-1}$$

01.06.03.0145.01

$$\sin\left(\frac{13\pi}{7}\right) == \frac{1}{2}(-1)^{5/14}\left(-1 + (-1)^{2/7}\right)$$

01.06.03.0146.01

$$\sin\left(\frac{15\pi}{8}\right) == -\frac{\sqrt{2-\sqrt{2}}}{2}$$

01.06.03.0147.01

$$\sin\left(\frac{15\pi}{8}\right) == \left(z;\, 8 z^4 - 8 z^2 + 1\right)_2^{-1}$$

01.06.03.0148.01

$$\sin\left(\frac{15\pi}{8}\right) == \frac{1}{2}(-1)^{3/8}\left(-1 + \sqrt[4]{-1}\right)$$

01.06.03.0149.01

$$\sin\left(\frac{17\pi}{9}\right) == -\frac{i\left(\left(-1 - i\sqrt{3}\right)^{4/3} - \left(-1 + i\sqrt{3}\right)^{4/3}\right)}{4\sqrt[3]{2}}$$

01.06.03.0150.01

$$\sin\left(\frac{17\pi}{9}\right) == \left(z;\, 64 z^6 - 96 z^4 + 36 z^2 - 3\right)_3^{-1}$$

01.06.03.0151.01

$$\sin\left(\frac{17\pi}{9}\right) = \frac{1}{2}(-1)^{7/18}\left(-1+(-1)^{2/9}\right)$$

01.06.03.0152.01

$$\sin\left(\frac{19\pi}{10}\right) = -\frac{\sqrt{5}-1}{4}$$

01.06.03.0153.01

$$\sin\left(\frac{23\pi}{12}\right) = -\frac{\sqrt{3}-1}{2\sqrt{2}}$$

01.06.03.0154.01

$$\sin\left(\frac{23\pi}{12}\right) = \left(z;\, 16z^4-16z^2+1\right)_2^{-1}$$

01.06.03.0155.01

$$\sin(2\pi) = 0$$

01.06.03.0156.01

$$\sin\left(\frac{\pi}{17}\right) = \frac{1}{4}\sqrt{\left(8-\sqrt{\left(2\left(\sqrt{\left(2\left(8\sqrt{2\left(\sqrt{17}+17\right)}+6\sqrt{17}+\sqrt{2\left(17-\sqrt{17}\right)}-\sqrt{34\left(17-\sqrt{17}\right)}+34\right)\right)}+\sqrt{17}-\sqrt{2\left(17-\sqrt{17}\right)}+15\right)\right)}\right)}$$

01.06.03.0157.01

$$\sin\left(\frac{\pi}{30}\right) = \frac{1}{4}\sqrt{\frac{3}{2}\left(5-\sqrt{5}\right)} - \frac{\sqrt{5}+1}{8}$$

$\sin\left(\frac{n\pi}{m}\right)$ can be expressed using only square roots if $n \in \mathbb{Z}$ and m is a product of a power of 2 and distinct Fermat primes $\{3, 5, 17, 257, \ldots\}$.

Values at infinities

01.06.03.0158.01

$$\sin(i\infty) = i\infty$$

01.06.03.0159.01

$$\sin(-i\infty) = -i\infty$$

01.06.03.0160.01

$$\sin(\tilde{\infty}) = ¿$$

General characteristics

Domain and analyticity

$\sin(z)$ is an entire analytical function of z which is defined over the whole complex z-plane.

01.06.04.0001.01

$$z \longrightarrow \sin(z) :: \mathbb{C} \longrightarrow \mathbb{C}$$

Symmetries and periodicities

Parity

$\sin(z)$ is an odd function.

01.06.04.0002.01

$\sin(-z) = -\sin(z)$

Mirror symmetry

01.06.04.0003.01

$\sin(\bar{z}) = \overline{\sin(z)}$

Periodicity

$\sin(z)$ is a periodic function with period 2π.

01.06.04.0009.01

$\sin(z + 2\pi) = \sin(z)$

01.06.04.0004.01

$\sin(z + 2\pi m) = \sin(z) /; m \in \mathbb{Z}$

01.06.04.0005.01

$\sin(z + \pi m) = (-1)^m \sin(z) /; m \in \mathbb{Z}$

Poles and essential singularities

The function $\sin(z)$ has only one singular point at $z = \tilde{\infty}$. It is an essential singular point.

01.06.04.0006.01

$\mathcal{S}ing_z(\sin(z)) = \{\{\tilde{\infty}, \infty\}\}$

Branch points

The function $\sin(z)$ does not have branch points.

01.06.04.0007.01

$\mathcal{BP}_z(\sin(z)) = \{\}$

Branch cuts

The function $\sin(z)$ does not have branch cuts.

01.06.04.0008.01

$\mathcal{BC}_z(\sin(z)) = \{\}$

Series representations

Generalized power series

Expansions at $z = z_0$

For the function itself

01.06.06.0030.01

$$\sin(z) \propto \sin(z_0) + \cos(z_0)(z - z_0) - \frac{1}{2}\sin(z_0)(z - z_0)^2 + \ldots \;/;\; (z \to z_0)$$

01.06.06.0031.01

$$\sin(z) \propto \sin(z_0) + \cos(z_0)(z - z_0) - \frac{1}{2}\sin(z_0)(z - z_0)^2 + O\left((z - z_0)^3\right)$$

01.06.06.0032.01

$$\sin(z) = \sum_{k=0}^{\infty} \frac{1}{k!} \sin\left(\frac{\pi k}{2} + z_0\right)(z - z_0)^k$$

01.06.06.0033.01

$$\sin(z) = \frac{1}{2} i \left(e^{-i z_0}\, {}_0F_0(;\,; -i(z - z_0)) - e^{i z_0}\, {}_0F_0(;\,; i(z - z_0))\right)$$

01.06.06.0034.01

$$\sin(z) \propto \sin(z_0)(1 + O(z - z_0))$$

01.06.06.0035.01

$$\sin(z) = F_\infty(z, z_0) \;/;\; \left(\left(F_n(z, z_0) = \sum_{k=0}^{n} \frac{\sin\left(\frac{\pi k}{2} + z_0\right)(z - z_0)^k}{k!} = \frac{1}{2} i \left(e^{-i z} Q(n+1, -i(z - z_0)) - e^{i z} Q(n+1, i(z - z_0))\right)\right) \bigwedge n \in \mathbb{N}\right)$$

Summed form of the truncated series expansion.

Expansions at $z = 0$

For the function itself

01.06.06.0001.02

$$\sin(z) \propto z - \frac{z^3}{6} + \frac{z^5}{120} - \ldots \;/;\; (z \to 0)$$

01.06.06.0036.01

$$\sin(z) \propto z - \frac{z^3}{6} + \frac{z^5}{120} - O\left(z^7\right)$$

01.06.06.0002.01

$$\sin(z) = \sum_{k=0}^{\infty} \frac{(-1)^k z^{2k+1}}{(2k+1)!}$$

01.06.06.0003.01

$$\sin(z) = z\, {}_0F_1\left(;\, \frac{3}{2};\, -\frac{z^2}{4}\right)$$

01.06.06.0004.02

$$\sin(z) \propto z + O\left(z^3\right)$$

01.06.06.0037.01

$$\sin(z) = F_\infty(z) /; \left(\left(F_n(z) = z \sum_{k=0}^{n} \frac{(-1)^k z^{2k}}{(2k+1)!} = \sin(z) + \frac{(-1)^n z^{2n+3}}{(2n+3)!} {}_1F_2\left(1; n+2, n+\frac{5}{2}; -\frac{z^2}{4}\right)\right) \bigwedge n \in \mathbb{N}\right)$$

Summed form of the truncated series expansion.

For powers of the function

For the second power

01.06.06.0005.02

$$\sin^2(z) \propto z^2 - \frac{z^4}{3} + \frac{2z^6}{45} - \ldots /; (z \to 0)$$

01.06.06.0038.01

$$\sin^2(z) \propto z^2 - \frac{z^4}{3} + \frac{2z^6}{45} - O(z^8)$$

01.06.06.0006.01

$$\sin^2(z) = \sum_{k=1}^{\infty} \frac{(-1)^{k-1} 2^{2k-1} z^{2k}}{(2k)!}$$

01.06.06.0007.01

$$\sin^2(z) = z^2 {}_1F_2\left(1; 2, \frac{3}{2}; -z^2\right)$$

01.06.06.0039.01

$$\sin^2(z) \propto z^2 + O(z^4)$$

01.06.06.0040.01

$$\sin^2(z) = F_\infty(z) /; \left(\left(F_m(z) = \frac{1}{2} z^2 \sum_{j=0}^{m} \frac{(-1)^j 2^{2(j+1)} z^{2j}}{\Gamma(2j+3)} = \sin^2(z) + \frac{1}{2} \sqrt{\pi} z^4 (-z^2)^m {}_1\tilde{F}_2\left(1; m+\frac{5}{2}, m+3; -z^2\right)\right) \bigwedge m \in \mathbb{N}\right)$$

Summed form of the truncated series expansion.

For the third power

01.06.06.0008.02

$$\sin^3(z) \propto z^3 - \frac{z^5}{2} + \frac{13z^7}{120} - \ldots /; (z \to 0)$$

01.06.06.0041.01

$$\sin^3(z) \propto z^3 - \frac{z^5}{2} + \frac{13z^7}{120} - O(z^9)$$

01.06.06.0009.01

$$\sin^3(z) = \frac{1}{4} \sum_{k=1}^{\infty} \frac{(-1)^{k-1} (3^{2k+1} - 3) z^{2k+1}}{(2k+1)!}$$

01.06.06.0042.01

$$\sin^3(z) = \frac{3z}{4}\left({}_0F_1\left(;\frac{3}{2};-\frac{z^2}{4}\right) - {}_0F_1\left(;\frac{3}{2};-\frac{9}{4}z^2\right)\right)$$

01.06.06.0043.01

$$\sin^3(z) \propto z^3 + O(z^5)$$

01.06.06.0044.01

$$\sin^3(z) = F_\infty(z) /; \left(\left(F_m(z) = \frac{1}{4} z^3 \sum_{j=0}^{m} \frac{(-1)^j \left(-3 + 3^{2j+3}\right) z^{2j}}{(2j+3)!} = \sin^3(z) + \frac{3(-z)^m z^{m+5}}{4\,\Gamma(2m+6)} \left(9^{m+2}\,{}_1F_2\left(1; m+3, m+\frac{7}{2}; -\frac{9z^2}{4}\right) - {}_1F_2\left(1; m+3, m+\frac{7}{2}; -\frac{z^2}{4}\right)\right)\right) \bigwedge m \in \mathbb{N}\right)$$

Summed form of the truncated series expansion.

For symbolical integer power

01.06.06.0045.01

$$\sin^n(z) \propto z^n \left(1 - \left(\frac{2^{1-n}}{(n+2)!} \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n}{k} (n-2k)^{n+2}\right) z^2 + \left(\frac{2^{1-n}}{(n+4)!} \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n}{k} (n-2k)^{n+4}\right) z^4 + \ldots\right) /; (z \to 0) \bigwedge n \in \mathbb{N}^+$$

01.06.06.0046.01

$$\sin^n(z) \propto z^n \left(1 - \left(\frac{2^{1-n}}{(n+2)!} \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n}{k} (n-2k)^{n+2}\right) z^2 + \left(\frac{2^{1-n}}{(n+4)!} \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n}{k} (n-2k)^{n+4}\right) z^4 + O(z^6)\right) /; n \in \mathbb{N}^+$$

01.06.06.0047.01

$$\sin^n(z) = 2^{1-n} z^n \sum_{j=0}^{\infty} \left(\frac{(-1)^j}{(2j+n)!} \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n}{k} (n-2k)^{2j+n}\right) z^{2j} /; n \in \mathbb{N}^+$$

01.06.06.0048.01

$$\sin^n(z) = \frac{2^{1-n} z^n}{n!} \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n}{k} (n-2k)^n \,{}_1F_2\left(1; \frac{n+1}{2}, \frac{n}{2}+1; -\frac{(n-2k)^2 z^2}{4}\right) /; n \in \mathbb{N}^+$$

01.06.06.0049.01

$$\sin^n(z) \propto z^n\left(1 + O(z^2)\right) /; n \in \mathbb{N}^+$$

01.06.06.0050.01

$$\sin^n(z) \propto F_\infty(z) /; \left(\left(F_m(z) == 2^{1-n} z^n \sum_{j=0}^{m} \left(\frac{(-1)^j}{(2j+n)!} \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n}{k} (n-2k)^{2j+n} \right) z^{2j} == 2^{1-n} z^n \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n}{k} (n-2k)^n \left(\frac{1}{n!} \, {}_1F_2\left(1; \frac{n}{2} + \frac{1}{2}, \frac{n}{2} + 1; -\frac{(n-2k)^2 z^2}{4}\right) - \frac{\left(-(n-2k)^2 z^2\right)^{m+1}}{\Gamma(2m+n+3)} \, {}_1F_2\left(1; \frac{n+3}{2} + m, m + \frac{n}{2} + 2; -\frac{(n-2k)^2 z^2}{4}\right)\right)\right) \bigwedge m \in \mathbb{N} \bigwedge n \in \mathbb{N}^+\right)$$

Summed form of the truncated series expansion.

For symbolical power

01.06.06.0051.01

$$\sin^a(z) == e^{2 i a \pi \left\lfloor \frac{1}{2} - \frac{\arg\left(\frac{\sin(z)}{z}\right)}{2\pi} - \frac{\arg(z)}{2\pi} \right\rfloor} a z^a \sum_{k=0}^{\infty} \binom{k-a}{k} \sum_{j=0}^{k} \frac{(-1)^j}{a-j} \binom{k}{j} p_{j,k} z^k /;$$

$$p_{j,0} == 1 \bigwedge p_{j,k} == \frac{1}{k} \sum_{m=1}^{k} \frac{(jm + m - k)\left(-m + 2\left\lfloor \frac{m}{2} \right\rfloor + 1\right)(-1)^{m/2} p_{j,k-m}}{(m+1)!} \bigwedge k \in \mathbb{N}^+$$

01.06.06.0052.01

$$\left(z^\beta \sin(z)\right)^a == e^{2 i a \pi \left\lfloor \frac{1}{2} - \frac{\arg\left(\frac{\sin(z)}{z}\right)}{2\pi} - \frac{\operatorname{Im}((\beta+1)\log(z))}{2\pi} \right\rfloor} a z^{(\beta+1)a} \sum_{k=0}^{\infty} \binom{k-a}{k} \sum_{j=0}^{k} \frac{(-1)^j}{a-j} \binom{k}{j} p_{j,k} z^k /;$$

$$p_{j,0} == 1 \bigwedge p_{j,k} == \frac{1}{k} \sum_{m=1}^{k} \frac{(jm + m - k)\left(-m + 2\left\lfloor \frac{m}{2} \right\rfloor + 1\right)(-1)^{m/2} p_{j,k-m}}{(m+1)!} \bigwedge k \in \mathbb{N}^+$$

Expansions at $z == \frac{\pi}{2}$

For the function itself

01.06.06.0010.02

$$\sin(z) \propto 1 - \frac{1}{2}\left(z - \frac{\pi}{2}\right)^2 + \frac{1}{24}\left(z - \frac{\pi}{2}\right)^4 - \ldots /; \left(z \to \frac{\pi}{2}\right)$$

01.06.06.0053.01

$$\sin(z) \propto 1 - \frac{1}{2}\left(z - \frac{\pi}{2}\right)^2 + \frac{1}{24}\left(z - \frac{\pi}{2}\right)^4 - O\left(\left(z - \frac{\pi}{2}\right)^6\right)$$

01.06.06.0011.01

$$\sin(z) == \sum_{k=0}^{\infty} \frac{(-1)^k}{(2k)!} \left(z - \frac{\pi}{2}\right)^{2k}$$

01.06.06.0012.01

$$\sin(z) = {}_0F_1\left(;\frac{1}{2};-\frac{1}{4}\left(z-\frac{\pi}{2}\right)^2\right)$$

01.06.06.0013.02

$$\sin(z) \propto 1 + O\left(\left(z-\frac{\pi}{2}\right)^2\right)$$

01.06.06.0054.01

$$\sin(z) = F_\infty(z) \,/;$$
$$\left(\left(F_n(z) = \sum_{k=0}^{n} \frac{(-1)^k}{(2k)!}\left(z-\frac{\pi}{2}\right)^{2k} = \sin(z) + \frac{(-1)^n\sqrt{\pi}}{2^{2n+2}}\left(z-\frac{\pi}{2}\right)^{2+2n} {}_1\tilde{F}_2\left(1; n+\frac{3}{2}, n+2; -\frac{1}{4}\left(z-\frac{\pi}{2}\right)^2\right)\right) \bigwedge n \in \mathbb{N}\right)$$

Summed form of the truncated series expansion.

For powers of the function

For the second power

01.06.06.0014.02

$$\sin^2(z) \propto 1 - \left(z-\frac{\pi}{2}\right)^2 + \frac{1}{3}\left(z-\frac{\pi}{2}\right)^4 - \ldots \,/;\, \left(z \to \frac{\pi}{2}\right)$$

01.06.06.0055.01

$$\sin^2(z) \propto 1 - \left(z-\frac{\pi}{2}\right)^2 + \frac{1}{3}\left(z-\frac{\pi}{2}\right)^4 - O\left(\left(z-\frac{\pi}{2}\right)^6\right)$$

01.06.06.0015.01

$$\sin^2(z) = 1 + \sum_{k=1}^{\infty} \frac{(-1)^k\, 2^{2k-1}}{(2k)!}\left(z-\frac{\pi}{2}\right)^{2k}$$

01.06.06.0016.01

$$\sin^2(z) = \frac{1}{2}\,{}_0F_1\left(;\frac{1}{2};-\left(z-\frac{\pi}{2}\right)^2\right) + \frac{1}{2}$$

01.06.06.0056.01

$$\sin^2(z) \propto 1 + O\left(\left(z-\frac{\pi}{2}\right)^2\right)$$

01.06.06.0057.01

$$\sin^2(z) = F_\infty(z) \,/;$$
$$\left(\left(F_m(z) = 1 + \frac{1}{2}\sum_{j=1}^{m} \frac{(-1)^j\, 2^{2j}}{(2j)!}\left(z-\frac{\pi}{2}\right)^{2j} = \sin^2(z) + \frac{(-1)^m\sqrt{\pi}}{2}\left(z-\frac{\pi}{2}\right)^{2+2m} {}_1\tilde{F}_2\left(1; m+\frac{3}{2}, m+2; -\left(z-\frac{\pi}{2}\right)^2\right)\right) \bigwedge m \in \mathbb{N}\right)$$

Summed form of the truncated series expansion.

For the third power

01.06.06.0017.02

$$\sin^3(z) \propto 1 - \frac{3}{2}\left(z - \frac{\pi}{2}\right)^2 + \frac{7}{8}\left(z - \frac{\pi}{2}\right)^4 - \ldots /; \left(z \to \frac{\pi}{2}\right)$$

01.06.06.0058.01

$$\sin^3(z) \propto 1 - \frac{3}{2}\left(z - \frac{\pi}{2}\right)^2 + \frac{7}{8}\left(z - \frac{\pi}{2}\right)^4 - O\left(\left(z - \frac{\pi}{2}\right)^6\right)$$

01.06.06.0018.01

$$\sin^3(z) = \frac{1}{4}\sum_{k=0}^{\infty} \frac{(-1)^k \left(3^{2k} + 3\right)}{(2k)!}\left(z - \frac{\pi}{2}\right)^{2k}$$

01.06.06.0059.01

$$\sin^3(z) = \frac{3}{4}\, {}_0F_1\left(; \frac{1}{2}; -\frac{1}{4}\left(z - \frac{\pi}{2}\right)^2\right) + \frac{1}{4}\, {}_0F_1\left(; \frac{1}{2}; -\frac{9}{4}\left(z - \frac{\pi}{2}\right)^2\right)$$

01.06.06.0060.01

$$\sin^3(z) \propto 1 + O\left(\left(z - \frac{\pi}{2}\right)^2\right)$$

01.06.06.0061.01

$$\sin^3(z) = F_\infty(z) /; \left(\left(F_m(z) = 1 + \frac{1}{4}\sum_{j=1}^{m} \frac{(-1)^j \left(3 + 3^{2j}\right)}{(2j)!}\left(z - \frac{\pi}{2}\right)^{2j} = \sin^3(z) + (-1)^m\, 2^{-2m-4} \sqrt{\pi} \left(z - \frac{\pi}{2}\right)^{2+2m} \left(3\, {}_1\tilde{F}_2\left(1; m + \frac{3}{2}, m + 2; -\frac{1}{4}\left(z - \frac{\pi}{2}\right)^2\right) + 3^{2m+2}\, {}_1\tilde{F}_2\left(1; m + \frac{3}{2}, m + 2; -\frac{9}{4}\left(z - \frac{\pi}{2}\right)^2\right)\right)\right) \bigwedge m \in \mathbb{N}\right)$$

Summed form of the truncated series expansion.

For symbolical integer power

01.06.06.0062.01

$$\sin^n(z) \propto 1 + \frac{1}{2^{n+2}}\left((1 + (-1)^n)\binom{n}{\lfloor \frac{n}{2} \rfloor}\left(n - 2\left\lfloor \frac{n}{2} \right\rfloor\right)^2 - 2^{n+1} n\right)\left(z - \frac{\pi}{2}\right)^2 + \frac{1}{3\, 2^{n+4}}\left(2^{n+1} n (3n - 2) - (1 + (-1)^n)\binom{n}{\lfloor \frac{n}{2} \rfloor}\left(n - 2\left\lfloor \frac{n}{2} \right\rfloor\right)^4\right)\left(z - \frac{\pi}{2}\right)^4 + \ldots /; \left(z \to \frac{\pi}{2}\right) \bigwedge n \in \mathbb{N}^+$$

01.06.06.0063.01

$$\sin^n(z) \propto 1 + \frac{1}{2^{n+2}}\left((1 + (-1)^n)\binom{n}{\lfloor \frac{n}{2} \rfloor}\left(n - 2\left\lfloor \frac{n}{2} \right\rfloor\right)^2 - 2^{n+1} n\right)\left(z - \frac{\pi}{2}\right)^2 + \frac{1}{3\, 2^{n+4}}\left(2^{n+1} n (3n - 2) - (1 + (-1)^n)\binom{n}{\lfloor \frac{n}{2} \rfloor}\left(n - 2\left\lfloor \frac{n}{2} \right\rfloor\right)^4\right)\left(z - \frac{\pi}{2}\right)^4 + O\left(\left(z - \frac{\pi}{2}\right)^6\right) /; n \in \mathbb{N}^+$$

01.06.06.0064.01

$$\sin^n(z) = 1 + 2^{1-n} \sum_{j=1}^{\infty}\left(\frac{(-1)^j}{(2j)!} \sum_{k=0}^{\lfloor \frac{n-1}{2} \rfloor} \binom{n}{k} (n - 2k)^{2j}\right)\left(z - \frac{\pi}{2}\right)^{2j} /; n \in \mathbb{N}^+$$

01.06.06.0065.01

$$\sin^n(z) = 2^{-n}\binom{n}{\frac{n}{2}}(1 - n \bmod 2) + 2^{1-n}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}\binom{n}{k}\,{}_0F_1\left(;\frac{1}{2};-\frac{(n-2k)^2}{4}\left(z-\frac{\pi}{2}\right)^2\right) /; n \in \mathbb{N}^+$$

01.06.06.0066.01

$$\sin^n(z) \propto 1 + O\left(\left(z-\frac{\pi}{2}\right)^2\right) /; n \in \mathbb{N}^+$$

01.06.06.0067.01

$$\sin^n(z) = F_\infty(z) /; \left(\left(F_m(z) = 1 + 2^{1-n}\sum_{j=1}^{m}\frac{1}{(2j)!}\left((-1)^j\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}\binom{n}{k}(n-2k)^{2j}\right)\left(z-\frac{\pi}{2}\right)^{2j} = \sin^n(z) + \frac{(-1)^m\sqrt{\pi}}{2^{2m+n+1}}\left(z-\frac{\pi}{2}\right)^{2+2m}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}\binom{n}{k}(n-2k)^{2m+2}\,{}_1\tilde{F}_2\left(1; m+\frac{3}{2}, m+2; -\frac{(n-2k)^2}{4}\left(z-\frac{\pi}{2}\right)^2\right)\right) \bigwedge m \in \mathbb{N} \bigwedge n \in \mathbb{N}^+\right)$$

Summed form of the truncated series expansion.

q-series

01.06.06.0019.01

$$\sin(z) = \frac{1}{2i}\left(q - \frac{1}{q}\right) /; q = e^{i\pi z}$$

Exponential Fourier series

01.06.06.0020.01

$$\sin(a x) = -\frac{2\sin(a\pi)}{\pi}\sum_{k=1}^{\infty}\frac{(-1)^k k\sin(k x)}{k^2 - a^2} /; a \notin \mathbb{Z} \bigwedge -\pi < x < \pi$$

Asymptotic series expansions

01.06.06.0021.01

$$\sin(z) \propto \sin(z) /; (|z| \to \infty)$$

01.06.06.0022.01

$$\sin(z) \propto \frac{i}{2} e^{-iz} /; \left(z \to e^{i\phi}\infty\right) \bigwedge 0 < \phi < \pi$$

01.06.06.0023.01

$$\sin(z) \propto -\frac{i}{2} e^{iz} /; \left(z \to e^{i\phi}\infty\right) \bigwedge -\pi < \phi < 0$$

01.06.06.0068.01

$$\sin(z) \propto \begin{cases} -\frac{i}{2} e^{iz} & -\pi < \arg(z) < 0 \\ \frac{1}{2} i\, e^{-iz} & 0 < \arg(z) < \pi \\ \sin(z) & \text{True} \end{cases} /; (|z| \to \infty)$$

Other series representations

01.06.06.0025.01

$$\sin(z) = \pi \sum_{k=0}^{\infty} (-1)^k \left(2k + \frac{z}{\pi}\right) \left(\frac{1}{k!} \left(\frac{z}{\pi}\right)_k\right)^3$$

01.06.06.0026.01

$$\sin(z) = 2 \sum_{k=0}^{\infty} (-1)^k J_{2k+1}(z)$$

01.06.06.0027.01

$$\frac{\sin(n z)}{\sin(z)} = \sum_{j=0}^{n} \prod_{\substack{k=1 \\ k \neq j}}^{n} \frac{\sin(z + \theta_j - \theta_k)}{\sin(\theta_j - \theta_k)} /; n \in \mathbb{N} \bigwedge \theta_j \neq \theta_k$$

01.06.06.0028.01

$$\log\left(\frac{\sin(z)}{z}\right) = \sum_{k=1}^{\infty} \frac{(-1)^k 2^{2k-1} B_{2k} z^{2k}}{k (2k)!} /; 1.780467 < |z| \leq \pi$$

01.06.06.0029.01

$$\sin(z) = z \left(\sum_{k=n}^{\infty} (-1)^{k-n} \binom{2k}{k-n} \binom{k - n - \frac{z}{c\pi} + 1}{2k+1} - \sum_{k=n-1}^{\infty} (-1)^{k-n} \binom{2k}{k-n+1} \binom{k + n + \frac{z}{c\pi}}{2k+1} \right) /; n \in \mathbb{Z}$$

Everett series

Residue representations

01.06.06.0024.01

$$\sin(z) = \frac{\sqrt{\pi}}{2} z \sum_{j=0}^{\infty} \text{res}_s \left(\frac{\left(\frac{z^2}{4}\right)^{-s}}{\Gamma\left(\frac{3}{2} - s\right)} \Gamma(s) \right) (-j)$$

Dual Taylor series representations

01.06.06.0069.01

$$\sin(x) \theta(x) \propto \sum_{k=0}^{\infty} (-1)^k \frac{\partial^{2k} \delta(x)}{\partial x^{2k}}$$

01.06.06.0070.01

$$\sin(\lambda x) \theta(x) \propto \sum_{k=0}^{\infty} (-1)^k \frac{\partial^{2k} \delta(x)}{\partial x^{2k}} \lambda^{-1-2k} /; (\lambda \to \infty)$$

Integral representations

On the real axis

Of the direct function

01.06.07.0001.01

$$\sin(z) = z \int_0^1 \cos(z t) \, dt$$

Contour integral representations

01.06.07.0002.01

$$\sin(z) = \frac{\sqrt{\pi}\, z}{2} \frac{1}{2\pi i} \int_{\gamma-i\infty}^{\gamma+i\infty} e^{s-\frac{z^2}{4s}} s^{-\frac{3}{2}} \, ds \,/;\, \gamma > 0$$

01.06.07.0003.01

$$\sin(x) = \frac{\sqrt{\pi}}{2\pi i} \int_{\gamma-i\infty}^{\gamma+i\infty} \frac{\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)} \left(\frac{x}{2}\right)^{-2s+1} ds \,/;\, 0 < \gamma < 1 \bigwedge x > 0$$

01.06.07.0004.01

$$\sin(z) = \frac{\sqrt{\pi}\, z}{4 i} \int_{\mathcal{L}} \frac{\Gamma(s)}{\Gamma\left(s+\frac{1}{2}\right) \Gamma\left(\frac{1}{2}-s\right) \Gamma\left(\frac{3}{2}-s\right)} \left(-\frac{z^2}{4}\right)^{-s} ds$$

Product representations

01.06.08.0001.01

$$\sin(z) = z \prod_{k=1}^{\infty} \left(1 - \frac{z^2}{\pi^2 k^2}\right)$$

01.06.08.0002.01

$$\sin(z) = z \prod_{\substack{k=-\infty \\ k\neq 0}}^{\infty} \left(1 - \frac{z}{\pi k}\right) e^{\frac{z}{\pi k}}$$

01.06.08.0003.01

$$\sin(z) = z \prod_{k=1}^{\infty} \cos\left(\frac{z}{2^k}\right) /;\, |z| < 1$$

01.06.08.0004.01

$$\sin(z) = z \prod_{k=1}^{\infty} \left(1 - \frac{4}{3} \sin^2\left(\frac{z}{3^k}\right)\right)$$

Limit representations

01.06.09.0001.01

$$\sin(z) = \frac{\sqrt{\pi}}{2} \lim_{n\to\infty} \frac{(-1)^n}{4^n\, n!} H_{2n+1}\left(\frac{z}{2\sqrt{n}}\right)$$

01.06.09.0002.01

$$\sin(z) = \lim_{n\to\infty} \frac{(-1)^n \pi^{2n+1}}{4\,(2n)!} E_{2n}\left(\frac{z}{\pi}\right)$$

01.06.09.0003.01

$$\sin(z) = \lim_{a\to\infty} \operatorname{Se}\left(a, q, \frac{z}{\sqrt{a}}\right) /;\, q \in \mathbb{R}$$

01.06.09.0004.01

$$\sin(z) == -\lim_{a\to\infty} \frac{1}{\sqrt{a}} \operatorname{Ce}'\left(a, q, \frac{z}{\sqrt{a}}\right) /; q \in \mathbb{R}$$

01.06.09.0005.01

$$\sin(z) == -\pi \lim_{n\to\infty} \frac{1}{\log(n)} \sum_{k=1}^{n} \frac{\mu(k)}{k} \log\left(\frac{n}{k}\right) \operatorname{frac}\left(\frac{k z}{2 \pi}\right)$$

Differential equations

Ordinary linear differential equations and wronskians

For the direct function itself

01.06.13.0001.01

$$w''(z) + w(z) == 0 /; w(z) == \sin(z) \bigwedge w(0) == 0 \bigwedge w'(0) == 1$$

01.06.13.0002.01

$$w''(z) + w(z) == 0 /; w(z) == c_1 \cos(z) + c_2 \sin(z)$$

01.06.13.0003.01

$$W_z(\cos(z), \sin(z)) == 1$$

01.06.13.0004.01

$$w''(z) + a\, w(z) + b == 0 /; w(z) == -\frac{b}{a} + c_1 \cos\left(\sqrt{a}\, z\right) + c_2 \sin\left(\sqrt{a}\, z\right)$$

01.06.13.0005.01

$$W_z\left(\cos\left(\sqrt{a}\, z\right), \sin\left(\sqrt{a}\, z\right)\right) == \sqrt{a}$$

01.06.13.0007.01

$$w''(z) - \frac{g''(z)}{g'(z)} w'(z) + g'(z)^2 w(z) = 0 /; w(z) = c_1 \cos(g(z)) + c_2 \sin(g(z))$$

01.06.13.0008.01

$$W_z(\cos(g(z)), \sin(g(z))) == g'(z)$$

01.06.13.0009.01

$$w''(z) - \left(\frac{2 h'(z)}{h(z)} + \frac{g''(z)}{g'(z)}\right) w'(z) + \left(g'(z)^2 + \frac{2 h'(z)^2}{h(z)^2} + \frac{h'(z) g''(z)}{h(z) g'(z)} - \frac{h''(z)}{h(z)}\right) w(z) = 0 /; w(z) = c_1 h(z) \cos(g(z)) + c_2 h(z) \sin(g(z))$$

01.06.13.0010.01

$$W_z(h(z) \cos(g(z)), h(z) \sin(g(z))) == h(z)^2 g'(z)$$

01.06.13.0011.01

$$z^2 w''(z) - (r + 2 s - 1) z\, w'(z) + \left(a^2 r^2 z^{2 r} + s (r + s)\right) w(z) = 0 /; w(z) = c_1 z^s \cos(a z^r) + c_2 z^s \sin(a z^r)$$

01.06.13.0012.01

$$W_z(z^s \cos(a z^r), z^s \sin(a z^r)) == a\, r\, z^{r+2 s-1}$$

01.06.13.0013.01

$$w''(z) - (\log(r) + 2 \log(s)) w'(z) + \left(a^2 \log^2(r) r^{2 z} + \log(s) (\log(r) + \log(s))\right) w(z) = 0 /; w(z) = c_1 s^z \cos(a r^z) + c_2 s^z \sin(a r^z)$$

01.06.13.0014.01

$$W_z(s^z \cos(a r^z), s^z \sin(a r^z)) == a\, r^z s^{2 z} \log(r)$$

Ordinary nonlinear differential equations

01.06.13.0006.02

$$w'(z) - \sqrt{1 - (w(z))^2} = 0 \text{ /; } w(z) = \sin(z) \bigwedge w(0) = 0 \bigwedge |\mathrm{Re}(z)| < \frac{\pi}{2}$$

Transformations

Transformations and argument simplifications

Argument involving basic arithmetic operations

01.06.16.0001.01

$$\sin(-z) = -\sin(z)$$

01.06.16.0002.01

$$\sin\left(a\,(b\,z^c)^m\right) = \frac{(b\,z^c)^m}{b^m\,z^{m\,c}} \sin(a\,b^m\,z^{m\,c}) \text{ /; } 2\,m \in \mathbb{Z}$$

01.06.16.0003.01

$$\sin\left(\sqrt{z^2}\right) = \frac{\sqrt{z^2}}{z} \sin(z)$$

Argument involving inverse trigonometric and hyperbolic functions

Involving $\sin^{-1}$

01.06.16.0004.01

$$\sin\left(\sin^{-1}(z)\right) = z$$

01.06.16.0017.01

$$\sin\left(\frac{1}{2}\sin^{-1}(z)\right) = \frac{z\sqrt{1 - \sqrt{1 - z^2}}}{\sqrt{2}\,\sqrt{z^2}}$$

01.06.16.0128.01

$$\sin\left(i \sin^{-1}(z)\right) = -\frac{1}{2}\,i\left(i\,z + \sqrt{1 - z^2}\right)^{-i}\left(\left(i\,z + \sqrt{1 - z^2}\right)^{2\,i} - 1\right)$$

01.06.16.0129.01

$$\sin\left(a \sin^{-1}(z)\right) = -\frac{1}{2}\,i\left(i\,z + \sqrt{1 - z^2}\right)^{-a}\left(\left(i\,z + \sqrt{1 - z^2}\right)^{2\,a} - 1\right)$$

01.06.16.0029.01

$$\sin\left(n \sin^{-1}(z)\right) = z \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n-k-1}{k} 2^{n-2\,k-1} \left(1 - z^2\right)^{\frac{n-1}{2}-k} \text{ /; } n \in \mathbb{N}^+$$

01.06.16.0030.01

$$\sin\left(n \sin^{-1}(z)\right) = z\,U_{n-1}\left(\sqrt{1 - z^2}\right)$$

01.06.16.0056.01

$$\sin\left(\frac{n}{2}\sin^{-1}(z)\right) == z\left(\sqrt{1-z^2}+1\right)^{\frac{n}{2}-1}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{n/2-k-1}\left(\frac{1-\sqrt{1-z^2}}{z^2}\right)^k /; n\in\mathbb{N}^+$$

01.06.16.0057.01

$$\sin\left(\frac{n}{2}\sin^{-1}(z)\right) == \frac{z\sqrt{1-\sqrt{1-z^2}}}{\sqrt{2}\sqrt{z^2}}U_{n-1}\left(\frac{\sqrt{\sqrt{1-z^2}+1}}{\sqrt{2}}\right) /; n\in\mathbb{N}^+$$

Involving $\cos^{-1}$

01.06.16.0005.01

$$\sin\left(\cos^{-1}(z)\right) == \sqrt{1-z^2}$$

01.06.16.0018.01

$$\sin\left(\frac{1}{2}\cos^{-1}(z)\right) == \frac{\sqrt{1-z}}{\sqrt{2}}$$

01.06.16.0130.01

$$\sin\left(i\cos^{-1}(z)\right) = \frac{1}{2}\,i\,e^{-\frac{\pi}{2}}\left(i\,z+\sqrt{1-z^2}\right)^{-i}\left(e^{\pi}\left(i\,z+\sqrt{1-z^2}\right)^{2i}-1\right)$$

01.06.16.0131.01

$$\sin\left(a\cos^{-1}(z)\right) = -\frac{1}{2}\,i\,e^{-\frac{1}{2}i\,a\,\pi}\left(i\,z+\sqrt{1-z^2}\right)^{a}\left(e^{i\,a\,\pi}\left(i\,z+\sqrt{1-z^2}\right)^{-2a}-1\right)$$

01.06.16.0031.01

$$\sin\left(n\cos^{-1}(z)\right) == \sqrt{1-z^2}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{n-2k-1}z^{n-2k-1} /; n\in\mathbb{N}^+$$

01.06.16.0032.01

$$\sin\left(n\cos^{-1}(z)\right) == \sqrt{1-z^2}\;U_{n-1}(z)$$

01.06.16.0058.01

$$\sin\left(\frac{n}{2}\cos^{-1}(z)\right) == \sqrt{1-z}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{n/2-k-1}(z+1)^{\frac{n-1}{2}-k} /; n\in\mathbb{N}^+$$

01.06.16.0059.01

$$\sin\left(\frac{n}{2}\cos^{-1}(z)\right) == \frac{\sqrt{1-z}}{\sqrt{2}}U_{n-1}\left(\frac{\sqrt{z+1}}{\sqrt{2}}\right) /; n\in\mathbb{N}^+$$

Involving $\tan^{-1}$

01.06.16.0006.01

$$\sin(\tan^{-1}(z)) = \frac{z}{\sqrt{1+z^2}}$$

01.06.16.0007.01

$$\sin(\tan^{-1}(x, y)) = \frac{y}{\sqrt{x^2+y^2}}$$

01.06.16.0019.01

$$\sin\left(\frac{1}{2}\tan^{-1}(z)\right) = \frac{z}{\sqrt{2}\sqrt{z^2}}\sqrt{1-\frac{1}{\sqrt{z^2+1}}}$$

01.06.16.0132.01

$$\sin\left(\frac{1}{2}\tan^{-1}(x, y)\right) = \frac{i\left(1-\frac{x+i\,y}{\sqrt{x^2+y^2}}\right)}{2\sqrt{\frac{x+i\,y}{\sqrt{x^2+y^2}}}}$$

01.06.16.0133.01

$$\sin(i\tan^{-1}(z)) = \frac{1}{2}\,i\left((1-i\,z)^i-(i\,z+1)^i\right)\left(z^2+1\right)^{-\frac{i}{2}}$$

01.06.16.0134.01

$$\sin(i\tan^{-1}(x, y)) = -\frac{1}{2}\,i\left(\frac{x+i\,y}{\sqrt{x^2+y^2}}\right)^{-i}\left(\left(\frac{x+i\,y}{\sqrt{x^2+y^2}}\right)^{2i}-1\right)$$

01.06.16.0135.01

$$\sin(a\tan^{-1}(z)) = \frac{1}{2}\,i\left((1-i\,z)^a-(i\,z+1)^a\right)\left(z^2+1\right)^{-\frac{a}{2}}$$

01.06.16.0136.01

$$\sin(a\tan^{-1}(x, y)) = -\frac{1}{2}\,i\left(\frac{x+i\,y}{\sqrt{x^2+y^2}}\right)^{-a}\left(\left(\frac{x+i\,y}{\sqrt{x^2+y^2}}\right)^{2a}-1\right)$$

01.06.16.0033.01

$$\sin(n\tan^{-1}(z)) = \left(z^2+1\right)^{-\frac{n}{2}}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n}{2k+1}z^{2k+1}\;/;\; n\in\mathbb{N}^+$$

01.06.16.0034.01

$$\sin(n\tan^{-1}(z)) = \frac{z}{\sqrt{z^2+1}}\,U_{n-1}\left(\frac{1}{\sqrt{z^2+1}}\right)\;/;\; n\in\mathbb{N}^+$$

01.06.16.0137.01

$$\sin(i\tan^{-1}(x, y)) = -\frac{1}{2}\,i\left(\frac{x+i\,y}{\sqrt{x^2+y^2}}\right)^{-i}\left(\left(\frac{x+i\,y}{\sqrt{x^2+y^2}}\right)^{2i}-1\right)$$

01.06.16.0138.01

$$\sin\left(a\tan^{-1}(x,y)\right) = -\frac{1}{2}\,i\left(\frac{x+i\,y}{\sqrt{x^2+y^2}}\right)^{-a}\left(\left(\frac{x+i\,y}{\sqrt{x^2+y^2}}\right)^{2a}-1\right)$$

01.06.16.0035.01

$$\sin\left(n\tan^{-1}(x,y)\right) = \frac{x^{n-1}\,y}{\left(x^2+y^2\right)^{n/2}}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{n-2k-1}\left(\frac{x^2+y^2}{x^2}\right)^k\;/;\;n\in\mathbb{N}^+$$

01.06.16.0036.01

$$\sin\left(n\tan^{-1}(x,y)\right) = \frac{y}{\sqrt{x^2+y^2}}\,U_{n-1}\left(\frac{x}{\sqrt{x^2+y^2}}\right)$$

01.06.16.0060.01

$$\sin\left(\frac{n}{2}\tan^{-1}(z)\right) = \frac{z}{\sqrt{z^2+1}}\left(1+\frac{1}{\sqrt{z^2+1}}\right)^{\frac{n}{2}-1}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{\frac{n}{2}-k-1}\left(\frac{\sqrt{z^2+1}}{\sqrt{z^2+1}+1}\right)^k\;/;\;n\in\mathbb{N}^+$$

01.06.16.0061.01

$$\sin\left(\frac{n}{2}\tan^{-1}(z)\right) = \frac{z}{\sqrt{2}\,\sqrt{z^2}}\sqrt{1-\frac{1}{\sqrt{z^2+1}}}\;U_{n-1}\left(\frac{1}{\sqrt{2}}\sqrt{1+\frac{1}{\sqrt{z^2+1}}}\right)\;/;\;n\in\mathbb{N}^+$$

Involving $\cot^{-1}$

01.06.16.0008.01

$$\sin\left(\cot^{-1}(z)\right) = \frac{\sqrt{-z}}{\sqrt{z}\,\sqrt{-1-z^2}}$$

01.06.16.0020.01

$$\sin\left(\frac{1}{2}\cot^{-1}(z)\right) = \frac{z}{\sqrt{2}}\sqrt{\frac{1}{z^2}}\sqrt{1-\frac{1}{\sqrt{1+\frac{1}{z^2}}}}$$

01.06.16.0139.01

$$\sin\left(i\cot^{-1}(z)\right) = \frac{1}{2}\,i\left(1+\frac{1}{z^2}\right)^{-\frac{i}{2}}\left(\left(\frac{-i+z}{z}\right)^{i}-\left(\frac{i+z}{z}\right)^{i}\right)$$

01.06.16.0140.01

$$\sin\left(a\cot^{-1}(z)\right) = \frac{1}{2}\,i\left(1+\frac{1}{z^2}\right)^{-\frac{a}{2}}\left(\left(\frac{-i+z}{z}\right)^{a}-\left(\frac{i+z}{z}\right)^{a}\right)$$

01.06.16.0037.01

$$\sin\left(n\cot^{-1}(z)\right) = \left(1+\frac{1}{z^2}\right)^{-\frac{n}{2}}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n}{2k+1}z^{-2k-1}\;/;\;n\in\mathbb{N}^+$$

01.06.16.0038.01

$$\sin\left(n\cot^{-1}(z)\right) = \frac{\sqrt{-z}}{\sqrt{z}\,\sqrt{-z^2-1}}\,U_{n-1}\left(\frac{\sqrt{-z^2}}{\sqrt{-z^2-1}}\right) /;\, n\in\mathbb{N}^+$$

01.06.16.0062.01

$$\sin\left(\frac{n}{2}\cot^{-1}(z)\right) = \frac{1}{z\sqrt{1+\frac{1}{z^2}}}\left(\frac{\sqrt{-z^2}}{\sqrt{-z^2-1}}+1\right)^{\frac{n}{2}-1}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{\frac{n}{2}-k-1}\left(1-\left(\sqrt{1+\frac{1}{z^2}}-1\right)z^2\right)^k /;\, n\in\mathbb{N}^+$$

01.06.16.0063.01

$$\sin\left(\frac{n}{2}\cot^{-1}(z)\right) = \frac{z}{\sqrt{2}}\sqrt{\frac{1}{z^2}}\sqrt{1-\frac{\sqrt{-z^2}}{\sqrt{-z^2-1}}}\,U_{n-1}\left(\frac{1}{\sqrt{2}}\sqrt{\frac{\sqrt{-z^2}}{\sqrt{-z^2-1}}+1}\right) /;\, n\in\mathbb{N}^+$$

Involving $\csc^{-1}$

01.06.16.0009.01

$$\sin\left(\csc^{-1}(z)\right) = \frac{1}{z}$$

01.06.16.0021.01

$$\sin\left(\frac{1}{2}\csc^{-1}(z)\right) = \frac{z}{\sqrt{2}}\sqrt{\frac{1}{z^2}}\sqrt{1-\sqrt{1-\frac{1}{z^2}}}$$

01.06.16.0141.01

$$\sin\left(i\csc^{-1}(z)\right) = -\frac{1}{2}i\left(\left(\sqrt{1-\frac{1}{z^2}}+\frac{i}{z}\right)^{2i}-1\right)\left(\sqrt{1-\frac{1}{z^2}}+\frac{i}{z}\right)^{-i}$$

01.06.16.0142.01

$$\sin\left(a\csc^{-1}(z)\right) = -\frac{1}{2}i\left(\left(\sqrt{1-\frac{1}{z^2}}+\frac{i}{z}\right)^{2a}-1\right)\left(\sqrt{1-\frac{1}{z^2}}+\frac{i}{z}\right)^{-a}$$

01.06.16.0039.01

$$\sin\left(n\csc^{-1}(z)\right) = \frac{1}{z}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{n-2k-1}\left(1-\frac{1}{z^2}\right)^{\frac{n-1}{2}-k} /;\, n\in\mathbb{N}^+$$

01.06.16.0040.01

$$\sin\left(n\csc^{-1}(z)\right) = \frac{1}{z}\,U_{n-1}\left(\sqrt{1-\frac{1}{z^2}}\right) /;\, n\in\mathbb{N}^+$$

01.06.16.0064.01

$$\sin\left(\frac{n}{2}\csc^{-1}(z)\right) = \frac{1}{z}\left(\frac{\sqrt{z^2-1}}{\sqrt{z^2}}+1\right)^{\frac{n}{2}-1}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{\frac{n}{2}-k-1}\left(z^2-\sqrt{z^2}\sqrt{z^2-1}\right)^k \;/;\; n\in\mathbb{N}^+$$

01.06.16.0065.01

$$\sin\left(\frac{n}{2}\csc^{-1}(z)\right) = \frac{z}{\sqrt{2}}\sqrt{\frac{1}{z^2}}\sqrt{1-\sqrt{1-\frac{1}{z^2}}}\;U_{n-1}\left(\frac{1}{\sqrt{2}}\sqrt{\sqrt{1-\frac{1}{z^2}}+1}\right) \;/;\; n\in\mathbb{N}^+$$

Involving $\sec^{-1}$

01.06.16.0010.01

$$\sin\left(\sec^{-1}(z)\right) = \sqrt{1-\frac{1}{z^2}}$$

01.06.16.0022.01

$$\sin\left(\frac{1}{2}\sec^{-1}(z)\right) = \frac{\sqrt{z-1}}{\sqrt{2\,z}}$$

01.06.16.0143.01

$$\sin\left(i\sec^{-1}(z)\right) = \frac{1}{2}\,i\,e^{-\frac{\pi}{2}}\left(e^{\pi}\left(\sqrt{1-\frac{1}{z^2}}+\frac{i}{z}\right)^{2i}-1\right)\left(\sqrt{1-\frac{1}{z^2}}+\frac{i}{z}\right)^{-i}$$

01.06.16.0144.01

$$\sin\left(a\sec^{-1}(z)\right) = -\frac{1}{2}\,e^{-\frac{1}{2}i\,a\,\pi}\,i\left(e^{i\,a\,\pi}-\left(\sqrt{1-\frac{1}{z^2}}+\frac{i}{z}\right)^{2a}\right)\left(\sqrt{1-\frac{1}{z^2}}+\frac{i}{z}\right)^{-a}$$

01.06.16.0041.01

$$\sin\left(n\sec^{-1}(z)\right) = \sqrt{1-\frac{1}{z^2}}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{n-2k-1}\,z^{2k-n+1} \;/;\; n\in\mathbb{N}^+$$

01.06.16.0042.01

$$\sin\left(n\sec^{-1}(z)\right) = \sqrt{1-\frac{1}{z^2}}\;U_{n-1}\left(\frac{1}{z}\right)$$

01.06.16.0066.01

$$\sin\left(\frac{n}{2}\sec^{-1}(z)\right) = \left(\frac{z+1}{z}\right)^{\frac{n-1}{2}}\sqrt{\frac{z-1}{z}}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{\frac{n}{2}-k-1}\left(\frac{z}{z+1}\right)^k \;/;\; n\in\mathbb{N}^+$$

01.06.16.0067.01

$$\sin\left(\frac{n}{2}\sec^{-1}(z)\right) = \frac{1}{\sqrt{2}}\sqrt{\frac{z-1}{z}}\;U_{n-1}\left(\frac{1}{\sqrt{2}}\sqrt{\frac{z+1}{z}}\right) \;/;\; n\in\mathbb{N}^+$$

Involving $\sinh^{-1}$

01.06.16.0145.01

$$\sin\left(\sinh^{-1}(z)\right) = -\frac{1}{2}\,i\left(z+\sqrt{z^2+1}\right)^{-i}\left(\left(z+\sqrt{z^2+1}\right)^{2i}-1\right)$$

01.06.16.0011.01

$$\sin\left(i\sinh^{-1}(z)\right) = i\,z$$

01.06.16.0023.01

$$\sin\left(\frac{i}{2}\sinh^{-1}(z)\right) = \frac{i\,z}{\sqrt{2}\,\sqrt{z^2}}\sqrt{\sqrt{1+z^2}-1}$$

01.06.16.0146.01

$$\sin\left(a\sinh^{-1}(z)\right) = -\frac{1}{2}\,i\left(z+\sqrt{z^2+1}\right)^{-i\,a}\left(\left(z+\sqrt{z^2+1}\right)^{2\,i\,a}-1\right)$$

01.06.16.0043.01

$$\sin\left(i\,n\sinh^{-1}(z)\right) = i\,z\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{n-2k-1}\left(z^2+1\right)^{\frac{n-1}{2}-k} /;\ n\in\mathbb{N}^+$$

01.06.16.0044.01

$$\sin\left(i\,n\sinh^{-1}(z)\right) = i\,z\,U_{n-1}\left(\sqrt{z^2+1}\right) /;\ n\in\mathbb{N}^+$$

01.06.16.0068.01

$$\sin\left(\frac{i\,n}{2}\sinh^{-1}(z)\right) = i\,z\left(\sqrt{z^2+1}+1\right)^{\frac{n}{2}-1}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{\frac{n}{2}-k-1}\left(\frac{\sqrt{z^2+1}-1}{z^2}\right)^k /;\ n\in\mathbb{N}^+$$

01.06.16.0069.01

$$\sin\left(\frac{i\,n}{2}\sinh^{-1}(z)\right) = \frac{i\,z}{\sqrt{2}\sqrt{\sqrt{z^2+1}+1}}\,U_{n-1}\left(\frac{\sqrt{\sqrt{z^2+1}+1}}{\sqrt{2}}\right) /;\ n\in\mathbb{N}^+$$

Involving $\cosh^{-1}$

01.06.16.0147.01

$$\sin\left(\cosh^{-1}(z)\right) = -\frac{1}{2}\,i\left(z+\sqrt{z-1}\,\sqrt{z+1}\right)^{-i}\left(\left(z+\sqrt{z-1}\,\sqrt{z+1}\right)^{2i}-1\right)$$

01.06.16.0012.01

$$\sin\left(i\cosh^{-1}(z)\right) = i\sqrt{z-1}\,\sqrt{z+1}$$

01.06.16.0024.01

$$\sin\left(\frac{i}{2}\cosh^{-1}(z)\right) = \frac{i\sqrt{z-1}}{\sqrt{2}}$$

01.06.16.0148.01

$$\sin\left(a\cosh^{-1}(z)\right) = -\frac{1}{2}\, i \left(z+\sqrt{z-1}\,\sqrt{z+1}\right)^{-i a}\left(\left(z+\sqrt{z-1}\,\sqrt{z+1}\right)^{2 i a}-1\right)$$

01.06.16.0045.01

$$\sin\left(i\, n\cosh^{-1}(z)\right) = i\sqrt{z-1}\,\sqrt{z+1}\sum_{k=0}^{\left\lfloor \frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{n-2k-1}z^{n-2k-1}\;/;\; n\in\mathbb{N}^+$$

01.06.16.0046.01

$$\sin\left(i\, n\cosh^{-1}(z)\right) = i\sqrt{z-1}\,\sqrt{z+1}\; U_{n-1}(z)\;/;\; n\in\mathbb{N}^+$$

01.06.16.0070.01

$$\sin\left(\frac{i\, n}{2}\cosh^{-1}(z)\right) = i\sqrt{z-1}\sum_{k=0}^{\left\lfloor \frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{\frac{n}{2}-k-1}(z+1)^{\frac{n-1}{2}-k}\;/;\; n\in\mathbb{N}^+$$

01.06.16.0071.01

$$\sin\left(\frac{i\, n}{2}\cosh^{-1}(z)\right) = \frac{i\sqrt{z-1}}{\sqrt{2}}\; U_{n-1}\left(\frac{\sqrt{z+1}}{\sqrt{2}}\right)\;/;\; n\in\mathbb{N}^+$$

Involving $\tanh^{-1}$

01.06.16.0149.01

$$\sin\left(\tanh^{-1}(z)\right) = \frac{1}{2}\, i\left(1-z^2\right)^{-\frac{i}{2}}\left((1-z)^{i}-(z+1)^{i}\right)$$

01.06.16.0013.01

$$\sin\left(i\tanh^{-1}(z)\right) = \frac{i\, z}{\sqrt{1-z^2}}$$

01.06.16.0025.01

$$\sin\left(\frac{i}{2}\tanh^{-1}(z)\right) = \frac{i\, z}{\sqrt{2}\,\sqrt{z^2}}\sqrt{\frac{1}{\sqrt{1-z^2}}-1}$$

01.06.16.0150.01

$$\sin\left(a\tanh^{-1}(z)\right) = \frac{1}{2}\, i\left(1-z^2\right)^{-\frac{1}{2}(i a)}\left((1-z)^{i a}-(z+1)^{i a}\right)$$

01.06.16.0047.01

$$\sin\left(i\, n\tanh^{-1}(z)\right) = i\left(1-z^2\right)^{-\frac{n}{2}}\sum_{k=0}^{\left\lfloor \frac{n-1}{2}\right\rfloor}\binom{n}{2k+1}z^{2k+1}\;/;\; n\in\mathbb{N}^+$$

01.06.16.0048.01

$$\sin\left(i\, n\tanh^{-1}(z)\right) = \frac{i\, z}{\sqrt{1-z^2}}\; U_{n-1}\left(\frac{1}{\sqrt{1-z^2}}\right)\;/;\; n\in\mathbb{N}^+$$

01.06.16.0072.01

$$\sin\left(\frac{i\,n}{2}\tanh^{-1}(z)\right) = \frac{i\,z}{\sqrt{1-z^2}}\left(1+\frac{1}{\sqrt{1-z^2}}\right)^{\frac{n}{2}-1}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{n/2-k-1}\left(\frac{\sqrt{1-z^2}}{\sqrt{1-z^2}+1}\right)^k \;/;\; n\in\mathbb{N}^+$$

01.06.16.0073.01

$$\sin\left(\frac{i\,n}{2}\tanh^{-1}(z)\right) = \frac{i\,z}{\sqrt{2}\sqrt{-z^2}}\sqrt{1-\frac{1}{\sqrt{1-z^2}}}\;U_{n-1}\left(\frac{1}{\sqrt{2}}\sqrt{1+\frac{1}{\sqrt{1-z^2}}}\right) /;\; n\in\mathbb{N}^+$$

Involving $\coth^{-1}$

01.06.16.0151.01

$$\sin\left(\coth^{-1}(z)\right) = \frac{1}{2}\,i\left(\left(1-\frac{1}{z}\right)^{i}-\left(1+\frac{1}{z}\right)^{i}\right)\left(1-\frac{1}{z^2}\right)^{-\frac{i}{2}}$$

01.06.16.0014.01

$$\sin\left(i\coth^{-1}(z)\right) = \frac{i\sqrt{z^2}}{z\sqrt{z^2-1}}$$

01.06.16.0026.01

$$\sin\left(\frac{i}{2}\coth^{-1}(z)\right) = \frac{i\,z}{\sqrt{2}}\sqrt{\frac{1}{z^2}}\sqrt{\frac{1}{\sqrt{1-\frac{1}{z^2}}}-1}$$

01.06.16.0152.01

$$\sin\left(a\coth^{-1}(z)\right) = \frac{1}{2}\,i\left(1-\frac{1}{z^2}\right)^{-\frac{1}{2}(i\,a)}\left(\left(1-\frac{1}{z}\right)^{i\,a}-\left(1+\frac{1}{z}\right)^{i\,a}\right)$$

01.06.16.0049.01

$$\sin\left(i\,n\coth^{-1}(z)\right) = i\left(1-\frac{1}{z^2}\right)^{-\frac{n}{2}}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}\binom{n}{2k+1}z^{-2k-1} \;/;\; n\in\mathbb{N}^+$$

01.06.16.0051.01

$$\sin\left(i\,n\coth^{-1}(z)\right) = \frac{i\sqrt{z^2}}{z\sqrt{z^2-1}}\;U_{n-1}\left(\frac{\sqrt{z^2}}{\sqrt{z^2-1}}\right) /;\; n\in\mathbb{N}^+$$

01.06.16.0074.01

$$\sin\left(\frac{i\,n}{2}\coth^{-1}(z)\right) = \frac{i}{z\sqrt{1-\frac{1}{z^2}}}\left(\frac{\sqrt{z^2}}{\sqrt{z^2-1}}+1\right)^{\frac{n}{2}-1}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{\frac{n}{2}-k-1}\left(\left(\sqrt{1-\frac{1}{z^2}}-1\right)z^2+1\right)^k \;/;\; n\in\mathbb{N}^+$$

01.06.16.0075.01

$$\sin\left(\frac{i\,n}{2}\coth^{-1}(z)\right) = -\frac{i\,z}{\sqrt{2}}\sqrt{-\frac{1}{z^2}}\sqrt{1-\frac{\sqrt{z^2}}{\sqrt{z^2-1}}}\;U_{n-1}\left(\frac{1}{\sqrt{2}}\sqrt{\frac{\sqrt{z^2}}{\sqrt{z^2-1}}+1}\right)\;/;\;n\in\mathbb{N}^+$$

Involving csch^{-1}

01.06.16.0153.01

$$\sin\left(\operatorname{csch}^{-1}(z)\right) = \frac{1}{2}\,i\left(\sqrt{1+\frac{1}{z^2}}+\frac{1}{z}\right)^{-i} - \frac{1}{2}\,i\left(\sqrt{1+\frac{1}{z^2}}+\frac{1}{z}\right)^{i}$$

01.06.16.0015.01

$$\sin\left(i\operatorname{csch}^{-1}(z)\right) = \frac{i}{z}$$

01.06.16.0027.01

$$\sin\left(\frac{i}{2}\operatorname{csch}^{-1}(z)\right) = \frac{i\,z}{\sqrt{2}}\sqrt{\frac{1}{z^2}}\sqrt{\sqrt{1+\frac{1}{z^2}}-1}$$

01.06.16.0154.01

$$\sin\left(a\operatorname{csch}^{-1}(z)\right) = \frac{1}{2}\,i\left(\sqrt{1+\frac{1}{z^2}}+\frac{1}{z}\right)^{-i\,a} - \frac{1}{2}\,i\left(\sqrt{1+\frac{1}{z^2}}+\frac{1}{z}\right)^{i\,a}$$

01.06.16.0052.01

$$\sin\left(i\,n\operatorname{csch}^{-1}(z)\right) = \frac{i}{z}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k\binom{n-k-1}{k}2^{n-2k-1}\left(1+\frac{1}{z^2}\right)^{\frac{n-1}{2}-k}\;/;\;n\in\mathbb{N}^+$$

01.06.16.0053.01

$$\sin\left(i\,n\operatorname{csch}^{-1}(z)\right) = \frac{i}{z}\,U_{n-1}\left(\sqrt{1+\frac{1}{z^2}}\right)\;/;\;n\in\mathbb{N}^+$$

01.06.16.0076.01

$$\sin\left(\frac{i\,n}{2}\operatorname{csch}^{-1}(z)\right) = \frac{i}{z}\left(\sqrt{1+\frac{1}{z^2}}+1\right)^{\frac{n}{2}-1}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}\binom{n-k-1}{k}2^{\frac{n}{2}-k-1}\left(z^2+\sqrt{-z^2}\,\sqrt{-z^2-1}\right)^k\;/;\;n\in\mathbb{N}^+$$

01.06.16.0077.01

$$\sin\left(\frac{i\,n}{2}\operatorname{csch}^{-1}(z)\right) = -\frac{i\,z}{\sqrt{2}}\sqrt{-\frac{1}{z^2}}\sqrt{1-\sqrt{1+\frac{1}{z^2}}}\;U_{n-1}\left(\frac{1}{\sqrt{2}}\sqrt{\sqrt{1+\frac{1}{z^2}}+1}\right)\;/;\;n\in\mathbb{N}^+$$

Involving sech^{-1}

01.06.16.0155.01

$$\sin\left(\operatorname{sech}^{-1}(z)\right) = \frac{1}{2}\, i \left(\sqrt{\frac{1}{z}-1}\,\sqrt{1+\frac{1}{z}}+\frac{1}{z}\right)^{-i} - \frac{1}{2}\, i \left(\sqrt{\frac{1}{z}-1}\,\sqrt{1+\frac{1}{z}}+\frac{1}{z}\right)^{i}$$

01.06.16.0016.01

$$\sin\left(i \operatorname{sech}^{-1}(z)\right) = \frac{i}{z}\sqrt{\frac{1-z}{1+z}}\,(1+z)$$

01.06.16.0028.01

$$\sin\left(\frac{i}{2}\operatorname{sech}^{-1}(z)\right) = \frac{i\sqrt{1-z}}{\sqrt{2}}\sqrt{\frac{1}{z}}$$

01.06.16.0156.01

$$\sin\left(a \operatorname{sech}^{-1}(z)\right) = \frac{1}{2}\, i \left(\sqrt{\frac{1}{z}-1}\,\sqrt{1+\frac{1}{z}}+\frac{1}{z}\right)^{-i a} - \frac{1}{2}\, i \left(\sqrt{\frac{1}{z}-1}\,\sqrt{1+\frac{1}{z}}+\frac{1}{z}\right)^{i a}$$

01.06.16.0054.01

$$\sin\left(i\, n \operatorname{sech}^{-1}(z)\right) = i\sqrt{\frac{1-z}{1+z}}\,(1+z)\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k \binom{n-k-1}{k} 2^{n-2k-1} z^{2k-n} \;/;\; n \in \mathbb{N}^+$$

01.06.16.0055.01

$$\sin\left(i\, n \operatorname{sech}^{-1}(z)\right) = \frac{i}{z}\sqrt{\frac{1-z}{1+z}}\,(1+z)\, U_{n-1}\left(\frac{1}{z}\right) /;\; n \in \mathbb{N}^+$$

01.06.16.0078.01

$$\sin\left(\frac{i\, n}{2}\operatorname{sech}^{-1}(z)\right) = i\sqrt{\frac{1-z}{z}}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^k \binom{n-k-1}{k} 2^{\frac{n}{2}-k-1}\left(\frac{z+1}{z}\right)^{\frac{n-1}{2}-k} /;\; n \in \mathbb{N}^+$$

01.06.16.0079.01

$$\sin\left(\frac{i\, n}{2}\operatorname{sech}^{-1}(z)\right) = \frac{i}{\sqrt{2}}\sqrt{\frac{1-z}{z}}\; U_{n-1}\left(\frac{1}{\sqrt{2}}\sqrt{\frac{z+1}{z}}\right) /;\; n \in \mathbb{N}^+$$

Argument involving complex components

01.06.16.0080.01

$$\sin(\arg(z)) = \frac{\operatorname{Im}(z)}{|z|}$$

01.06.16.0081.01

$$\sin(\arg(z)) + i\cos(\arg(z)) = \frac{i\,\bar{z}}{|z|}$$

01.06.16.0082.01

$$\sin(a\arg(z)) = \frac{\operatorname{Re}(z)\,|z|^{-a}}{2\operatorname{Im}(z)}\sqrt{-\frac{\operatorname{Im}(z)^2}{\operatorname{Re}(z)^2}}\left(\left(\operatorname{Re}(z)-\operatorname{Re}(z)\sqrt{-\frac{\operatorname{Im}(z)^2}{\operatorname{Re}(z)^2}}\right)^a - \left(\operatorname{Re}(z)+\operatorname{Re}(z)\sqrt{-\frac{\operatorname{Im}(z)^2}{\operatorname{Re}(z)^2}}\right)^a\right)$$

01.06.16.0083.01

$$\sin(a\arg(z)) = \frac{i\,|z|^{-a}\,|\operatorname{Im}(z)|\,|\operatorname{Re}(z)|}{2\operatorname{Im}(z)\operatorname{Re}(z)}\left(\left(\operatorname{Re}(z)-\frac{i\,|\operatorname{Im}(z)|\,|\operatorname{Re}(z)|}{\operatorname{Re}(z)}\right)^a - \left(\operatorname{Re}(z)+\frac{i\,|\operatorname{Im}(z)|\,|\operatorname{Re}(z)|}{\operatorname{Re}(z)}\right)^a\right)$$

Addition formulas

01.06.16.0084.01

$$\sin(a+b) == \sin(a)\cos(b) + \cos(a)\sin(b)$$

01.06.16.0085.01

$$\sin(a-b) == \sin(a)\cos(b) - \cos(a)\sin(b)$$

01.06.16.0086.01

$$\sin(a+i\,b) == \sin(a)\cosh(b) + i\cos(a)\sinh(b)$$

01.06.16.0087.01

$$\sin(a-i\,b) == \sin(a)\cosh(b) - i\cos(a)\sinh(b)$$

Half-angle formulas

01.06.16.0088.02

$$\sin\left(\frac{z}{2}\right) == \sqrt{\frac{1-\cos(z)}{2}} \;/;\; 0 < \mathrm{Re}(z) < 2\pi \lor \mathrm{Re}(z) == 0 \land \mathrm{Im}(z) \geq 0 \lor \mathrm{Re}(z) == 2\pi \land \mathrm{Im}(z) \leq 0$$

01.06.16.0089.01

$$\sin\left(\frac{z}{2}\right) == (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{2\pi} \right\rfloor} \left(1 - \left(1 + (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{2\pi} \right\rfloor + \left\lfloor -\frac{\mathrm{Re}(z)}{2\pi} \right\rfloor}\right) \theta(-\mathrm{Im}(z))\right) \sqrt{\frac{1-\cos(z)}{2}}$$

Multiple arguments

Argument involving numeric multiples of variable

01.06.16.0090.01

$$\sin(2z) == 2\sin(z)\cos(z)$$

01.06.16.0091.01

$$\sin(3z) == 3\sin(z) - 4\sin^3(z)$$

01.06.16.0092.01

$$\sin(3z) == 3\cos^2(z)\sin(z) - \sin^3(z)$$

Argument involving symbolic multiples of variable

01.06.16.0093.01

$$\sin(n z) == \sin(z) \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n-k-1}{k} 2^{n-2k-1} \cos^{n-2k-1}(z) \;/;\; n \in \mathbb{N}^+$$

01.06.16.0094.01

$$\sin(n z) == \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^k \binom{n}{2k+1} \sin^{2k+1}(z) \cos^{-2k+n-1}(z) \;/;\; n \in \mathbb{N}^+$$

01.06.16.0095.01

$$\sin(n z) == 2^{n-1} \prod_{k=0}^{n-1} \sin\left(\frac{\pi k}{n} + z\right) \;/;\; n \in \mathbb{N}^+$$

01.06.16.0096.01

$$\sin(n z) == \sin(z)\, U_{n-1}(\cos(z))$$

01.06.16.0157.01

$$\sin(a\,z) = \frac{1}{2\,i}\left((\cos(z)+i\sin(z))^a\,e^{-2\,i\,\pi\,a\left\lfloor\frac{\pi-\mathrm{Re}(z)}{2\pi}\right\rfloor} - (\cos(z)-i\sin(z))^a\,e^{-2\,i\,\pi\,a\left\lfloor\frac{\mathrm{Re}(z)+\pi}{2\pi}\right\rfloor}\right)$$

Some functions of arguments

01.06.16.0158.01

$$\sin(a\,(b\,z^c)^m) = \sin(a\,b^m\,z^{m\,c})\;/;\; -\pi < \arg(b) + \mathrm{Im}(c\log(z)) \le \pi$$

01.06.16.0159.01

$$\sin\left(\sqrt{z^2}\right) = \sin(z)\;/;\; -\frac{\pi}{2} < \arg(z) \le \frac{\pi}{2}$$

01.06.16.0160.01

$$\sin\left(\sqrt{z^2}\right) = -\sin(z)\;/;\; -\pi < \arg(z) \le -\frac{\pi}{2} \bigvee \frac{\pi}{2} < \arg(z) \le \pi$$

01.06.16.0161.01

$$\sin\left(\sqrt{z^2}\right) = \frac{\sqrt{z^2}}{z}\sin(z)$$

01.06.16.0162.01

$$\sin\left(a\sqrt{b\,z^2}\right) = \frac{\sqrt{b\,z^2}}{\sqrt{b}\,z}\sin\left(a\sqrt{b}\,z\right)$$

01.06.16.0163.01

$$\sin\left(a\sqrt[3]{b\,z^3}\right) = -\frac{i\,e^{-i\,a\sqrt[3]{b}\,z}}{6\,b^{2/3}\,z^2}\left(\left(-1+e^{2\,i\,a\sqrt[3]{b}\,z}\right)\left(\sqrt[3]{b}\,z\sqrt[3]{b\,z^3} + (b\,z^3)^{2/3} + b^{2/3}\,z^2\right) + e^{\frac{1}{2}\,i\,a\sqrt[3]{b}\,z}\left(\sqrt[3]{b\,z^3} - \sqrt[3]{b}\,z\right)\right.$$
$$\left.\left(\left(-1+e^{i\,a\sqrt[3]{b}\,z}\right)\left(2\,z\sqrt[3]{b} + \sqrt[3]{b\,z^3}\right)\cosh\left(\frac{1}{2}\sqrt{3}\,a\sqrt[3]{b}\,z\right) - i\sqrt{3}\left(1+e^{i\,a\sqrt[3]{b}\,z}\right)\sqrt[3]{b\,z^3}\,\sinh\left(\frac{1}{2}\sqrt{3}\,a\sqrt[3]{b}\,z\right)\right)\right)$$

01.06.16.0164.01

$$\sin\left(a\sqrt[4]{b\,z^4}\right) = \frac{\sqrt[4]{b}\,z}{2\,(b\,z^4)^{3/4}}\left(\left(\sqrt{b}\,z^2 + \sqrt{b\,z^4}\right)\sin\left(a\sqrt[4]{b}\,z\right) + \left(\sqrt{b}\,z^2 - \sqrt{b\,z^4}\right)\sinh\left(a\sqrt[4]{b}\,z\right)\right)$$

01.06.16.0165.01

$$\sin\left(a\,(b\,z^n)^{1/n}\right) = \frac{1}{2}\,i\sum_{i=0}^{n-1}\left(\frac{\left(-i\,a\,(b\,z^n)^{1/n}\right)^i}{i!}\,{}_1F_n\left(1;\frac{i+1}{n},\frac{i+2}{n},\ldots,\frac{i+n}{n};\frac{(-i)^n\,a^n\,b\,z^n}{n^n}\right) - \right.$$
$$\left.\frac{\left(i\,a\,(b\,z^n)^{1/n}\right)^i}{i!}\,{}_1F_n\left(1;\frac{i+1}{n},\frac{i+2}{n},\ldots,\frac{i+n}{n};\frac{i^n\,a^n\,b\,z^n}{n^n}\right)\right)\;/;\; n\in\mathbb{N}^+$$

Products, sums, and powers of the direct function

Products of the direct function

01.06.16.0097.01

$$\sin(a)\sin(b) = \frac{1}{2}(\cos(a-b)-\cos(a+b))$$

Products involving the direct function

01.06.16.0098.01

$$\sin(a)\cos(b) = \frac{1}{2}(\sin(a-b)+\sin(a+b))$$

01.06.16.0113.01

$$\prod_{k=1}^{n}\sin(z_k) = (-2)^{-n}\sum_{\substack{k_1=-1\\ \Delta k_1=2}}^{1}\sum_{\substack{k_2=-1\\ \Delta k_2=2}}^{1}\dots\sum_{\substack{k_n=-1\\ \Delta k_n=2}}^{1}\cos\left(\sum_{j=1}^{n}k_j\left(z_j+\frac{\pi}{2}\right)\right)$$

Sums of the direct function

01.06.16.0099.01

$$\sin(a)+\sin(b) = 2\cos\left(\frac{a-b}{2}\right)\sin\left(\frac{a+b}{2}\right)$$

01.06.16.0100.01

$$\sin(a)-\sin(b) = 2\cos\left(\frac{a+b}{2}\right)\sin\left(\frac{a-b}{2}\right)$$

Sums involving the direct function

Involving other trigonometric functions

Involving cos

01.06.16.0114.01

$$\sin(z)+\cos(z) = \sqrt{2}\cos\left(z-\frac{\pi}{4}\right)$$

01.06.16.0115.01

$$\sin(z)-\cos(z) = -\sqrt{2}\cos\left(z+\frac{\pi}{4}\right)$$

01.06.16.0116.01

$$\sin(a)+\cos(b) = 2\cos\left(\frac{a-b}{2}-\frac{\pi}{4}\right)\cos\left(\frac{a+b}{2}-\frac{\pi}{4}\right)$$

01.06.16.0117.01

$$\sin(a)-\cos(b) = -2\cos\left(\frac{a+b}{2}+\frac{\pi}{4}\right)\cos\left(\frac{a-b}{2}+\frac{\pi}{4}\right)$$

01.06.16.0118.01

$$a\sin(z)+b\cos(z) = a\sqrt{1+\frac{b^2}{a^2}}\sin\left(z+\tan^{-1}\left(\frac{b}{a}\right)\right)$$

Involving hyperbolic functions

Involving sinh

01.06.16.0119.01

$$\sin(z) + i\sinh(z) = 2\cos\left(\frac{z\,e^{-\frac{1}{4}(i\pi)}}{\sqrt{2}}\right)\sin\left(\frac{z\,e^{\frac{i\pi}{4}}}{\sqrt{2}}\right)$$

01.06.16.0120.01

$$\sin(z) - i\sinh(z) = 2\cos\left(\frac{z\,e^{\frac{i\pi}{4}}}{\sqrt{2}}\right)\sin\left(\frac{z\,e^{-\frac{1}{4}(i\pi)}}{\sqrt{2}}\right)$$

01.06.16.0121.01

$$\sin(a) + i\sinh(b) = 2\cos\left(\frac{1}{2}(a - i\,b)\right)\sin\left(\frac{1}{2}(a + b\,i)\right)$$

01.06.16.0122.01

$$\sin(a) - i\sinh(b) = 2\cos\left(\frac{1}{2}(a + b\,i)\right)\sin\left(\frac{1}{2}(a - i\,b)\right)$$

Involving cosh

01.06.16.0123.01

$$\sin(z) + \cosh(z) = 2\cos\left(\frac{z\,e^{-\frac{1}{4}(i\pi)}}{\sqrt{2}} - \frac{\pi}{4}\right)\cos\left(\frac{z\,e^{\frac{i\pi}{4}}}{\sqrt{2}} - \frac{\pi}{4}\right)$$

01.06.16.0124.01

$$\sin(z) - \cosh(z) = -2\cos\left(\frac{e^{\frac{i\pi}{4}}\,z}{\sqrt{2}} + \frac{\pi}{4}\right)\cos\left(\frac{e^{-\frac{1}{4}(i\pi)}\,z}{\sqrt{2}} + \frac{\pi}{4}\right)$$

01.06.16.0125.01

$$\sin(a) + \cosh(b) = 2\cos\left(\frac{1}{2}(a - i\,b) - \frac{\pi}{4}\right)\cos\left(\frac{1}{2}(a + b\,i) - \frac{\pi}{4}\right)$$

01.06.16.0126.01

$$\sin(a) - \cosh(b) = -2\cos\left(\frac{1}{2}(a + b\,i) + \frac{\pi}{4}\right)\cos\left(\frac{1}{2}(a - i\,b) + \frac{\pi}{4}\right)$$

Powers of the direct function

01.06.16.0101.01

$$\sin^2(z) = \frac{1}{2}(1 - \cos(2\,z))$$

01.06.16.0102.01

$$\sin^3(z) = \frac{1}{4}(3\sin(z) - \sin(3\,z))$$

01.06.16.0103.01

$$\sin^{2n}(z) = 2^{-2n}\binom{2n}{n} + 2^{1-2n}\sum_{k=0}^{n-1}(-1)^{n-k}\binom{2n}{k}\cos(2(n-k)\,z)\;/;\; n \in \mathbb{N}^+$$

01.06.16.0127.01

$$\sin^{2n}(z) = 2^{1-2n}\sum_{k=0}^{n-1}(-1)^{n-k}\binom{2n}{k}(\cos(2(n-k)\,z) - 1)\;/;\; n \in \mathbb{N}^+$$

01.06.16.0104.01

$$\sin^{2n-1}(z) = 2^{2-2n} \sum_{k=0}^{n-1} (-1)^{n-k-1} \binom{2n-1}{k} \sin((2n-2k-1)z) /; n \in \mathbb{N}^+$$

01.06.16.0105.01

$$\sin^n(z) = 2^{-n} \binom{n}{\frac{n}{2}} (1 - n \bmod 2) - 2^{1-n} \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^{k+n-1} \binom{n}{k} \cos\left(\frac{\pi n}{2} + (n-2k)z\right) /; n \in \mathbb{N}^+$$

Powers involving the direct function

01.06.16.0106.01

$$(\cos(z) + i \sin(z))^n = \cos(n z) + i \sin(n z) /; n \in \mathbb{N}^+$$

De Moivre's theorem

01.06.16.0107.01

$$(\cos(z) + i \sin(z))^n = e^{i n z} /; n \in \mathbb{N}^+$$

01.06.16.0108.01

$$(\cos(z) - i \sin(z))^n = \cos(n z) - i \sin(n z) /; n \in \mathbb{N}^+$$

01.06.16.0109.01

$$(\cos(z) - i \sin(z))^n = e^{-i n z} /; n \in \mathbb{N}^+$$

Sums of powers involving the direct function

01.06.16.0110.01

$$\sin^2(a) - \sin^2(b) = \sin(a-b) \sin(a+b)$$

01.06.16.0111.01

$$\sin^2(a) - \cos^2(b) = -\cos(a-b) \cos(a+b)$$

Related transformations

01.06.16.0112.01

$$\sin\left(a \sin^{-1}(z)\right) = \frac{\sqrt{z^2}}{z} \sin\left(\frac{1}{2} a \cos^{-1}\left(1 - 2 z^2\right)\right)$$

Identities

Functional identities

Univariate functional identities

01.06.17.0001.01

$$\sin^2(2z) = 4\left(1 - \sin^2(z)\right) \sin^2(z)$$

01.06.17.0002.01

$$\sin^4(z_1 + z_2) - 2\left(-2 \sin^2(z_2) \sin^2(z_1) + \sin^2(z_1) + \sin^2(z_2)\right) \sin^2(z_1 + z_2) + \left(\sin^2(z_1) - \sin^2(z_2)\right)^2 = 0$$

01.06.17.0003.01

$$\sin(z) = n \sin\left(\frac{z}{n}\right) \prod_{k=1}^{\left\lfloor \frac{n}{2} \right\rfloor} \left(1 - \frac{\sin^2\left(\frac{z}{n}\right)}{\sin^2\left(\frac{4 k \pi}{2 n}\right)}\right) /; \frac{n-1}{2} \in \mathbb{N}^+$$

Biivariate functional identities

01.06.17.0004.01

$$|g(x + i y)| = |g(x) + g(i y)| /; g(z) = c \sin(d z) \bigwedge d \in \mathbb{R} \bigwedge x \in \mathbb{R} \bigwedge y \in \mathbb{R}$$

01.06.17.0005.01

$$g(x + y) g(x - y) = g(x)^2 - g(y)^2 /; g(z) = \sin(c z) \bigwedge x \in \mathbb{R} \bigwedge y \in \mathbb{R}$$

Complex characteristics

Real part

01.06.19.0001.01

$$\mathrm{Re}(\sin(x + i y)) = \cosh(y) \sin(x)$$

Imaginary part

01.06.19.0002.01

$$\mathrm{Im}(\sin(x + i y)) = \cos(x) \sinh(y)$$

Absolute value

01.06.19.0003.01

$$|\sin(x + i y)| = \sqrt{\frac{\cosh(2 y) - \cos(2 x)}{2}}$$

01.06.19.0004.01

$$|\sin(x + i y)| = \sqrt{\cosh^2(y) \sin^2(x) + \cos^2(x) \sinh^2(y)}$$

01.06.19.0008.01

$$|\sin(x + i y)| = |\sin(x) + \sin(i y)| /; x \in \mathbb{R} \bigwedge y \in \mathbb{R}$$

Argument

01.06.19.0005.01

$$\arg(\sin(x + i y)) = \tan^{-1}(\cot(x) \tanh(y)) + \frac{\pi}{2} \mathrm{sgn}\left(\mathrm{sgn}(\cos(x) \sinh(y)) + \frac{1}{2}\right) (1 - \mathrm{sgn}(\cosh(y) \sin(x)))$$

01.06.19.0006.01

$$\arg(\sin(x + i y)) = \tan^{-1}(\cosh(y) \sin(x), \cos(x) \sinh(y))$$

Conjugate value

01.06.19.0007.01

$$\overline{\sin(x + i y)} = \cosh(y) \sin(x) - i \cos(x) \sinh(y)$$

Differentiation

Low-order differentiation

01.06.20.0001.01

$$\frac{\partial \sin(z)}{\partial z} = \cos(z)$$

01.06.20.0002.01

$$\frac{\partial^2 \sin(z)}{\partial z^2} = -\sin(z)$$

Symbolic differentiation

01.06.20.0003.02

$$\frac{\partial^n \sin(z)}{\partial z^n} = \sin\left(z + \frac{\pi n}{2}\right) /; n \in \mathbb{N}$$

01.06.20.0004.01

$$\frac{\partial^n f(\sin(z))}{\partial z^n} = \sum_{m=1}^{n} \frac{1}{m!} \left(\sum_{j=0}^{m-1} \binom{m}{j} \sum_{l=0}^{m-j} (-1)^j \, 2^{j-m} \sin^j(z) \, (j + 2l - m)^n \, \exp\left(-\frac{i}{2} (n\pi - (j + 2l - m)(\pi - 2z))\right) \binom{m-j}{l} f^{(m)}(\sin(z)) \right) /; n \in \mathbb{N}^+$$

01.06.20.0005.02

$$\frac{\partial^n f(\sin(z))}{\partial z^n} = \sum_{m=0}^{n} \frac{f^{(m)}(\sin(z))}{m!} \left(\frac{\partial^n (\sin(y) - \sin(z))^m}{\partial y^n} /. \{y \to z\} \right) /; n \in \mathbb{N}$$

01.06.20.0007.02

$$\frac{\partial^n \sin(a z + b)}{\partial z^n} = a^n \sin\left(a z + b + \frac{n \pi}{2}\right) /; n \in \mathbb{N}$$

01.06.20.0011.01

$$\frac{\partial^n \sin^m(z)}{\partial z^n} = i^{m+n} \, 2^{-m} \sum_{k=0}^{m} (-1)^k \binom{m}{k} (2k - m)^n \, e^{(2k-m) i z} /; m \in \mathbb{N} \land n \in \mathbb{N}^+$$

01.06.20.0012.01

$$\frac{\partial^n \sin^m(z)}{\partial z^n} = 2^{-m} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} (m - 2k)^n \left(i^{n-m} \, e^{(m-2k) i z} + i^{m-n} \, e^{-(m-2k) i z} \right) /; m \in \mathbb{N} \land n \in \mathbb{N}^+$$

01.06.20.0008.02

$$\frac{\partial^n \sin^m(z)}{\partial z^n} = 2^{1-m} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m} \binom{m}{k} (m - 2k)^n \cos\left(\frac{1}{2} \pi (m + n) + (m - 2k) z\right) /; m \in \mathbb{N} \land n \in \mathbb{N}^+$$

01.06.20.0013.01

$$\frac{\partial^n \sin^m(z)}{\partial z^n} = 2^{-m} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} (m - 2k)^n \left((i^{n-m} + i^{m-n}) \cos((m - 2k) z) + i \, (i^{n-m} - i^{m-n}) \sin((m - 2k) z) \right) /; m \in \mathbb{N} \land n \in \mathbb{N}^+$$

01.06.20.0014.01

$$\frac{\partial^n \sin^m(z)}{\partial z^n} = 2^{-m} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} (m-2k)^n \left(i\,(i^{n-m} - i^{m-n}) \sum_{j=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor - k} (-1)^j \binom{m-2k}{2j+1} \sin^{2j+1}(z) \cos^{-2j-2k+m-1}(z) + (i^{n-m} + i^{m-n}) \sum_{j=0}^{\left\lfloor \frac{m}{2} \right\rfloor - k} (-1)^j \binom{m-2k}{2j} \sin^{2j}(z) \cos^{-2j-2k+m}(z) \right) /;\ m \in \mathbb{N} \bigwedge n \in \mathbb{N}^+$$

Fractional integro-differentiation

01.06.20.0006.01

$$\frac{\partial^\alpha \sin(z)}{\partial z^\alpha} = 2^{\alpha-1} \sqrt{\pi}\, z^{1-\alpha} \,{}_1\tilde{F}_2\left(1; 1-\frac{\alpha}{2}, \frac{3}{2}-\frac{\alpha}{2}; -\frac{z^2}{4}\right)$$

01.06.20.0009.01

$$\frac{\partial^\alpha \sin(a z + b)}{\partial z^\alpha} = 2^{\alpha-1} \sqrt{\pi}\, z^{-\alpha} \left(a z \cos(b) \,{}_1\tilde{F}_2\left(1; 1-\frac{\alpha}{2}, \frac{3}{2}-\frac{\alpha}{2}; -\frac{1}{4} a^2 z^2\right) + 2 \,{}_1\tilde{F}_2\left(1; \frac{1}{2}-\frac{\alpha}{2}, 1-\frac{\alpha}{2}; -\frac{1}{4} a^2 z^2\right) \sin(b)\right)$$

01.06.20.0010.01

$$\frac{\partial^\alpha \sin^n(z)}{\partial z^\alpha} = \frac{2^{-n}\, (1 - n \bmod 2)\, z^{-\alpha}}{\Gamma(1-\alpha)} \binom{n}{\frac{n}{2}} - 2^{\alpha-n} \sqrt{\pi}\, z^{-\alpha} \sum_{k=0}^{\left\lfloor \frac{n-1}{2} \right\rfloor} (-1)^{k+n-1} \binom{n}{k} \left(2 \cos\left(\frac{n\pi}{2}\right) {}_1\tilde{F}_2\left(1; \frac{1}{2}-\frac{\alpha}{2}, 1-\frac{\alpha}{2}; -\frac{1}{4}(n-2k)^2 z^2\right) - (n-2k)\, z \,{}_1\tilde{F}_2\left(1; 1-\frac{\alpha}{2}, \frac{3}{2}-\frac{\alpha}{2}; -\frac{1}{4}(n-2k)^2 z^2\right) \sin\left(\frac{n\pi}{2}\right)\right) /;\ n \in \mathbb{N}^+$$

01.06.20.0015.01

$$\frac{\partial^\alpha \left(z^\beta \sin(z)\right)^a}{\partial z^\alpha} = e^{2 i a \pi \left\lfloor \frac{1}{2} - \frac{\arg\left(\frac{\sin(z)}{z}\right)}{2\pi} - \frac{\operatorname{Im}((\beta+1)\log(z))}{2\pi} \right\rfloor} a\, z^{(\beta+1) a - \alpha} \sum_{k=0}^{\infty} \binom{k-a}{k} \sum_{j=0}^{k} \frac{(-1)^j}{a-j} \binom{k}{j} p_{j,k}\, \mathcal{FC}_{\exp}^{(\alpha)}(z, (\beta+1) a + k)\, z^k /;$$

$$p_{j,0} = 1 \bigwedge p_{j,k} = \frac{1}{k} \sum_{m=1}^{k} \frac{(j m + m - k)\left(-m + 2\left\lfloor \frac{m}{2} \right\rfloor + 1\right)(-1)^{m/2}\, p_{j,k-m}}{(m+1)!} \bigwedge k \in \mathbb{N}^+$$

Integration

Indefinite integration

Involving only one direct function

01.06.21.0024.01

$$\int \sin(b + a z)\, dz = -\frac{\cos(b + a z)}{a}$$

01.06.21.0025.01

$$\int \sin(a z)\, dz = -\frac{\cos(a z)}{a}$$

01.06.21.0026.01

$$\int \sin(z)\,dz = -\cos(z)$$

Involving one direct function and elementary functions

Involving power function

Involving power

Power arguments

01.06.21.0027.01

$$\int \sin(a z^r)\,dz = -\frac{i z}{2 r}\left((i a z^r)^{-1/r}\,\Gamma\left(\frac{1}{r}, i a z^r\right) - (-i a z^r)^{-1/r}\,\Gamma\left(\frac{1}{r}, -i a z^r\right)\right)$$

01.06.21.0028.01

$$\int \sin(a z^2)\,dz = \frac{1}{\sqrt{a}}\sqrt{\frac{\pi}{2}}\,S\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\,z\right)$$

01.06.21.0029.01

$$\int \sin(a\sqrt{z})\,dz = \frac{2\sin(a\sqrt{z}) - 2 a\sqrt{z}\cos(a\sqrt{z})}{a^2}$$

01.06.21.0030.01

$$\int \sin(a (z^r)^p)\,dz = \frac{i z}{2 p r}\left((-i a (z^r)^p)^{-\frac{1}{p r}}\,\Gamma\left(\frac{1}{p r}, -i a (z^r)^p\right) - (i a (z^r)^p)^{-\frac{1}{p r}}\,\Gamma\left(\frac{1}{p r}, i a (z^r)^p\right)\right)$$

01.06.21.0031.01

$$\int \sin\left(a (z^r)^{1/r}\right)\,dz = -\frac{z (z^r)^{-1/r}\cos\left(a (z^r)^{1/r}\right)}{a}$$

01.06.21.0032.01

$$\int \sin\left(a\sqrt{z^2}\right)\,dz = -\frac{\sqrt{z^2}\cos\left(a\sqrt{z^2}\right)}{a z}$$

Involving $z^{\alpha-1}$and arguments $a z$

01.06.21.0033.01

$$\int z^{\alpha-1}\sin(a z)\,dz = \frac{1}{2} i z^\alpha \left(E_{1-\alpha}(-i a z) - E_{1-\alpha}(i a z)\right)$$

01.06.21.0034.01

$$\int z^{\alpha-1}\sin(z)\,dz = \frac{1}{2} i z^\alpha \left(z^2\right)^{-\alpha}\left((i z)^\alpha\,\Gamma(\alpha, -i z) - (-i z)^\alpha\,\Gamma(\alpha, i z)\right)$$

01.06.21.0035.01

$$\int z^n \sin(a z)\,dz = -\frac{i^n\left(\Gamma(n+1, -i a z) + (-1)^n\,\Gamma(n+1, i a z)\right)}{2 a^{n+1}} \;/;\; n \in \mathbb{Z}$$

01.06.21.0036.01

$$\int z^n \sin(a z)\, dz = \frac{1}{2} i (-i a)^{-n-1} \left(\frac{\text{Ei}(-i a z) + (-1)^n \text{Ei}(i a z)}{(-n-1)!} + e^{i a z} \left(\sum_{k=0}^{n} \frac{(-i a z)^k}{(n+1)_{k-n}} - \sum_{k=n+1}^{-1} \frac{(-i a z)^k}{(n+1)_{k-n}} \right) + (-1)^n e^{-i a z} \left(\sum_{k=0}^{n} \frac{(i a z)^k}{(n+1)_{k-n}} - \sum_{k=n+1}^{-1} \frac{(i a z)^k}{(n+1)_{k-n}} \right) \right) /; n \in \mathbb{Z}$$

01.06.21.0037.01

$$\int z \sin(a z)\, dz = \frac{\sin(a z) - a z \cos(a z)}{a^2}$$

01.06.21.0038.01

$$\int z^2 \sin(a z)\, dz = \frac{(2 - a^2 z^2) \cos(a z) + 2 a z \sin(a z)}{a^3}$$

01.06.21.0039.01

$$\int z^3 \sin(a z)\, dz = \frac{3 (a^2 z^2 - 2) \sin(a z) - a z (a^2 z^2 - 6) \cos(a z)}{a^4}$$

01.06.21.0040.01

$$\int z^4 \sin(a z)\, dz = \frac{4 a z (a^2 z^2 - 6) \sin(a z) - (a^4 z^4 - 12 a^2 z^2 + 24) \cos(a z)}{a^5}$$

01.06.21.0041.01

$$\int z^5 \sin(a z)\, dz = \frac{5 (a^4 z^4 - 12 a^2 z^2 + 24) \sin(a z) - a z (a^4 z^4 - 20 a^2 z^2 + 120) \cos(a z)}{a^6}$$

01.06.21.0042.01

$$\int z^6 \sin(a z)\, dz = \frac{(-a^6 z^6 + 30 a^4 z^4 - 360 a^2 z^2 + 720) \cos(a z) + 6 a z (a^4 z^4 - 20 a^2 z^2 + 120) \sin(a z)}{a^7}$$

01.06.21.0043.01

$$\int z^7 \sin(a z)\, dz = \frac{1}{a^8} \left(7 (a^6 z^6 - 30 a^4 z^4 + 360 a^2 z^2 - 720) \sin(a z) - a z (a^6 z^6 - 42 a^4 z^4 + 840 a^2 z^2 - 5040) \cos(a z)\right)$$

01.06.21.0044.01

$$\int z^8 \sin(a z)\, dz = \frac{1}{a^9} \left(8 a z (a^6 z^6 - 42 a^4 z^4 + 840 a^2 z^2 - 5040) \sin(a z) - (a^8 z^8 - 56 a^6 z^6 + 1680 a^4 z^4 - 20\,160 a^2 z^2 + 40\,320) \cos(a z)\right)$$

01.06.21.0045.01

$$\int \frac{\sin(a z)}{z}\, dz = \text{Si}(a z)$$

01.06.21.0046.01

$$\int \frac{\sin(a z)}{z^2}\, dz = a \,\text{Ci}(a z) - \frac{\sin(a z)}{z}$$

01.06.21.0047.01

$$\int \frac{\sin(a z)}{z^3}\, dz = -\frac{a^2 \,\text{Si}(a z) z^2 + a \cos(a z) z + \sin(a z)}{2 z^2}$$

01.06.21.0048.01

$$\int \frac{\sin(a z)}{z^4} \, dz = -\frac{a^3 \, \mathrm{Ci}(a z) \, z^3 + a \cos(a z) \, z + \left(2 - a^2 z^2\right) \sin(a z)}{6 z^3}$$

01.06.21.0049.01

$$\int \frac{\sin(a z)}{z^5} \, dz = \frac{a^4 \, \mathrm{Si}(a z) \, z^4 + a \left(a^2 z^2 - 2\right) \cos(a z) \, z + \left(a^2 z^2 - 6\right) \sin(a z)}{24 z^4}$$

01.06.21.0050.01

$$\int z^{n+\frac{1}{2}} \sin(a z) \, dz = -\frac{i^n a^{-n-1} \sqrt{z}}{2 \sqrt{a^2 z^2}} \left(\sqrt{i a z} \, \Gamma\left(n + \frac{3}{2}, -i a z\right) + (-1)^n \sqrt{-i a z} \, \Gamma\left(n + \frac{3}{2}, i a z\right) \right) /; n \in \mathbb{Z}$$

01.06.21.0051.01

$$\int z^{n+\frac{1}{2}} \sin(a z) \, dz = -\frac{i (-1)^n (i a)^{-n-1} \sqrt{z}}{2 \sqrt{a^2 z^2}} \Bigg(\left(\sqrt{i a z} \, \mathrm{erfc}\left(\sqrt{-i a z}\right) + (-1)^n \sqrt{-i a z} \, \mathrm{erfc}\left(\sqrt{i a z}\right) \right) \Gamma\left(n + \frac{3}{2}\right) +$$

$$e^{i a z} \sqrt{i a z} \left(\sum_{k=0}^{n} \frac{(-i a z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} - \sum_{k=n+1}^{-1} \frac{(-i a z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} \right) + (-1)^n e^{-i a z} \sqrt{-i a z} \left(\sum_{k=0}^{n} \frac{(i a z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} - \sum_{k=n+1}^{-1} \frac{(i a z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} \right) \Bigg) /; n \in \mathbb{Z}$$

01.06.21.0052.01

$$\int \sqrt{z} \sin(a z) \, dz = \frac{1}{a^{3/2}} \sqrt{\frac{\pi}{2}} \, C\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z} \right) - \frac{\sqrt{z} \cos(a z)}{a}$$

01.06.21.0053.01

$$\int z^{3/2} \sin(a z) \, dz = \frac{1}{4 a^{5/2}} \left(2 \sqrt{a} \sqrt{z} \left(3 \sin(a z) - 2 a z \cos(a z)\right) - 3 \sqrt{2 \pi} \, S\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z} \right) \right)$$

01.06.21.0054.01

$$\int z^{5/2} \sin(a z) \, dz = \frac{1}{8 a^{7/2}} \left(2 \sqrt{a} \sqrt{z} \left(\left(15 - 4 a^2 z^2\right) \cos(a z) + 10 a z \sin(a z) \right) - 15 \sqrt{2 \pi} \, C\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z} \right) \right)$$

01.06.21.0055.01

$$\int z^{7/2} \sin(a z) \, dz = \frac{1}{16 a^{9/2}} \left(105 \sqrt{2 \pi} \, S\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z} \right) + 2 \sqrt{a} \sqrt{z} \left(\left(70 a z - 8 a^3 z^3\right) \cos(a z) + 7 \left(4 a^2 z^2 - 15\right) \sin(a z) \right) \right)$$

01.06.21.0056.01

$$\int z^{9/2} \sin(a z) \, dz =$$

$$\frac{1}{32 a^{11/2}} \left(945 \sqrt{2 \pi} \, C\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z} \right) - 2 \sqrt{a} \sqrt{z} \left(\left(16 a^4 z^4 - 252 a^2 z^2 + 945\right) \cos(a z) + 18 a z \left(35 - 4 a^2 z^2\right) \sin(a z) \right) \right)$$

01.06.21.0057.01

$$\int \frac{\sin(a z)}{\sqrt{z}} \, dz = \frac{\sqrt{2 \pi}}{\sqrt{a}} \, S\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z} \right)$$

01.06.21.0058.01

$$\int \frac{\sin(a z)}{z^{3/2}} \, dz = 2 \sqrt{a} \sqrt{2 \pi} \, C\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z} \right) - \frac{2 \sin(a z)}{\sqrt{z}}$$

01.06.21.0059.01

$$\int \frac{\sin(a\,z)}{z^{5/2}}\,dz = -\frac{2}{3\,z^{3/2}}\left(2\,a^{3/2}\sqrt{2\,\pi}\,S\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)z^{3/2}+2\,a\cos(a\,z)\,z+\sin(a\,z)\right)$$

01.06.21.0060.01

$$\int \frac{\sin(a\,z)}{z^{7/2}}\,dz = \frac{1}{15\,z^{5/2}}\left(-8\,a^{5/2}\sqrt{2\,\pi}\,C\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)z^{5/2}-4\,a\cos(a\,z)\,z+2\left(4\,a^2\,z^2-3\right)\sin(a\,z)\right)$$

01.06.21.0061.01

$$\int \frac{\sin(a\,z)}{z^{9/2}}\,dz = \frac{2}{105\,z^{7/2}}\left(8\,a^{7/2}\sqrt{2\,\pi}\,S\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)z^{7/2}+2\,a\left(4\,a^2\,z^2-3\right)\cos(a\,z)\,z+\left(4\,a^2\,z^2-15\right)\sin(a\,z)\right)$$

Involving $z^{\alpha-1}$ and arguments $a\,z+b$

01.06.21.0062.01

$$\int z^{\alpha-1}\sin(b+a\,z)\,dz = \frac{1}{2}\,i\,e^{-i\,b}\,z^{\alpha}\left(e^{2\,i\,b}\,E_{1-\alpha}(-i\,a\,z)-E_{1-\alpha}(i\,a\,z)\right)$$

01.06.21.0063.01

$$\int z^{n}\sin(b+a\,z)\,dz = -\frac{1}{2}\,i^{n}\,a^{-n-1}\left(e^{i\,b}\,\Gamma(n+1,\,-i\,a\,z)+(-1)^n\,e^{-i\,b}\,\Gamma(n+1,\,i\,a\,z)\right)\,/;\,n\in\mathbb{Z}$$

01.06.21.0064.01

$$\int z^{n}\sin(b+a\,z)\,dz = \frac{1}{2}\,i\,(-i\,a)^{-n-1}\left(\frac{e^{-i\,b}\,\mathrm{Ei}(-i\,a\,z)+(-1)^n\,e^{i\,b}\,\mathrm{Ei}(i\,a\,z)}{(-n-1)!}+\right.$$
$$\left.e^{i\,b+i\,a\,z}\left(\sum_{k=0}^{n}\frac{(-i\,a\,z)^k}{(n+1)_{k-n}}-\sum_{k=n+1}^{-1}\frac{(-i\,a\,z)^k}{(n+1)_{k-n}}\right)+(-1)^n\,e^{-i\,b-i\,a\,z}\left(\sum_{k=0}^{n}\frac{(i\,a\,z)^k}{(n+1)_{k-n}}-\sum_{k=n+1}^{-1}\frac{(i\,a\,z)^k}{(n+1)_{k-n}}\right)\right)\,/;\,n\in\mathbb{Z}$$

01.06.21.0065.01

$$\int z\sin(b+a\,z)\,dz = \frac{\sin(b+a\,z)-a\,z\cos(b+a\,z)}{a^2}$$

01.06.21.0066.01

$$\int z^2\sin(b+a\,z)\,dz = \frac{\left(2-a^2\,z^2\right)\cos(b+a\,z)+2\,a\,z\sin(b+a\,z)}{a^3}$$

01.06.21.0067.01

$$\int z^3\sin(b+a\,z)\,dz = \frac{3\left(a^2\,z^2-2\right)\sin(b+a\,z)-a\,z\left(a^2\,z^2-6\right)\cos(b+a\,z)}{a^4}$$

01.06.21.0068.01

$$\int z^4\sin(b+a\,z)\,dz = \frac{4\,a\,z\left(a^2\,z^2-6\right)\sin(b+a\,z)-\left(a^4\,z^4-12\,a^2\,z^2+24\right)\cos(b+a\,z)}{a^5}$$

01.06.21.0069.01

$$\int z^5\sin(b+a\,z)\,dz = \frac{5\left(a^4\,z^4-12\,a^2\,z^2+24\right)\sin(b+a\,z)-a\,z\left(a^4\,z^4-20\,a^2\,z^2+120\right)\cos(b+a\,z)}{a^6}$$

01.06.21.0070.01

$$\int \frac{\sin(b + a z)}{z} \, dz = \operatorname{Ci}(a z) \sin(b) + \cos(b) \operatorname{Si}(a z)$$

01.06.21.0071.01

$$\int \frac{\sin(b + a z)}{z^2} \, dz = a \cos(b) \operatorname{Ci}(a z) - \frac{\sin(b + a z) + a z \sin(b) \operatorname{Si}(a z)}{z}$$

01.06.21.0072.01

$$\int \frac{\sin(b + a z)}{z^3} \, dz = -\frac{a^2 \operatorname{Ci}(a z) \sin(b) z^2 + a^2 \cos(b) \operatorname{Si}(a z) z^2 + a \cos(b + a z) z + \sin(b + a z)}{2 z^2}$$

01.06.21.0073.01

$$\int \frac{\sin(b + a z)}{z^4} \, dz = -\frac{1}{6 z^3} \left(a^3 \cos(b) \operatorname{Ci}(a z) z^3 - a^3 \sin(b) \operatorname{Si}(a z) z^3 - a^2 \sin(b + a z) z^2 + a \cos(b + a z) z + 2 \sin(b + a z)\right)$$

01.06.21.0074.01

$$\int \frac{\sin(b + a z)}{z^5} \, dz = \frac{1}{24 z^4} \left(a^4 \operatorname{Ci}(a z) \sin(b) z^4 + a^4 \cos(b) \operatorname{Si}(a z) z^4 + a^3 \cos(b + a z) z^3 + a^2 \sin(b + a z) z^2 - 2 a \cos(b + a z) z - 6 \sin(b + a z)\right)$$

01.06.21.0075.01

$$\int z^{n+\frac{1}{2}} \sin(b + a z) \, dz = -\frac{i}{2 \sqrt{a^2 z^2}} \left((i a)^{-n-1} \sqrt{z} \left((-1)^n e^{i b} \sqrt{i a z} \, \Gamma\left(n + \frac{3}{2}, -i a z\right) + e^{-i b} \sqrt{-i a z} \, \Gamma\left(n + \frac{3}{2}, i a z\right)\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0076.01

$$\int z^{n+\frac{1}{2}} \sin(b + a z) \, dz = -\frac{i (-1)^n (i a)^{-n-1} e^{-i b} \sqrt{z}}{2 \sqrt{a^2 z^2}} \left(\left(e^{2 i b} \sqrt{i a z} \operatorname{erfc}\left(\sqrt{-i a z}\right) + (-1)^n \sqrt{-i a z} \operatorname{erfc}\left(\sqrt{i a z}\right)\right) \Gamma\left(n + \frac{3}{2}\right) + e^{2 i b + i a z} \sqrt{i a z} \left(\sum_{k=0}^{n} \frac{(-i a z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} - \sum_{k=n+1}^{-1} \frac{(-i a z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}}\right) + (-1)^n e^{-i a z} \sqrt{-i a z} \left(\sum_{k=0}^{n} \frac{(i a z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} - \sum_{k=n+1}^{-1} \frac{(i a z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}}\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0077.01

$$\int \sqrt{z} \sin(b + a z) \, dz = -\frac{1}{2 a^{3/2}} \left(2 \sqrt{a} \sqrt{z} \cos(b + a z) - \sqrt{2 \pi} \cos(b) C\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z}\right) + \sqrt{2 \pi} S\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z}\right) \sin(b)\right)$$

01.06.21.0078.01

$$\int z^{3/2} \sin(b + a z) \, dz = \frac{1}{4 a^{5/2}} \left(-3 \sqrt{2 \pi} \cos(b) S\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z}\right) - 3 \sqrt{2 \pi} C\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z}\right) \sin(b) + 2 \sqrt{a} \sqrt{z} \left(3 \sin(b + a z) - 2 a z \cos(b + a z)\right)\right)$$

01.06.21.0079.01

$$\int z^{5/2}\sin(b+a\,z)\,dz = \frac{1}{8\,a^{7/2}}\left(-15\sqrt{2\pi}\,\cos(b)\,C\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)+ 15\sqrt{2\pi}\,S\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)\sin(b)+2\sqrt{a}\,\sqrt{z}\,\left(\left(15-4\,a^2\,z^2\right)\cos(b+a\,z)+10\,a\,z\sin(b+a\,z)\right)\right)$$

01.06.21.0080.01

$$\int z^{7/2}\sin(b+a\,z)\,dz = \frac{1}{16\,a^{9/2}}\left(105\sqrt{2\pi}\,\cos(b)\,S\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)+ 105\sqrt{2\pi}\,C\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)\sin(b)+2\sqrt{a}\,\sqrt{z}\,\left(\left(70\,a\,z-8\,a^3\,z^3\right)\cos(b+a\,z)+7\left(4\,a^2\,z^2-15\right)\sin(b+a\,z)\right)\right)$$

01.06.21.0081.01

$$\int z^{9/2}\sin(b+a\,z)\,dz = \frac{1}{32\,a^{11/2}}\left(945\sqrt{2\pi}\,\cos(b)\,C\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)-945\sqrt{2\pi}\,S\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)\sin(b)- 2\sqrt{a}\,\sqrt{z}\,\left(\left(16\,a^4\,z^4-252\,a^2\,z^2+945\right)\cos(b+a\,z)+18\,a\,z\left(35-4\,a^2\,z^2\right)\sin(b+a\,z)\right)\right)$$

01.06.21.0082.01

$$\int \frac{\sin(b+a\,z)}{\sqrt{z}}\,dz = \frac{\sqrt{2\pi}}{\sqrt{a}}\left(\cos(b)\,S\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)+C\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)\sin(b)\right)$$

01.06.21.0083.01

$$\int \frac{\sin(b+a\,z)}{z^{3/2}}\,dz = 2\sqrt{a}\,\sqrt{2\pi}\,\cos(b)\,C\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)-2\sqrt{a}\,\sqrt{2\pi}\,S\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)\sin(b)-\frac{2\sin(b+a\,z)}{\sqrt{z}}$$

01.06.21.0084.01

$$\int \frac{\sin(b+a\,z)}{z^{5/2}}\,dz = -\frac{1}{3\,z^{3/2}} \left(2\left(2\,a^{3/2}\sqrt{2\pi}\,\cos(b)\,S\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)z^{3/2}+2\,a^{3/2}\sqrt{2\pi}\,C\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)\sin(b)\,z^{3/2}+2\,a\cos(b+a\,z)\,z+\sin(b+a\,z)\right)\right)$$

01.06.21.0085.01

$$\int \frac{\sin(b+a\,z)}{z^{7/2}}\,dz = -\frac{1}{15\,z^{5/2}}\left(2\left(4\,a^{5/2}\sqrt{2\pi}\,\cos(b)\,C\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)z^{5/2}- 4\,a^{5/2}\sqrt{2\pi}\,S\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\,\sqrt{z}\right)\sin(b)\,z^{5/2}-4\,a^2\sin(b+a\,z)\,z^2+2\,a\cos(b+a\,z)\,z+3\sin(b+a\,z)\right)\right)$$

01.06.21.0086.01

$$\int \frac{\sin(b + a z)}{z^{9/2}} \, dz = \frac{1}{105 z^{7/2}} \left(2 \left(8 a^{7/2} \sqrt{2\pi} \cos(b) S\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z}\right) z^{7/2} + 8 a^{7/2} \sqrt{2\pi} \, C\left(\sqrt{a} \sqrt{\frac{2}{\pi}} \sqrt{z}\right) \sin(b) z^{7/2} + 8 a^3 \cos(b + a z) z^3 + 4 a^2 \sin(b + a z) z^2 - 6 a \cos(b + a z) z - 15 \sin(b + a z)\right)\right)$$

Involving $z^{\alpha-1}$ and arguments $a\, z^r$

01.06.21.0087.01

$$\int z^{\alpha-1} \sin(a z^r) \, dz = -\frac{i z^\alpha}{2 r} \left((i a z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, i a z^r\right) - (-i a z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, -i a z^r\right)\right)$$

01.06.21.0088.01

$$\int \frac{\sin(a z^r)}{z} \, dz = \frac{\text{Si}(a z^r)}{r}$$

01.06.21.0089.01

$$\int z^{2n} \sin(a z^2) \, dz = \frac{i z}{4} \left(\frac{(-i a)^{-n}}{\sqrt{-i a z^2}} \left(\text{erfc}\left(\sqrt{-i a z^2}\right) \Gamma\left(n + \frac{1}{2}\right) + e^{i a z^2} \sum_{k=0}^{n-1} \frac{(-i a z^2)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}} - e^{i a z^2} \sum_{k=n}^{-1} \frac{(-i a z^2)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}}\right) - \frac{(i a)^{-n}}{\sqrt{i a z^2}} \left(\text{erfc}\left(\sqrt{i a z^2}\right) \Gamma\left(n + \frac{1}{2}\right) + e^{-i a z^2} \sum_{k=0}^{n-1} \frac{(i a z^2)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}} - e^{-i a z^2} \sum_{k=n}^{-1} \frac{(i a z^2)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}}\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0090.01

$$\int z^{2n-1} \sin(a z^2) \, dz = \frac{1}{4} i \left((-i a)^{-n} \left(\frac{(-1)^{n-1} \text{Ei}(i a z^2)}{(-n)!} + e^{i a z^2} \sum_{k=0}^{n-1} \frac{(-i a z^2)^k}{(n)_{k-n+1}} - e^{i a z^2} \sum_{k=n}^{-1} \frac{(-i a z^2)^k}{(n)_{k-n+1}}\right) - (i a)^{-n} \left(\frac{(-1)^{n-1} \text{Ei}(-i a z^2)}{(-n)!} + e^{-i a z^2} \sum_{k=0}^{n-1} \frac{(i a z^2)^k}{(n)_{k-n+1}} - e^{-i a z^2} \sum_{k=n}^{-1} \frac{(i a z^2)^k}{(n)_{k-n+1}}\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0091.01

$$\int z \sin(a z^2) \, dz = -\frac{\cos(a z^2)}{2 a}$$

01.06.21.0092.01

$$\int z^2 \sin(a z^2) \, dz = \frac{1}{4} \left(\frac{\sqrt{2\pi}}{a^{3/2}} C\left(\sqrt{a} \sqrt{\frac{2}{\pi}} z\right) - \frac{2 z \cos(a z^2)}{a}\right)$$

01.06.21.0093.01

$$\int z^3 \sin(a z^2) \, dz = \frac{\sin(a z^2) - a z^2 \cos(a z^2)}{2 a^2}$$

01.06.21.0094.01

$$\int z^4 \sin(a z^2)\,dz = \frac{1}{8}\left(\frac{6 z \sin(a z^2) - 4 a z^3 \cos(a z^2)}{a^2} - \frac{3\sqrt{2\pi}}{a^{5/2}} S\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\, z\right)\right)$$

01.06.21.0095.01

$$\int z^5 \sin(a z^2)\,dz = \frac{2 a \sin(a z^2) z^2 + (2 - a^2 z^4)\cos(a z^2)}{2 a^3}$$

01.06.21.0096.01

$$\int \frac{\sin(a z^2)}{z}\,dz = \frac{1}{2}\operatorname{Si}(a z^2)$$

01.06.21.0097.01

$$\int \frac{\sin(a z^2)}{z^2}\,dz = \sqrt{a}\sqrt{2\pi}\, C\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\, z\right) - \frac{\sin(a z^2)}{z}$$

01.06.21.0098.01

$$\int \frac{\sin(a z^2)}{z^3}\,dz = \frac{1}{2}\left(a \operatorname{Ci}(a z^2) - \frac{\sin(a z^2)}{z^2}\right)$$

01.06.21.0099.01

$$\int \frac{\sin(a z^2)}{z^4}\,dz = -\frac{1}{3 z^3}\left(2\sqrt{2\pi}\, z^3 S\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\, z\right) a^{3/2} + 2 z^2 \cos(a z^2)\, a + \sin(a z^2)\right)$$

01.06.21.0100.01

$$\int \frac{\sin(a z^2)}{z^5}\,dz = -\frac{a^2 \operatorname{Si}(a z^2) z^4 + a \cos(a z^2) z^2 + \sin(a z^2)}{4 z^4}$$

01.06.21.0101.01

$$\int z^n \sin(a\sqrt{z})\,dz = i\, a^{-2(n+1)} (-1)^{n-1} \left(\frac{\operatorname{Ei}(-i a \sqrt{z})}{(-2n-2)!} + e^{i a \sqrt{z}} \sum_{k=0}^{2n+1} \frac{(-i a \sqrt{z})^k}{(2n+2)_{k-2n-1}} - e^{i a \sqrt{z}} \sum_{k=2n+2}^{-1} \frac{(-i a \sqrt{z})^k}{(2n+2)_{k-2n-1}} - \right.$$
$$\left. e^{-i a \sqrt{z}} \sum_{k=0}^{2n+1} \frac{(i a \sqrt{z})^k}{(2n+2)_{k-2n-1}} + e^{-i a \sqrt{z}} \sum_{k=2n+2}^{-1} \frac{(i a \sqrt{z})^k}{(2n+2)_{k-2n-1}} - \frac{\operatorname{Ei}(i a \sqrt{z})}{(-2n-2)!}\right) /;\ n \in \mathbb{Z}$$

01.06.21.0102.01

$$\int z \sin(a\sqrt{z})\,dz = -\frac{2\left(a\sqrt{z}\,(a^2 z - 6)\cos(a\sqrt{z}) - 3(a^2 z - 2)\sin(a\sqrt{z})\right)}{a^4}$$

01.06.21.0103.01

$$\int z^2 \sin(a\sqrt{z})\,dz = -\frac{2\left(a\sqrt{z}\,(z^2 a^4 - 20 z a^2 + 120)\cos(a\sqrt{z}) - 5(z^2 a^4 - 12 z a^2 + 24)\sin(a\sqrt{z})\right)}{a^6}$$

01.06.21.0104.01

$$\int z^3 \sin(a\sqrt{z})\,dz =$$
$$-\frac{1}{a^8}\left(2\left(a\sqrt{z}\,(z^3 a^6 - 42 z^2 a^4 + 840 z a^2 - 5040)\cos(a\sqrt{z}) - 7(z^3 a^6 - 30 z^2 a^4 + 360 z a^2 - 720)\sin(a\sqrt{z})\right)\right)$$

01.06.21.0105.01

$$\int z^4 \sin\left(a\sqrt{z}\right) dz = -\frac{1}{a^{10}}\left(2\left(a\sqrt{z}\left(z^4 a^8 - 72 z^3 a^6 + 3024 z^2 a^4 - 60\,480 z a^2 + 362\,880\right)\cos\left(a\sqrt{z}\right) - 9\left(z^4 a^8 - 56 z^3 a^6 + 1680 z^2 a^4 - 20\,160 z a^2 + 40\,320\right)\sin\left(a\sqrt{z}\right)\right)\right)$$

01.06.21.0106.01

$$\int z^5 \sin\left(a\sqrt{z}\right) dz = -\frac{1}{a^{12}}\left(2\left(a\sqrt{z}\left(z^5 a^{10} - 110 z^4 a^8 + 7920 z^3 a^6 - 332\,640 z^2 a^4 + 6\,652\,800 z a^2 - 39\,916\,800\right)\cos\left(a\sqrt{z}\right) - 11\left(z^5 a^{10} - 90 z^4 a^8 + 5040 z^3 a^6 - 151\,200 z^2 a^4 + 1\,814\,400 z a^2 - 3\,628\,800\right)\sin\left(a\sqrt{z}\right)\right)\right)$$

01.06.21.0107.01

$$\int \frac{\sin\left(a\sqrt{z}\right)}{z} dz = 2\,\mathrm{Si}\left(a\sqrt{z}\right)$$

01.06.21.0108.01

$$\int \frac{\sin\left(a\sqrt{z}\right)}{z^2} dz = -\frac{z\,\mathrm{Si}\left(a\sqrt{z}\right) a^2 + \sqrt{z}\cos\left(a\sqrt{z}\right) a + \sin\left(a\sqrt{z}\right)}{z}$$

01.06.21.0109.01

$$\int \frac{\sin\left(a\sqrt{z}\right)}{z^3} dz = \frac{z^2\,\mathrm{Si}\left(a\sqrt{z}\right) a^4 + \sqrt{z}\left(a^2 z - 2\right)\cos\left(a\sqrt{z}\right) a + \left(a^2 z - 6\right)\sin\left(a\sqrt{z}\right)}{12 z^2}$$

01.06.21.0110.01

$$\int \frac{\sin\left(a\sqrt{z}\right)}{z^4} dz = -\frac{1}{360 z^3}\left(z^3\,\mathrm{Si}\left(a\sqrt{z}\right) a^6 + \sqrt{z}\left(z^2 a^4 - 2 z a^2 + 24\right)\cos\left(a\sqrt{z}\right) a + \left(z^2 a^4 - 6 z a^2 + 120\right)\sin\left(a\sqrt{z}\right)\right)$$

01.06.21.0111.01

$$\int \frac{\sin\left(a\sqrt{z}\right)}{z^5} dz = \frac{1}{20\,160 z^4}\left(z^4\,\mathrm{Si}\left(a\sqrt{z}\right) a^8 + \sqrt{z}\left(z^3 a^6 - 2 z^2 a^4 + 24 z a^2 - 720\right)\cos\left(a\sqrt{z}\right) a + \left(z^3 a^6 - 6 z^2 a^4 + 120 z a^2 - 5040\right)\sin\left(a\sqrt{z}\right)\right)$$

Involving $z^{\alpha-1}$ and arguments $a\,z^r + b$

01.06.21.0112.01

$$\int z^{\alpha-1}\sin(a z^r + b)\,dz = \frac{i z^\alpha}{2 r}\left(e^{i b}(-i a z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r}, -i a z^r\right) - e^{-i b}(i a z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r}, i a z^r\right)\right)$$

01.06.21.0113.01

$$\int \frac{\sin(a z^r + b)}{z} dz = \frac{\mathrm{Ci}(a z^r)\sin(b) + \cos(b)\,\mathrm{Si}(a z^r)}{r}$$

01.06.21.0114.01

$$\int z^n \sin\left(a z^2 + b\right) dz = \frac{1}{4} i z^{n+1}\left(e^{i b}\left(-i a z^2\right)^{-\frac{n+1}{2}}\Gamma\left(\frac{n+1}{2}, -i a z^2\right) - e^{-i b}\left(i a z^2\right)^{-\frac{n+1}{2}}\Gamma\left(\frac{n+1}{2}, i a z^2\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0115.01

$$\int z^{2n}\sin(a z^2+b)\,dz = \frac{1}{4} i z \left(e^{i b}(-i a z^2)^{-\frac{1}{2}}(-i a)^{-n}\left(\operatorname{erfc}\left(\sqrt{-i a z^2}\right)\Gamma\left(n+\frac{1}{2}\right)+e^{i a z^2}\sum_{k=0}^{n-1}\frac{(-i a z^2)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}-e^{i a z^2}\sum_{k=n}^{-1}\frac{(-i a z^2)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}\right)-e^{-i b}(i a z^2)^{-\frac{1}{2}}(i a)^{-n}\left(\operatorname{erfc}\left(\sqrt{i a z^2}\right)\Gamma\left(n+\frac{1}{2}\right)+e^{-i a z^2}\sum_{k=0}^{n-1}\frac{(i a z^2)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}-e^{-i a z^2}\sum_{k=n}^{-1}\frac{(i a z^2)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}\right)\right) /; n\in\mathbb{Z}$$

01.06.21.0116.01

$$\int z^{2n-1}\sin(a z^2+b)\,dz = \frac{1}{4} i \left(e^{i b}(-i a)^{-n}\left(\frac{(-1)^{n-1}\operatorname{Ei}(i a z^2)}{(-n)!}+e^{i a z^2}\operatorname{Sum}\left(\frac{(-i a z^2)^k}{(n)_{k-n+1}},\{k,0,n-1\}\right)-e^{i a z^2}\operatorname{Sum}\left(\frac{(-i a z^2)^k}{(n)_{k-n+1}},\{k,n,-1\}\right)\right)-e^{-i b}(i a)^{-n}\left(\frac{(-1)^{n-1}\operatorname{Ei}(-i a z^2)}{(-n)!}+e^{-i a z^2}\operatorname{Sum}\left(\frac{(i a z^2)^k}{(n)_{k-n+1}},\{k,0,n-1\}\right)-e^{-i a z^2}\operatorname{Sum}\left(\frac{(i a z^2)^k}{(n)_{k-n+1}},\{k,n,-1\}\right)\right)\right) /; n\in\mathbb{Z}$$

01.06.21.0117.01

$$\int z\sin(a z^2+b)\,dz = -\frac{\cos(a z^2+b)}{2a}$$

01.06.21.0118.01

$$\int z^2\sin(a z^2+b)\,dz = -\frac{2\sqrt{a}\,z\cos(a z^2+b)-\sqrt{2\pi}\cos(b)\,C\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\,z\right)+\sqrt{2\pi}\,S\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\,z\right)\sin(b)}{4a^{3/2}}$$

01.06.21.0119.01

$$\int z^3\sin(a z^2+b)\,dz = \frac{\sin(a z^2+b)-a z^2\cos(a z^2+b)}{2a^2}$$

01.06.21.0120.01

$$\int z^4\sin(a z^2+b)\,dz = -\frac{1}{8a^{5/2}}\left(3\sqrt{2\pi}\cos(b)\,S\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\,z\right)+3\sqrt{2\pi}\,C\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\,z\right)\sin(b)+2\sqrt{a}\,z\left(2a z^2\cos(a z^2+b)-3\sin(a z^2+b)\right)\right)$$

01.06.21.0121.01

$$\int z^5\sin(a z^2+b)\,dz = \frac{2a\sin(a z^2+b)z^2+(2-a^2z^4)\cos(a z^2+b)}{2a^3}$$

01.06.21.0122.01

$$\int\frac{\sin(a z^2+b)}{z}\,dz = \frac{1}{2}\left(\operatorname{Ci}(a z^2)\sin(b)+\cos(b)\operatorname{Si}(a z^2)\right)$$

01.06.21.0123.01

$$\int \frac{\sin(a z^2 + b)}{z^2} \, dz = \sqrt{a} \sqrt{2\pi} \cos(b) C\left(\sqrt{a} \sqrt{\frac{2}{\pi}} z\right) - \frac{\sqrt{a} \sqrt{2\pi} z S\left(\sqrt{a} \sqrt{\frac{2}{\pi}} z\right) \sin(b) + \sin(a z^2 + b)}{z}$$

01.06.21.0124.01

$$\int \frac{\sin(a z^2 + b)}{z^3} \, dz = \frac{1}{2}\left(a \cos(b) \operatorname{Ci}(a z^2) - a \sin(b) \operatorname{Si}(a z^2) - \frac{\sin(a z^2 + b)}{z^2}\right)$$

01.06.21.0125.01

$$\int \frac{\sin(a z^2 + b)}{z^4} \, dz = -\frac{1}{3 z^3}\left(2 \sqrt{2\pi} z^3 \cos(b) S\left(\sqrt{a} \sqrt{\frac{2}{\pi}} z\right) a^{3/2} + 2 \sqrt{2\pi} z^3 C\left(\sqrt{a} \sqrt{\frac{2}{\pi}} z\right) \sin(b) a^{3/2} + 2 z^2 \cos(a z^2 + b) a + \sin(a z^2 + b)\right)$$

01.06.21.0126.01

$$\int \frac{\sin(a z^2 + b)}{z^5} \, dz = -\frac{a^2 \operatorname{Ci}(a z^2) \sin(b) z^4 + a^2 \cos(b) \operatorname{Si}(a z^2) z^4 + a \cos(a z^2 + b) z^2 + \sin(a z^2 + b)}{4 z^4}$$

01.06.21.0127.01

$$\int z^{\alpha-1} \sin(\sqrt{z} a + b) \, dz = i z^{\alpha} \left(e^{i b} \left(-i a \sqrt{z}\right)^{-2\alpha} \Gamma(2\alpha, -i a \sqrt{z}) - e^{-i b} \left(i a \sqrt{z}\right)^{-2\alpha} \Gamma(2\alpha, i a \sqrt{z})\right)$$

01.06.21.0128.01

$$\int z^n \sin(\sqrt{z} a + b) \, dz = i z^{n+1} \left(e^{i b} \left(-i a \sqrt{z}\right)^{-2(n+1)} \Gamma(2(n+1), -i a \sqrt{z}) - e^{-i b} \left(i a \sqrt{z}\right)^{-2(n+1)} \Gamma(2(n+1), i a \sqrt{z})\right) /; n \in \mathbb{Z}$$

01.06.21.0129.01

$$\int z^n \sin(\sqrt{z} a + b) \, dz = (-1)^{n-1} i a^{-2(n+1)} \left(e^{i b} \left(-\frac{\operatorname{Ei}(i a \sqrt{z})}{(-2(n+1))!} + e^{i a \sqrt{z}} \sum_{k=0}^{2(n+1)-1} \frac{\left(-i a \sqrt{z}\right)^k}{(2(n+1))_{k-2(n+1)+1}} - e^{i a \sqrt{z}} \sum_{k=2(n+1)}^{-1} \frac{\left(-i a \sqrt{z}\right)^k}{(2(n+1))_{k-2(n+1)+1}}\right) - e^{-i b} \left(-\frac{\operatorname{Ei}(-i a \sqrt{z})}{(-2(n+1))!} + e^{-i a \sqrt{z}} \sum_{k=0}^{2(n+1)-1} \frac{\left(i a \sqrt{z}\right)^k}{(2(n+1))_{k-2(n+1)+1}} - e^{-i a \sqrt{z}} \sum_{k=2(n+1)}^{-1} \frac{\left(i a \sqrt{z}\right)^k}{(2(n+1))_{k-2(n+1)+1}}\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0130.01

$$\int z \sin(\sqrt{z} a + b) \, dz = \frac{6(a^2 z - 2) \sin(\sqrt{z} a + b) - 2 a \sqrt{z} (a^2 z - 6) \cos(\sqrt{z} a + b)}{a^4}$$

01.06.21.0131.01

$$\int z^2 \sin(\sqrt{z} a + b) \, dz = \frac{1}{a^6}\left(10(z(a^2 z - 12) a^2 + 24) \sin(\sqrt{z} a + b) - 2 a \sqrt{z} (z(a^2 z - 20) a^2 + 120) \cos(\sqrt{z} a + b)\right)$$

01.06.21.0132.01

$$\int z^3 \sin(\sqrt{z} a + b) \, dz = \frac{1}{a^8}\left(14(a^2 z(z(a^2 z - 30) a^2 + 360) - 720) \sin(\sqrt{z} a + b) - 2 a \sqrt{z} (a^2 z(z(a^2 z - 42) a^2 + 840) - 5040) \cos(\sqrt{z} a + b)\right)$$

01.06.21.0133.01

$$\int z^4 \sin\left(\sqrt{z}\, a + b\right) dz = \frac{1}{a^{10}} \left(18 \left(z \left(a^2 z \left(z \left(a^2 z - 56\right) a^2 + 1680\right) - 20160\right) a^2 + 40320\right) \sin\left(\sqrt{z}\, a + b\right) - 2 a \sqrt{z} \left(z \left(a^2 z \left(z \left(a^2 z - 72\right) a^2 + 3024\right) - 60480\right) a^2 + 362880\right) \cos\left(\sqrt{z}\, a + b\right)\right)$$

01.06.21.0134.01

$$\int z^5 \sin\left(\sqrt{z}\, a + b\right) dz = -\frac{1}{a^{12}} \left(2 \left(a \sqrt{z} \left(z^5 a^{10} - 110 z^4 a^8 + 7920 z^3 a^6 - 332640 z^2 a^4 + 6652800 z a^2 - 39916800\right) \cos\left(\sqrt{z}\, a + b\right) - 11 \left(z^5 a^{10} - 90 z^4 a^8 + 5040 z^3 a^6 - 151200 z^2 a^4 + 1814400 z a^2 - 3628800\right) \sin\left(\sqrt{z}\, a + b\right)\right)\right)$$

01.06.21.0135.01

$$\int \frac{\sin\left(\sqrt{z}\, a + b\right)}{z} dz = 2 \left(\operatorname{Ci}\left(a \sqrt{z}\right) \sin(b) + \cos(b) \operatorname{Si}\left(a \sqrt{z}\right)\right)$$

01.06.21.0136.01

$$\int \frac{\sin\left(\sqrt{z}\, a + b\right)}{z^2} dz = -\frac{z \left(\operatorname{Ci}\left(a \sqrt{z}\right) \sin(b) + \cos(b) \operatorname{Si}\left(a \sqrt{z}\right)\right) a^2 + \sqrt{z} \cos\left(\sqrt{z}\, a + b\right) a + \sin\left(\sqrt{z}\, a + b\right)}{z}$$

01.06.21.0137.01

$$\int \frac{\sin\left(\sqrt{z}\, a + b\right)}{z^3} dz = \frac{1}{12 z^2} \left(z^2 \operatorname{Ci}\left(a \sqrt{z}\right) \sin(b) a^4 + z^2 \cos(b) \operatorname{Si}\left(a \sqrt{z}\right) a^4 + \sqrt{z} \left(a^2 z - 2\right) \cos\left(\sqrt{z}\, a + b\right) a + \left(a^2 z - 6\right) \sin\left(\sqrt{z}\, a + b\right)\right)$$

01.06.21.0138.01

$$\int \frac{\sin\left(\sqrt{z}\, a + b\right)}{z^4} dz = -\frac{1}{360 z^3} \left(z^3 \operatorname{Ci}\left(a \sqrt{z}\right) \sin(b) a^6 + z^3 \cos(b) \operatorname{Si}\left(a \sqrt{z}\right) a^6 + \sqrt{z} \left(z \left(a^2 z - 2\right) a^2 + 24\right) \cos\left(\sqrt{z}\, a + b\right) a + \left(z \left(a^2 z - 6\right) a^2 + 120\right) \sin\left(\sqrt{z}\, a + b\right)\right)$$

01.06.21.0139.01

$$\int \frac{\sin\left(\sqrt{z}\, a + b\right)}{z^5} dz = \frac{1}{20160 z^4} \left(24 a^3 \cos\left(\sqrt{z}\, a + b\right) z^{3/2} - 2 a^5 \cos\left(\sqrt{z}\, a + b\right) z^{5/2} + a^7 \cos\left(\sqrt{z}\, a + b\right) z^{7/2} + a^8 \operatorname{Ci}\left(a \sqrt{z}\right) \sin(b) z^4 + a^8 \cos(b) \operatorname{Si}\left(a \sqrt{z}\right) z^4 + a^6 \sin\left(\sqrt{z}\, a + b\right) z^3 - 6 a^4 \sin\left(\sqrt{z}\, a + b\right) z^2 + 120 a^2 \sin\left(\sqrt{z}\, a + b\right) z - 720 a \cos\left(\sqrt{z}\, a + b\right) \sqrt{z} - 5040 \sin\left(\sqrt{z}\, a + b\right)\right)$$

Involving rational functions

Involving $(a z + b)^{-n}$

01.06.21.0140.01

$$\int \frac{\sin(c z)}{b + a z} dz = \frac{1}{a} \left(\cos\left(\frac{b c}{a}\right) \operatorname{Si}\left(c \left(\frac{b}{a} + z\right)\right) - \operatorname{Ci}\left(c \left(\frac{b}{a} + z\right)\right) \sin\left(\frac{b c}{a}\right)\right)$$

01.06.21.0141.01

$$\int \frac{\sin(c\,z)}{(b+a\,z)^2}\,dz = \frac{1}{a^2}\left(c\cos\left(\frac{b\,c}{a}\right)\text{Ci}\left(c\left(\frac{b}{a}+z\right)\right)+c\sin\left(\frac{b\,c}{a}\right)\text{Si}\left(c\left(\frac{b}{a}+z\right)\right)-\frac{a\sin(c\,z)}{b+a\,z}\right)$$

01.06.21.0142.01

$$\int \frac{\sin(c\,z)}{(b+a\,z)^3}\,dz = -\frac{1}{2\,a^3}\left(\cos\left(\frac{b\,c}{a}\right)\text{Si}\left(c\left(\frac{b}{a}+z\right)\right)c^2-c^2\,\text{Ci}\left(c\left(\frac{b}{a}+z\right)\right)\sin\left(\frac{b\,c}{a}\right)+\frac{a\,(c\,(b+a\,z)\cos(c\,z)+a\sin(c\,z))}{(b+a\,z)^2}\right)$$

01.06.21.0143.01

$$\int \frac{\sin(c\,z)}{(b+a\,z)^4}\,dz = -\frac{1}{6\,a^4}\left(\left(\cos\left(\frac{b\,c}{a}\right)\text{Ci}\left(c\left(\frac{b}{a}+z\right)\right)+\sin\left(\frac{b\,c}{a}\right)\text{Si}\left(c\left(\frac{b}{a}+z\right)\right)\right)c^3+\frac{a^2\cos(c\,z)\,c}{(b+a\,z)^2}-\frac{a\left(\left(c^2\,z^2-2\right)a^2+2\,b\,c^2\,z\,a+b^2\,c^2\right)\sin(c\,z)}{(b+a\,z)^3}\right)$$

01.06.21.0144.01

$$\int \frac{\sin(c\,z)}{(b+a\,z)^5}\,dz = \frac{1}{24\,a^5}\left(-\left(\text{Ci}\left(c\left(\frac{b}{a}+z\right)\right)\sin\left(\frac{b\,c}{a}\right)-\cos\left(\frac{b\,c}{a}\right)\text{Si}\left(c\left(\frac{b}{a}+z\right)\right)\right)c^4+\frac{a\left(\left(c^2\,z^2-2\right)a^2+2\,b\,c^2\,z\,a+b^2\,c^2\right)\cos(c\,z)\,c}{(b+a\,z)^3}+\frac{a^2\left(\left(c^2\,z^2-6\right)a^2+2\,b\,c^2\,z\,a+b^2\,c^2\right)\sin(c\,z)}{(b+a\,z)^4}\right)$$

01.06.21.0145.01

$$\int \frac{\sin(c\,z)}{(b+a\,z)^6}\,dz = \frac{1}{120\,a^6}\left(\left(\cos\left(\frac{b\,c}{a}\right)\text{Ci}\left(c\left(\frac{b}{a}+z\right)\right)+\sin\left(\frac{b\,c}{a}\right)\text{Si}\left(c\left(\frac{b}{a}+z\right)\right)\right)c^5+\frac{a^2\left(\left(c^2\,z^2-6\right)a^2+2\,b\,c^2\,z\,a+b^2\,c^2\right)\cos(c\,z)\,c}{(b+a\,z)^4}-\frac{1}{(b+a\,z)^5}\left(a\left(\left(c^4\,z^4-2\,c^2\,z^2+24\right)a^4+4\,b\,c^2\,z\left(c^2\,z^2-1\right)a^3+2\,b^2\,c^2\left(3\,c^2\,z^2-1\right)a^2+4\,b^3\,c^4\,z\,a+b^4\,c^4\right)\sin(c\,z)\right)\right)$$

01.06.21.0146.01

$$\int \frac{z\sin(c\,z)}{b+a\,z}\,dz = -\frac{a\cos(c\,z)-b\,c\,\text{Ci}\left(c\left(\frac{b}{a}+z\right)\right)\sin\left(\frac{b\,c}{a}\right)+b\,c\cos\left(\frac{b\,c}{a}\right)\text{Si}\left(c\left(\frac{b}{a}+z\right)\right)}{a^2\,c}$$

01.06.21.0147.01

$$\int \frac{z^2\sin(c\,z)}{b+a\,z}\,dz = \frac{1}{a^3\,c^2}\left(-b^2\,\text{Ci}\left(c\left(\frac{b}{a}+z\right)\right)\sin\left(\frac{b\,c}{a}\right)c^2+b^2\cos\left(\frac{b\,c}{a}\right)\text{Si}\left(c\left(\frac{b}{a}+z\right)\right)c^2+a\,(c\,(b-a\,z)\cos(c\,z)+a\sin(c\,z))\right)$$

01.06.21.0148.01

$$\int \frac{z\sin(c\,z)}{(b+a\,z)^2}\,dz = \frac{1}{a^3\,(b+a\,z)}\left(-(b+a\,z)\,\text{Ci}\left(c\left(\frac{b}{a}+z\right)\right)\left(b\,c\cos\left(\frac{b\,c}{a}\right)+a\sin\left(\frac{b\,c}{a}\right)\right)+a\,b\sin(c\,z)+(b+a\,z)\left(a\cos\left(\frac{b\,c}{a}\right)-b\,c\sin\left(\frac{b\,c}{a}\right)\right)\text{Si}\left(c\left(\frac{b}{a}+z\right)\right)\right)$$

01.06.21.0149.01

$$\int \frac{z^2 \sin(c z)}{(b + a z)^2} \, dz = \frac{1}{a^4 c (b + a z)} \left(b c (b + a z) \operatorname{Ci}\left(c \left(\frac{b}{a} + z\right)\right) \left(b c \cos\left(\frac{b c}{a}\right) + 2 a \sin\left(\frac{b c}{a}\right)\right) - a \left(c \sin(c z) b^2 + a (b + a z) \cos(c z)\right) + b c (b + a z) \left(b c \sin\left(\frac{b c}{a}\right) - 2 a \cos\left(\frac{b c}{a}\right)\right) \operatorname{Si}\left(c \left(\frac{b}{a} + z\right)\right)\right)$$

01.06.21.0150.01

$$\int \frac{z^3 \sin(c z)}{(b + a z)^2} \, dz = \frac{1}{a^5} \left(-\frac{(a z - 2 b) \cos(c z) a^2}{c} + \frac{\left(z a^3 + b a^2 + b^3 c^2\right) \sin(c z) a}{c^2 (b + a z)} - b^2 \left(\operatorname{Ci}\left(c \left(\frac{b}{a} + z\right)\right) \left(b c \cos\left(\frac{b c}{a}\right) + 3 a \sin\left(\frac{b c}{a}\right)\right) + \left(b c \sin\left(\frac{b c}{a}\right) - 3 a \cos\left(\frac{b c}{a}\right)\right) \operatorname{Si}\left(c \left(\frac{b}{a} + z\right)\right)\right)\right)$$

01.06.21.0151.01

$$\int \frac{z^4 \sin(c z)}{(b + a z)^2} \, dz = \frac{1}{a^6 c^3 (b + a z)} \left(b^3 (b + a z) \operatorname{Ci}\left(c \left(\frac{b}{a} + z\right)\right) \left(b c \cos\left(\frac{b c}{a}\right) + 4 a \sin\left(\frac{b c}{a}\right)\right) c^3 + b^3 (b + a z) \left(b c \sin\left(\frac{b c}{a}\right) - 4 a \cos\left(\frac{b c}{a}\right)\right) \operatorname{Si}\left(c \left(\frac{b}{a} + z\right)\right) c^3 - a \left(a (b + a z) \left(\left(c^2 z^2 - 2\right) a^2 - 2 b c^2 z a + 3 b^2 c^2\right) \cos(c z) + c \left(-2 z^2 a^4 + 2 b^2 a^2 + b^4 c^2\right) \sin(c z)\right)\right)$$

Involving $\left(a z^2 + b\right)^{-n}$

01.06.21.0152.01

$$\int \frac{\sin(c z)}{a z^2 + b} \, dz = \frac{1}{2 \sqrt{a} \sqrt{b}} \left(\operatorname{Ci}\left(c \left(\frac{i \sqrt{b}}{\sqrt{a}} + z\right)\right) \sinh\left(\frac{\sqrt{b}\, c}{\sqrt{a}}\right) + \operatorname{Ci}\left(c \left(-\frac{i \sqrt{b}}{\sqrt{a}} + z\right)\right) \sinh\left(\frac{\sqrt{b}\, c}{\sqrt{a}}\right) + i \cosh\left(\frac{\sqrt{b}\, c}{\sqrt{a}}\right) \left(\operatorname{Si}\left(c \left(\frac{i \sqrt{b}}{\sqrt{a}} + z\right)\right) + \operatorname{Si}\left(\frac{i \sqrt{b}\, c}{\sqrt{a}} - c z\right)\right)\right)$$

01.06.21.0153.01

$$\int \frac{\sin(z)}{z^2 - 1} \, dz = \frac{1}{2} (\sin(1) \operatorname{Ci}(1 - z) - \cos(1) (\operatorname{Si}(1 - z) + \operatorname{Si}(z + 1)) + \operatorname{Ci}(z + 1) \sin(1))$$

01.06.21.0154.01

$$\int \frac{z \sin(c z)}{a z^2 + b} \, dz = \frac{1}{2 a} \left(-i \operatorname{Ci}\left(c \left(\frac{i \sqrt{b}}{\sqrt{a}} + z\right)\right) \sinh\left(\frac{\sqrt{b}\, c}{\sqrt{a}}\right) + i \operatorname{Ci}\left(c \left(-\frac{i \sqrt{b}}{\sqrt{a}} + z\right)\right) \sinh\left(\frac{\sqrt{b}\, c}{\sqrt{a}}\right) + \cosh\left(\frac{\sqrt{b}\, c}{\sqrt{a}}\right) \left(\operatorname{Si}\left(c \left(\frac{i \sqrt{b}}{\sqrt{a}} + z\right)\right) + \operatorname{Si}\left(c \left(-\frac{i \sqrt{b}}{\sqrt{a}} + z\right)\right)\right)\right)$$

01.06.21.0155.01

$$\int \frac{\sin(c\,z)}{\left(a\,z^2+b\right)^2}\,dz = \frac{1}{4\,a\,b^{3/2}\left(a\,z^2+b\right)}\left(-\left(a\,z^2+b\right)\mathrm{Ci}\left(c\left(\frac{i\sqrt{b}}{\sqrt{a}}+z\right)\right)\left(\sqrt{b}\,c\cosh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)-\sqrt{a}\,\sinh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)\right)-\left(a\,z^2+b\right)\mathrm{Ci}\left(c\left(-\frac{i\sqrt{b}}{\sqrt{a}}+z\right)\right)\left(\sqrt{b}\,c\cosh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)-\sqrt{a}\,\sinh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)\right)-i\left(\left(a\,z^2+b\right)\left(\sqrt{b}\,c\sinh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)-\sqrt{a}\,\cosh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)\right)\mathrm{Si}\left(c\left(\frac{i\sqrt{b}}{\sqrt{a}}+z\right)\right)+\sqrt{a}\left(a\,z^2+b\right)\cosh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)\mathrm{Si}\left(c\left(-\frac{i\sqrt{b}}{\sqrt{a}}+z\right)\right)+\sqrt{b}\left(2\,a\,i\,z\sin(c\,z)+c\left(a\,z^2+b\right)\sinh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)\mathrm{Si}\left(\frac{i\sqrt{b}\,c}{\sqrt{a}}-c\,z\right)\right)\right)\right)$$

01.06.21.0156.01

$$\int \frac{z\sin(c\,z)}{\left(a\,z^2+b\right)^2}\,dz = \frac{1}{4\,a^{3/2}}\left(-\frac{2\sqrt{a}\,\sin(c\,z)}{a\,z^2+b}+\frac{c\left(i\cosh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)\mathrm{Ci}\left(c\left(\frac{i\sqrt{b}}{\sqrt{a}}+z\right)\right)-\sinh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)\mathrm{Si}\left(c\left(\frac{i\sqrt{b}}{\sqrt{a}}+z\right)\right)\right)}{\sqrt{b}}+\frac{c\left(\sinh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)\mathrm{Si}\left(\frac{i\sqrt{b}\,c}{\sqrt{a}}-c\,z\right)-i\cosh\left(\frac{\sqrt{b}\,c}{\sqrt{a}}\right)\mathrm{Ci}\left(c\left(-\frac{i\sqrt{b}}{\sqrt{a}}+z\right)\right)\right)}{\sqrt{b}}\right)$$

Involving $\left(a\,z^2+b\,z+c\right)^{-n}$

01.06.21.0157.01

$$\int \frac{\sin(d\,z)}{a\,z^2+b\,z+c}\,dz = \frac{1}{\sqrt{b^2-4\,a\,c}}\left(-\mathrm{Ci}\left(\frac{d\left(b+2\,a\,z-\sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\sin\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)+\mathrm{Ci}\left(\frac{d\left(b+2\,a\,z+\sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\sin\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)+\cos\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\mathrm{Si}\left(\frac{d\left(b+2\,a\,z-\sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)-\cos\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\mathrm{Si}\left(\frac{d\left(b+2\,a\,z+\sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\right)$$

01.06.21.0158.01

$$\int \frac{z \sin(d\,z)}{a\,z^2 + b\,z + c}\, dz = \frac{1}{2\,a\sqrt{b^2 - 4\,a\,c}} \left(-\left(\sqrt{b^2-4\,a\,c} - b\right)\left(\operatorname{Ci}\left(\frac{d\left(b + 2\,a\,z - \sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\sin\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right) - \cos\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\operatorname{Si}\left(\frac{d\left(b + 2\,a\,z - \sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\right) - \left(b + \sqrt{b^2-4\,a\,c}\right)\left(\operatorname{Ci}\left(\frac{d\left(b + 2\,a\,z + \sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\sin\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right) - \cos\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\operatorname{Si}\left(\frac{d\left(b + 2\,a\,z + \sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\right)\right)$$

01.06.21.0159.01

$$\int \frac{\sin(d\,z)}{\left(a\,z^2 + b\,z + c\right)^2}\, dz = \left((c + z\,(b + a\,z))\left(\operatorname{Ci}\left(\frac{d\left(b + 2\,a\,z - \sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\left(\sqrt{b^2-4\,a\,c}\; d\cos\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right) + 2\,a\sin\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\right) + \operatorname{Ci}\left(\frac{d\left(b + 2\,a\,z + \sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\left(\sqrt{b^2-4\,a\,c}\; d\cos\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right) - 2\,a\sin\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\right)\right) - \sqrt{b^2-4\,a\,c}\;(b + 2\,a\,z)\sin(d\,z)\right) \Big/ \left(\left(b^2-4\,a\,c\right)^{3/2}(c + z\,(b + a\,z))\right) + \frac{1}{\left(b^2-4\,a\,c\right)^{3/2}}\left(\left(\sqrt{b^2-4\,a\,c}\; d\sin\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right) - 2\,a\cos\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\right)\operatorname{Si}\left(\frac{d\left(b + 2\,a\,z - \sqrt{b^2-4\,a\,c}\right)}{2\,a}\right) + \left(2\,a\cos\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right) + \sqrt{b^2-4\,a\,c}\; d\sin\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\right)\operatorname{Si}\left(\frac{d\left(b + 2\,a\,z + \sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\right)$$

01.06.21.0160.01

$$\int \frac{z\sin(d\,z)}{\left(a\,z^2+b\,z+c\right)^2}\,dz = \frac{1}{2\,a\left(b^2-4\,a\,c\right)^{3/2}}\left(\left(-\left(-b^2+\sqrt{b^2-4\,a\,c}\;b+4\,a\,c\right)d\cos\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)-2\,a\,b\sin\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\right)\right.$$
$$\left.\text{Ci}\left(\frac{d\left(b+2\,a\,z-\sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\right)+$$
$$\frac{1}{2\,a\left(b^2-4\,a\,c\right)^{3/2}}\left(\left(2\,a\,b\sin\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)-\left(b^2+\sqrt{b^2-4\,a\,c}\;b-4\,a\,c\right)d\cos\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\right)\right.$$
$$\left.\text{Ci}\left(\frac{d\left(b+2\,a\,z+\sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\right)+\frac{(2\,c+b\,z)\sin(d\,z)}{\left(b^2-4\,a\,c\right)(c+z\,(b+a\,z))}+$$
$$\frac{1}{2\,a\left(b^2-4\,a\,c\right)^{3/2}}\left(\left(2\,a\,b\cos\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)+\left(b^2-\sqrt{b^2-4\,a\,c}\;b-4\,a\,c\right)d\sin\left(\frac{\left(b-\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\right)\right.$$
$$\left.\text{Si}\left(\frac{d\left(b+2\,a\,z-\sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\right)+$$
$$\frac{1}{2\,a\left(b^2-4\,a\,c\right)^{3/2}}\left(\left(-2\,a\,b\cos\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)-\left(b^2+\sqrt{b^2-4\,a\,c}\;b-4\,a\,c\right)d\sin\left(\frac{\left(b+\sqrt{b^2-4\,a\,c}\right)d}{2\,a}\right)\right)\right.$$
$$\left.\text{Si}\left(\frac{d\left(b+2\,a\,z+\sqrt{b^2-4\,a\,c}\right)}{2\,a}\right)\right)$$

Involving algebraic functions

Involving $(a\,z+b)^{\beta}$

01.06.21.0161.01

$$\int (b+a\,z)^{\beta} \sin(d+c\,z)\,dz = -\frac{1}{2\,c}\left((b+a\,z)^{\beta}\left(\frac{c^2\,(b+a\,z)^2}{a^2}\right)^{-\beta}\left(\Gamma\left(\beta+1,-\frac{i\,c\,(b+a\,z)}{a}\right)\left(\cos\left(\frac{b\,c}{a}-d\right)-i\sin\left(\frac{b\,c}{a}-d\right)\right)\left(\frac{i\,c\,(b+a\,z)}{a}\right)^{\beta}+\left(-\frac{i\,c\,(b+a\,z)}{a}\right)^{\beta}\Gamma\left(\beta+1,\frac{i\,c\,(b+a\,z)}{a}\right)\left(\cos\left(\frac{b\,c}{a}-d\right)+i\sin\left(\frac{b\,c}{a}-d\right)\right)\right)\right)$$

01.06.21.0162.01

$$\int (b+a\,z)^{\beta} \sin(c\,z)\,dz = -\frac{1}{2\,c}\left((b+a\,z)^{\beta}\left(\frac{c^2\,(b+a\,z)^2}{a^2}\right)^{-\beta}\left(\Gamma\left(\beta+1,-\frac{i\,c\,(b+a\,z)}{a}\right)\left(\cos\left(\frac{b\,c}{a}\right)-i\sin\left(\frac{b\,c}{a}\right)\right)\left(\frac{i\,c\,(b+a\,z)}{a}\right)^{\beta}+\left(-\frac{i\,c\,(b+a\,z)}{a}\right)^{\beta}\Gamma\left(\beta+1,\frac{i\,c\,(b+a\,z)}{a}\right)\left(\cos\left(\frac{b\,c}{a}\right)+i\sin\left(\frac{b\,c}{a}\right)\right)\right)\right)$$

01.06.21.0163.01

$$\int (b+a\,z)^{3/2} \sin(c\,z)\,dz = \frac{1}{4\,a^2\left(\frac{c}{a}\right)^{5/2}}\left(-3\,a\sqrt{2\,\pi}\,\cos\left(\frac{b\,c}{a}\right)S\left(\sqrt{\frac{c}{a}}\sqrt{\frac{2}{\pi}}\sqrt{b+a\,z}\right)+3\,a\sqrt{2\,\pi}\,C\left(\sqrt{\frac{c}{a}}\sqrt{\frac{2}{\pi}}\sqrt{b+a\,z}\right)\sin\left(\frac{b\,c}{a}\right)-2\sqrt{\frac{c}{a}}\sqrt{b+a\,z}\,(2\,c\,(b+a\,z)\cos(c\,z)-3\,a\sin(c\,z))\right)$$

01.06.21.0164.01

$$\int \sqrt{a\,z+b}\,\sin(c\,z)\,dz = \frac{1}{2\,c\sqrt{\frac{c}{a}}}\left(-2\sqrt{\frac{c}{a}}\sqrt{b+a\,z}\,\cos(c\,z)+\sqrt{2\,\pi}\,\cos\left(\frac{b\,c}{a}\right)C\left(\sqrt{\frac{c}{a}}\sqrt{\frac{2}{\pi}}\sqrt{b+a\,z}\right)+\sqrt{2\,\pi}\,S\left(\sqrt{\frac{c}{a}}\sqrt{\frac{2}{\pi}}\sqrt{b+a\,z}\right)\sin\left(\frac{b\,c}{a}\right)\right)$$

01.06.21.0165.01

$$\int \frac{\sin(c\,z)}{\sqrt{a\,z+b}}\,dz = \frac{1}{c}\sqrt{\frac{c}{a}}\sqrt{2\,\pi}\left(\cos\left(\frac{b\,c}{a}\right)S\left(\sqrt{\frac{c}{a}}\sqrt{\frac{2}{\pi}}\sqrt{b+a\,z}\right)-C\left(\sqrt{\frac{c}{a}}\sqrt{\frac{2}{\pi}}\sqrt{b+a\,z}\right)\sin\left(\frac{b\,c}{a}\right)\right)$$

01.06.21.0166.01

$$\int \frac{\sin(c\,z)}{(b+a\,z)^{3/2}}\,dz = \frac{2}{a}\left(\sqrt{\frac{c}{a}}\sqrt{2\,\pi}\,\cos\left(\frac{b\,c}{a}\right)C\left(\sqrt{\frac{c}{a}}\sqrt{\frac{2}{\pi}}\sqrt{b+a\,z}\right)+\sqrt{\frac{c}{a}}\sqrt{2\,\pi}\,S\left(\sqrt{\frac{c}{a}}\sqrt{\frac{2}{\pi}}\sqrt{b+a\,z}\right)\sin\left(\frac{b\,c}{a}\right)-\frac{\sin(c\,z)}{\sqrt{b+a\,z}}\right)$$

Involving exponential function

Involving exp

Involving $a^{b z} \sin(c z)$

01.06.21.0167.01

$$\int a^{b z} \sin(c z)\, dz = \frac{a^{b z} (b \log(a) \sin(c z) - c \cos(c z))}{c^2 + b^2 \log^2(a)}$$

01.06.21.0168.01

$$\int e^{b z} \sin(c z)\, dz = \frac{e^{b z} (b \sin(c z) - c \cos(c z))}{b^2 + c^2}$$

01.06.21.0169.01

$$\int e^{i a z} \sin(a z)\, dz = -\frac{e^{2 i a z} - 2 i a z}{4 a}$$

01.06.21.0170.01

$$\int e^{-i a z} \sin(a z)\, dz = -\frac{2 i a z + e^{-2 i a z}}{4 a}$$

01.06.21.0171.01

$$\int e^{-a z} \sin(a z)\, dz = -\frac{e^{-a z} (\cos(a z) + \sin(a z))}{2 a}$$

Involving $a^{b z+e} \sin(c z)$

01.06.21.0172.01

$$\int a^{b z+e} \sin(c z)\, dz = \frac{a^{b z+e} (b \log(a) \sin(c z) - c \cos(c z))}{c^2 + b^2 \log^2(a)}$$

01.06.21.0173.01

$$\int e^{e+b z} \sin(c z)\, dz = \frac{e^{e+b z} (b \sin(c z) - c \cos(c z))}{b^2 + c^2}$$

01.06.21.0174.01

$$\int e^{e-i a z} \sin(a z)\, dz = -\frac{2 a e^e i z + e^{e-2 i a z}}{4 a}$$

01.06.21.0175.01

$$\int e^{e+i a z} \sin(a z)\, dz = \frac{e^e \left(2 i a z - e^{2 i a z}\right)}{4 a}$$

Involving $a^{b z} \sin(c z + d)$

01.06.21.0176.01

$$\int a^{b z} \sin(d + c z)\, dz = \frac{a^{b z} (b \log(a) \sin(d + c z) - c \cos(d + c z))}{c^2 + b^2 \log^2(a)}$$

01.06.21.0177.01

$$\int e^{b z} \sin(d + c z)\, dz = \frac{e^{b z} (b \sin(d + c z) - c \cos(d + c z))}{b^2 + c^2}$$

01.06.21.0178.01

$$\int e^{-i a z} \sin(d + a z)\, dz = -\frac{2 a e^{i d} i z + e^{-i d - 2 i a z}}{4 a}$$

01.06.21.0179.01

$$\int e^{i a z} \sin(d + a z)\, dz = \frac{e^{-i d} \left(2 i a z - e^{2 i (d + a z)}\right)}{4 a}$$

Involving $a^{b z + e} \sin(c z + d)$

01.06.21.0180.01

$$\int a^{b z + e} \sin(d + c z)\, dz = \frac{a^{b z + e} (b \log(a) \sin(d + c z) - c \cos(d + c z))}{c^2 + b^2 \log^2(a)}$$

01.06.21.0181.01

$$\int e^{e + b z} \sin(d + c z)\, dz = \frac{e^{e + b z} (b \sin(d + c z) - c \cos(d + c z))}{b^2 + c^2}$$

01.06.21.0182.01

$$\int e^{e - i a z} \sin(d + a z)\, dz = -\frac{2 a e^{e + i d} i z + e^{e - i d - 2 i a z}}{4 a}$$

01.06.21.0183.01

$$\int e^{e + i a z} \sin(d + a z)\, dz = \frac{e^{e - i d} \left(2 i a z - e^{2 i (d + a z)}\right)}{4 a}$$

Involving $a^{b z^r} \sin(c z)$

01.06.21.0184.01

$$\int a^{b z^2} \sin(c z)\, dz = \frac{i \sqrt{\pi}}{4 \sqrt{b} \log^{\frac{1}{2}}(a)} e^{\frac{c^2}{4 b \log(a)}} \left(\operatorname{erfi}\left(\frac{-i c + 2 b z \log(a)}{2 \sqrt{b} \log^{\frac{1}{2}}(a)}\right) - \operatorname{erfi}\left(\frac{i c + 2 b z \log(a)}{2 \sqrt{b} \log^{\frac{1}{2}}(a)}\right)\right)$$

01.06.21.0185.01

$$\int e^{b z^2} \sin(c z)\, dz = \frac{\sqrt{\pi}}{4 \sqrt{b}} e^{\frac{c^2}{4 b}} \left(\operatorname{erf}\left(\frac{c + 2 i b z}{2 \sqrt{b}}\right) + \operatorname{erf}\left(\frac{c - 2 i b z}{2 \sqrt{b}}\right)\right)$$

01.06.21.0186.01

$$\int e^{z^2} \sin(z)\, dz = \frac{1}{4} \sqrt[4]{e} \sqrt{\pi} \left(\operatorname{erf}\left(\frac{1}{2} - i z\right) + \operatorname{erf}\left(i z + \frac{1}{2}\right)\right)$$

01.06.21.0187.01

$$\int a^{b \sqrt{z}} \sin(c z)\, dz =$$

$$\frac{i b \sqrt{\pi}}{4 (i c)^{3/2}} e^{\frac{i b^2 \log^2(a)}{4 c}} \log(a) \left(e^{-\frac{i b^2 \log^2(a)}{2 c}} \operatorname{erf}\left(\frac{2 i c \sqrt{z} - b \log(a)}{2 \sqrt{i c}}\right) + \operatorname{erfi}\left(\frac{2 i c \sqrt{z} + b \log(a)}{2 \sqrt{i c}}\right)\right) - \frac{a^{b \sqrt{z}} \cos(c z)}{c}$$

01.06.21.0188.01

$$\int e^{b\sqrt{z}}\sin(c\,z)\,dz = \frac{i\,b\sqrt{\pi}}{4\,(i\,c)^{3/2}}\,e^{\frac{i\,b^2}{4\,c}}\left(e^{-\frac{i\,b^2}{2\,c}}\operatorname{erf}\left(\frac{2\,i\,c\sqrt{z}-b}{2\sqrt{i\,c}}\right)+\operatorname{erfi}\left(\frac{b+2\,i\,c\sqrt{z}}{2\sqrt{i\,c}}\right)\right)-\frac{e^{b\sqrt{z}}\cos(c\,z)}{c}$$

Involving $a^{b\,z^r+e}\sin(c\,z)$

01.06.21.0189.01

$$\int a^{b\,z^2+e}\sin(c\,z)\,dz = \frac{i\sqrt{\pi}}{4\sqrt{b}\,\log^{\frac{1}{2}}(a)}\,a^e\,e^{\frac{c^2}{4\,b\log(a)}}\left(\operatorname{erfi}\left(\frac{-i\,c+2\,b\,z\log(a)}{2\sqrt{b}\,\log^{\frac{1}{2}}(a)}\right)-\operatorname{erfi}\left(\frac{i\,c+2\,b\,z\log(a)}{2\sqrt{b}\,\log^{\frac{1}{2}}(a)}\right)\right)$$

01.06.21.0190.01

$$\int e^{b\,z^2+e}\sin(c\,z)\,dz = \frac{\sqrt{\pi}}{4\sqrt{b}}\,e^{\frac{c^2}{4\,b}+e}\left(\operatorname{erf}\left(\frac{c+2\,i\,b\,z}{2\sqrt{b}}\right)+\operatorname{erf}\left(\frac{c-2\,i\,b\,z}{2\sqrt{b}}\right)\right)$$

01.06.21.0191.01

$$\int a^{b\sqrt{z}+e}\sin(c\,z)\,dz = \frac{i\,b\sqrt{\pi}}{4\,(i\,c)^{3/2}}\,a^e\,e^{\frac{i\,b^2\log^2(a)}{4\,c}}\log(a)\left(e^{-\frac{i\,b^2\log^2(a)}{2\,c}}\operatorname{erf}\left(\frac{2\,i\,c\sqrt{z}-b\log(a)}{2\sqrt{i\,c}}\right)+\operatorname{erfi}\left(\frac{2\,i\,c\sqrt{z}+b\log(a)}{2\sqrt{i\,c}}\right)\right)-\frac{a^{b\sqrt{z}+e}\cos(c\,z)}{c}$$

01.06.21.0192.01

$$\int e^{b\sqrt{z}+e}\sin(c\,z)\,dz = \frac{i\,b\sqrt{\pi}}{4\,(i\,c)^{3/2}}\,e^{\frac{i\,b^2}{4\,c}+e}\left(e^{-\frac{i\,b^2}{2\,c}}\operatorname{erf}\left(\frac{2\,i\,c\sqrt{z}-b}{2\sqrt{i\,c}}\right)+\operatorname{erfi}\left(\frac{b+2\,i\,c\sqrt{z}}{2\sqrt{i\,c}}\right)\right)-\frac{e^{b\sqrt{z}+e}\cos(c\,z)}{c}$$

Involving $a^{b\,z^r+d\,z}\sin(c\,z)$

01.06.21.0193.01

$$\int a^{b\,z^2+d\,z}\sin(c\,z)\,dz = \frac{i\sqrt{\pi}}{4\sqrt{b}\,\log^{\frac{1}{2}}(a)}\,a^{-\frac{d^2}{4\,b}}\,e^{\frac{c\,(c-2\,i\,d\log(a))}{4\,b\log(a)}}\left(e^{\frac{i\,c\,d}{b}}\operatorname{erfi}\left(\frac{-i\,c+(d+2\,b\,z)\log(a)}{2\sqrt{b}\,\log^{\frac{1}{2}}(a)}\right)-\operatorname{erfi}\left(\frac{i\,c+(d+2\,b\,z)\log(a)}{2\sqrt{b}\,\log^{\frac{1}{2}}(a)}\right)\right)$$

01.06.21.0194.01

$$\int e^{b\,z^2+d\,z}\sin(c\,z)\,dz = \frac{i\sqrt{\pi}}{4\sqrt{b}}\,e^{\frac{(c-i\,d)^2}{4\,b}}\left(e^{\frac{i\,c\,d}{b}}\operatorname{erfi}\left(\frac{d-i\,c+2\,b\,z}{2\sqrt{b}}\right)-\operatorname{erfi}\left(\frac{d+i\,c+2\,b\,z}{2\sqrt{b}}\right)\right)$$

01.06.21.0195.01

$$\int a^{\sqrt{z}\,b+d\,z}\sin(c\,z)\,dz = -\frac{1}{2}\left(\frac{e^{-i\,c\,z}\,a^{\sqrt{z}\,b+d\,z}}{c+d\,i\log(a)}+\frac{e^{i\,c\,z}\,a^{\sqrt{z}\,b+d\,z}}{c-i\,d\log(a)}+\right.$$

$$\left.b\sqrt{\pi}\log(a)\left(\frac{i\,e^{\frac{b^2\log^2(a)}{4(-i\,c-d\log(a))}}\operatorname{erf}\left(\frac{-2\,i\,c\sqrt{z}-b\log(a)-2\,d\sqrt{z}\,\log(a)}{2\sqrt{-i\,c-d\log(a)}}\right)}{2\,(-i\,c-d\log(a))^{3/2}}-\frac{i\,e^{\frac{b^2\log^2(a)}{4(i\,c-d\log(a))}}\operatorname{erf}\left(\frac{2\,i\,c\sqrt{z}-b\log(a)-2\,d\sqrt{z}\,\log(a)}{2\sqrt{i\,c-d\log(a)}}\right)}{2\,(i\,c-d\log(a))^{3/2}}\right)\right)$$

01.06.21.0196.01

$$\int e^{\sqrt{z}\, b+d z} \sin(c z)\, dz = \frac{1}{2}\left(-b\sqrt{\pi}\left(\frac{i\, e^{\frac{b^2}{4(-d-i c)}} \operatorname{erf}\left(\frac{-b-2 i c\sqrt{z}-2 d\sqrt{z}}{2\sqrt{-d-i c}}\right)}{2(-d-i c)^{3/2}} - \frac{i\, e^{\frac{b^2}{4(i c-d)}} \operatorname{erf}\left(\frac{-b-2 d\sqrt{z}+2 i c\sqrt{z}}{2\sqrt{i c-d}}\right)}{2(i c-d)^{3/2}}\right) - \frac{e^{\sqrt{z}\, b-i c z+d z}}{c+i d} - \frac{e^{\sqrt{z}\, b+d z+i c z}}{c-i d}\right)$$

Involving $a^{b z^r+d z+e} \sin(c z)$

01.06.21.0197.01

$$\int a^{b z^2+d z+e} \sin(c z)\, dz = \frac{i\sqrt{\pi}}{4\sqrt{b}\, \log^{\frac{1}{2}}(a)}\, a^{e-\frac{d^2}{4 b}}\, e^{\frac{c(c-2 i d \log(a))}{4 b \log(a)}} \left(e^{\frac{i c d}{b}} \operatorname{erfi}\left(\frac{-i c+(d+2 b z)\log(a)}{2\sqrt{b}\, \log^{\frac{1}{2}}(a)}\right) + \operatorname{erfi}\left(\frac{-i c-(d+2 b z)\log(a)}{2\sqrt{b}\, \log^{\frac{1}{2}}(a)}\right)\right)$$

01.06.21.0198.01

$$\int e^{b z^2+d z+e} \sin(c z)\, dz = \frac{i\sqrt{\pi}}{4\sqrt{b}}\, e^{\frac{(c-i d)^2}{4 b}+e} \left(e^{\frac{i c d}{b}} \operatorname{erfi}\left(\frac{d-i c+2 b z}{2\sqrt{b}}\right) - \operatorname{erfi}\left(\frac{d+i c+2 b z}{2\sqrt{b}}\right)\right)$$

01.06.21.0199.01

$$\int a^{\sqrt{z}\, b+e+d z} \sin(c z)\, dz = -\frac{1}{2} a^e \left(\frac{e^{-i c z}\, a^{\sqrt{z}\, b+d z}}{c+d i \log(a)} + \frac{e^{i c z}\, a^{\sqrt{z}\, b+d z}}{c-i d \log(a)} + b i\sqrt{\pi}\log(a)\left(\frac{e^{\frac{b^2 \log^2(a)}{4(-i c-d\log(a))}} \operatorname{erf}\left(\frac{-2 i c\sqrt{z}-b\log(a)-2 d\sqrt{z}\log(a)}{2\sqrt{-i c-d\log(a)}}\right)}{2(-i c-d\log(a))^{3/2}} - \frac{e^{\frac{b^2\log^2(a)}{4(i c-d\log(a))}} \operatorname{erf}\left(\frac{2 i c\sqrt{z}-b\log(a)-2 d\sqrt{z}\log(a)}{2\sqrt{i c-d\log(a)}}\right)}{2(i c-d\log(a))^{3/2}}\right)\right)$$

01.06.21.0200.01

$$\int e^{\sqrt{z}\, b+e+d z} \sin(c z)\, dz = -\frac{1}{2} e^e \left(\frac{e^{\sqrt{z}\, b-i c z+d z}}{c+i d} + \frac{e^{\sqrt{z}\, b+d z+i c z}}{c-i d} + i b\sqrt{\pi}\left(\frac{e^{\frac{b^2}{4(-d-i c)}} \operatorname{erf}\left(\frac{-b-2 i c\sqrt{z}-2 d\sqrt{z}}{2\sqrt{-d-i c}}\right)}{2(-d-i c)^{3/2}} - \frac{e^{\frac{b^2}{4(i c-d)}} \operatorname{erf}\left(\frac{-b-2 d\sqrt{z}+2 i c\sqrt{z}}{2\sqrt{i c-d}}\right)}{2(i c-d)^{3/2}}\right)\right)$$

Involving $a^{b z^r} \sin(f z+g)$

01.06.21.0201.01

$$\int a^{b z^2} \sin(f z+g)\, dz = \frac{i\, e^{\frac{f^2}{4 b\log(a)}-i g}\sqrt{\pi}\left(\operatorname{erfi}\left(\frac{-i f+2 b z\log(a)}{2\sqrt{b\log(a)}}\right) - e^{2 i g} \operatorname{erfi}\left(\frac{i f+2 b z\log(a)}{2\sqrt{b\log(a)}}\right)\right)}{4\sqrt{b\log(a)}}$$

01.06.21.0202.01

$$\int e^{b z^2} \sin(f z + g)\, dz = \frac{e^{\frac{f^2}{4 b} - i g} \sqrt{\pi} \left(\operatorname{erf}\left(\frac{f + 2 i b z}{2 \sqrt{b}}\right) + e^{2 i g} \operatorname{erf}\left(\frac{f - 2 i b z}{2 \sqrt{b}}\right)\right)}{4 \sqrt{b}}$$

01.06.21.0203.01

$$\int a^{\sqrt{z}\, b} \sin(f z + g)\, dz = \frac{1}{4 f \sqrt{f^2}} \left(e^{-\frac{i \left(b^2 \log^2(a) + 4 f (g + f z)\right)}{4 f}} \left(b\, e^{i f z} \sqrt{i f} \sqrt{\pi} \operatorname{erfi}\left(\frac{-2 i f \sqrt{z} + b \log(a)}{2 \sqrt{-i f}}\right) \log(a) + e^{\frac{i b^2 \log^2(a)}{4 f}} \left(b\, e^{\frac{1}{4} i \left(\frac{b^2 \log^2(a)}{f} + 8 g + 4 f z\right)} \sqrt{-i f} \sqrt{\pi} \operatorname{erfi}\left(\frac{2 i f \sqrt{z} + b \log(a)}{2 \sqrt{i f}}\right) \log(a) - 2 a^{b \sqrt{z}} \left(1 + e^{2 i (g + f z)}\right) \sqrt{f^2}\right)\right)\right)$$

01.06.21.0204.01

$$\int e^{\sqrt{z}\, b} \sin(f z + g)\, dz = \frac{1}{4} e^{-i g} \left(-\frac{2 e^{b \sqrt{z} - i f z} \left(1 + e^{2 i (g + f z)}\right)}{f} + \frac{b\, e^{\frac{i \left(b^2 + 8 f g\right)}{4 f}} i \sqrt{\pi} \operatorname{erfi}\left(\frac{b + 2 i f \sqrt{z}}{2 \sqrt{i f}}\right)}{(i f)^{3/2}} - \frac{b\, e^{-\frac{i b^2}{4 f}} f \sqrt{\pi} \operatorname{erfi}\left(\frac{b - 2 i f \sqrt{z}}{2 \sqrt{-i f}}\right)}{(-i f)^{5/2}}\right)$$

Involving $a^{b z^r + e} \sin(f z + g)$

01.06.21.0205.01

$$\int a^{b z^2 + e} \sin(f z + g)\, dz = \frac{i\, a^e e^{\frac{f^2}{4 b \log(a)} - i g} \sqrt{\pi} \left(\operatorname{erfi}\left(\frac{-i f + 2 b z \log(a)}{2 \sqrt{b \log(a)}}\right) - e^{2 i g} \operatorname{erfi}\left(\frac{i f + 2 b z \log(a)}{2 \sqrt{b \log(a)}}\right)\right)}{4 \sqrt{b \log(a)}}$$

01.06.21.0206.01

$$\int e^{b z^2 + e} \sin(f z + g)\, dz = \frac{e^{\frac{f^2}{4 b} + e - i g} \sqrt{\pi} \left(\operatorname{erf}\left(\frac{f + 2 i b z}{2 \sqrt{b}}\right) + e^{2 i g} \operatorname{erf}\left(\frac{f - 2 i b z}{2 \sqrt{b}}\right)\right)}{4 \sqrt{b}}$$

01.06.21.0207.01

$$\int a^{\sqrt{z}\, b + e} \sin(f z + g)\, dz = \frac{1}{4 f \sqrt{f^2}} \left(a^e e^{-\frac{i \left(b^2 \log^2(a) + 4 f (g + f z)\right)}{4 f}} \left(b\, e^{i f z} \sqrt{i f} \sqrt{\pi} \operatorname{erfi}\left(\frac{-2 i f \sqrt{z} + b \log(a)}{2 \sqrt{-i f}}\right) \log(a) + e^{\frac{i b^2 \log^2(a)}{4 f}} \left(b\, e^{\frac{1}{4} i \left(\frac{b^2 \log^2(a)}{f} + 8 g + 4 f z\right)} \sqrt{-i f} \sqrt{\pi} \operatorname{erfi}\left(\frac{2 i f \sqrt{z} + b \log(a)}{2 \sqrt{i f}}\right) \log(a) - 2 a^{b \sqrt{z}} \left(1 + e^{2 i (g + f z)}\right) \sqrt{f^2}\right)\right)\right)$$

01.06.21.0208.01

$$\int e^{\sqrt{z}\, b+e} \sin(f\, z+g)\, dz = \frac{1}{4} e^{e-i g} \left(-\frac{2 e^{b \sqrt{z} - i f z} \left(1+e^{2 i (g+f z)}\right)}{f} + \frac{b\, e^{\frac{i (b^2+8 f g)}{4 f}}\, i \sqrt{\pi}\, \text{erfi}\left(\frac{b+2 i f \sqrt{z}}{2 \sqrt{i f}}\right)}{(i f)^{3/2}} - \frac{b\, e^{-\frac{i b^2}{4 f}}\, f \sqrt{\pi}\, \text{erfi}\left(\frac{b-2 i f \sqrt{z}}{2 \sqrt{-i f}}\right)}{(-i f)^{5/2}}\right)$$

Involving $a^{b z^r + d z} \sin(f z + g)$

01.06.21.0209.01

$$\int a^{b z^2+d z} \sin(f\, z+g)\, dz = \frac{1}{4 \sqrt{b \log(a)}} \left(i\, a^{-\frac{d^2}{4 b}}\, e^{\frac{f^2-2 i (d f+2 b g) \log(a)}{4 b \log(a)}} \sqrt{\pi} \left(e^{\frac{i d f}{b}}\, \text{erfi}\left(\frac{-i f+(d+2 b z) \log(a)}{2 \sqrt{b \log(a)}}\right) - e^{2 i g}\, \text{erfi}\left(\frac{i f+(d+2 b z) \log(a)}{2 \sqrt{b \log(a)}}\right)\right)\right)$$

01.06.21.0210.01

$$\int e^{b z^2+d z} \sin(f\, z+g)\, dz = \frac{i\, e^{-\frac{d^2+2 i f d-f^2+4 i b g}{4 b}} \sqrt{\pi} \left(e^{\frac{i d f}{b}}\, \text{erfi}\left(\frac{d-i f+2 b z}{2 \sqrt{b}}\right) - e^{2 i g}\, \text{erfi}\left(\frac{d+i f+2 b z}{2 \sqrt{b}}\right)\right)}{4 \sqrt{b}}$$

01.06.21.0211.01

$$\int a^{\sqrt{z}\, b+d z} \sin(f\, z+g)\, dz = -\frac{e^{-i (g+f z)}\, a^{\sqrt{z}\, b+d z}}{2 (f+d\, i \log(a))} - \frac{e^{i (g+f z)}\, a^{\sqrt{z}\, b+d z}}{2 (f-i\, d \log(a))} - \frac{i\, b\, e^{\frac{-i b^2 \log^2(a)+4 d g \log(a)-4 i f g}{4 (f+d i \log(a))}} \sqrt{\pi}\, \text{erfi}\left(\frac{-2 i f \sqrt{z}+\left(b+2 d \sqrt{z}\right) \log(a)}{2 \sqrt{-i f+d \log(a)}}\right) \log(a)}{4 (-i f+d \log(a))^{3/2}} + \frac{i\, b\, e^{-\frac{b^2 \log^2(a)-4 i d g \log(a)+4 f g}{4 (i f+d \log(a))}} \sqrt{\pi}\, \text{erfi}\left(\frac{b \log(a)+2 \sqrt{z}\, (i f+d \log(a))}{2 \sqrt{i f+d \log(a)}}\right) \log(a)}{4 (i f+d \log(a))^{3/2}}$$

01.06.21.0212.01

$$\int e^{\sqrt{z}\, b+d z} \sin(f\, z+g)\, dz = \frac{1}{4} e^{-i g} \left(2 e^{\sqrt{z}\, b+d z-i f z} \left(-\frac{1}{f+i d} - \frac{e^{2 i (g+f z)}}{f-i d}\right) + \frac{b\, e^{\frac{b^2}{-4 d-4 i f}+2 i g}\, i \sqrt{\pi}\, \text{erfi}\left(\frac{b+2 (d+i f) \sqrt{z}}{2 \sqrt{d+i f}}\right)}{(d+i f)^{3/2}} - \frac{i\, b\, e^{\frac{b^2}{4 i f-4 d}} \sqrt{\pi}\, \text{erfi}\left(\frac{b+2 (d-i f) \sqrt{z}}{2 \sqrt{d-i f}}\right)}{(d-i f)^{3/2}}\right)$$

Involving $a^{b z^r + d z + e} \sin(f z + g)$

01.06.21.0213.01

$$\int a^{b z^2+d z+e} \sin(f z+g)\, dz = \frac{1}{4\sqrt{b\log(a)}} \left(i\, a^{e-\frac{d^2}{4b}}\, e^{\frac{f^2-2 i (d f+2 b g)\log(a)}{4 b\log(a)}} \sqrt{\pi} \left(e^{\frac{i d f}{b}} \operatorname{erfi}\left(\frac{-i f+(d+2 b z)\log(a)}{2\sqrt{b\log(a)}}\right) - e^{2 i g} \operatorname{erfi}\left(\frac{i f+(d+2 b z)\log(a)}{2\sqrt{b\log(a)}}\right)\right)\right)$$

01.06.21.0214.01

$$\int e^{b z^2+d z+e} \sin(f z+g)\, dz = \frac{i\, e^{-\frac{d^2+2 i f d-f^2-4 b e+4 i b g}{4b}} \sqrt{\pi} \left(e^{\frac{i d f}{b}} \operatorname{erfi}\left(\frac{d-i f+2 b z}{2\sqrt{b}}\right) - e^{2 i g} \operatorname{erfi}\left(\frac{d+i f+2 b z}{2\sqrt{b}}\right)\right)}{4\sqrt{b}}$$

01.06.21.0215.01

$$\int a^{\sqrt{z}\, b+d z+e} \sin(f z+g)\, dz = -\frac{e^{-i (g+f z)}\, a^{\sqrt{z}\, b+e+d z}}{2(f+d\, i\log(a))} - \frac{e^{i (g+f z)}\, a^{\sqrt{z}\, b+e+d z}}{2(f-i\, d\log(a))} - \left(i\, b\, e^{\frac{-i\left(b^2-4 d e\right)\log^2(a)+4 (e f+d g)\log(a)-4 i f g}{4\left(f+d\, i\log(a)\right)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{-2 i f\sqrt{z}+\left(b+2 d\sqrt{z}\right)\log(a)}{2\sqrt{-i f+d\log(a)}}\right)\log(a)\right) \Big/ \left(4(-i f+d\log(a))^{3/2}\right) + \frac{i\, b\, e^{-\frac{\left(b^2-4 d e\right)\log^2(a)-4 i (e f+d g)\log(a)+4 f g}{4\left(i f+d\log(a)\right)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b\log(a)+2\sqrt{z}\,(i f+d\log(a))}{2\sqrt{i f+d\log(a)}}\right)\log(a)}{4(i f+d\log(a))^{3/2}}$$

01.06.21.0216.01

$$\int e^{\sqrt{z}\, b+d z+e} \sin(f z+g)\, dz = \frac{1}{4} e^{e-i g} \left(2 e^{\sqrt{z}\, b+d z-i f z} \left(-\frac{1}{f+i d} - \frac{e^{2 i (g+f z)}}{f-i d}\right) + \frac{b\, e^{\frac{b^2}{-4 d-4 i f}+2 i g}\, i\sqrt{\pi} \operatorname{erfi}\left(\frac{b+2(d+i f)\sqrt{z}}{2\sqrt{d+i f}}\right)}{(d+i f)^{3/2}} - \frac{i\, b\, e^{\frac{b^2}{4 i f-4 d}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b+2(d-i f)\sqrt{z}}{2\sqrt{d-i f}}\right)}{(d-i f)^{3/2}}\right)$$

Involving $a^{b z} \sin(c z^r)$

01.06.21.0217.01

$$\int a^{b z} \sin\left(c z^2\right) dz = \frac{i\sqrt{\pi}}{4\sqrt{i c}} \left(e^{-\frac{i b^2\log^2(a)}{4c}} \operatorname{erf}\left(\frac{2 i c z-b\log(a)}{2\sqrt{i c}}\right) - e^{\frac{i b^2\log^2(a)}{4c}} \operatorname{erfi}\left(\frac{2 i c z+b\log(a)}{2\sqrt{i c}}\right)\right)$$

01.06.21.0218.01

$$\int e^{b z} \sin\left(c z^2\right) dz = \frac{i\sqrt{\pi}}{4\sqrt{i c}} \left(e^{-\frac{i b^2}{4c}} \operatorname{erf}\left(\frac{2 i c z-b}{2\sqrt{i c}}\right) - e^{\frac{i b^2}{4c}} \operatorname{erfi}\left(\frac{b+2 i c z}{2\sqrt{i c}}\right)\right)$$

01.06.21.0219.01

$$\int a^{b z} \sin\left(c\sqrt{z}\right) dz = \frac{\sin\left(c\sqrt{z}\right) a^{b z}}{b\log(a)} - \frac{c\, e^{\frac{c^2}{4 b\log(a)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{i c+2 b\sqrt{z}\log(a)}{2\sqrt{b\log(a)}}\right)}{4(b\log(a))^{3/2}} + \frac{c\, e^{\frac{c^2}{4 b\log(a)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{i c-2 b\sqrt{z}\log(a)}{2\sqrt{b\log(a)}}\right)}{4(b\log(a))^{3/2}}$$

01.06.21.0220.01

$$\int e^{b z} \sin\left(c \sqrt{z}\right) dz = -\frac{c\, e^{\frac{c^2}{4 b}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{2 \sqrt{z}\, b + i c}{2 \sqrt{b}}\right)}{4 b^{3/2}} + \frac{c\, e^{\frac{c^2}{4 b}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{i c - 2 b \sqrt{z}}{2 \sqrt{b}}\right)}{4 b^{3/2}} + \frac{e^{b z} \sin\left(c \sqrt{z}\right)}{b}$$

Involving $a^{b z+e} \sin(c z^r)$

01.06.21.0221.01

$$\int a^{b z+e} \sin\left(c z^2\right) dz = \frac{i \sqrt{\pi}}{4 \sqrt{i c}}\, a^e \left(e^{-\frac{i b^2 \log^2(a)}{4 c}} \operatorname{erf}\left(\frac{2 i c z - b \log(a)}{2 \sqrt{i c}}\right) - e^{\frac{i b^2 \log^2(a)}{4 c}} \operatorname{erfi}\left(\frac{2 i c z + b \log(a)}{2 \sqrt{i c}}\right)\right)$$

01.06.21.0222.01

$$\int e^{b z+e} \sin\left(c z^2\right) dz = \frac{i \sqrt{\pi}}{4 \sqrt{i c}} \left(e^{e-\frac{i b^2}{4 c}} \operatorname{erf}\left(\frac{2 i c z - b}{2 \sqrt{i c}}\right) - e^{e+\frac{i b^2}{4 c}} \operatorname{erfi}\left(\frac{b + 2 i c z}{2 \sqrt{i c}}\right)\right)$$

01.06.21.0223.01

$$\int a^{b z+e} \sin\left(c \sqrt{z}\right) dz = \frac{\sin\left(c \sqrt{z}\right) a^{b z+e}}{b \log(a)} - \frac{c\, a^e\, e^{\frac{c^2}{4 b \log(a)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{i c + 2 b \sqrt{z}\, \log(a)}{2 \sqrt{b \log(a)}}\right)}{4 (b \log(a))^{3/2}} + \frac{c\, a^e\, e^{\frac{c^2}{4 b \log(a)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{i c - 2 b \sqrt{z}\, \log(a)}{2 \sqrt{b \log(a)}}\right)}{4 (b \log(a))^{3/2}}$$

01.06.21.0224.01

$$\int e^{b z+e} \sin\left(c \sqrt{z}\right) dz = -\frac{c\, e^{\frac{c^2}{4 b}+e} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{2 \sqrt{z}\, b + i c}{2 \sqrt{b}}\right)}{4 b^{3/2}} + \frac{c\, e^{\frac{c^2}{4 b}+e} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{i c - 2 b \sqrt{z}}{2 \sqrt{b}}\right)}{4 b^{3/2}} + \frac{e^{b z+e} \sin\left(c \sqrt{z}\right)}{b}$$

Involving $a^{b z^r} \sin(c z^r)$

01.06.21.0225.01

$$\int a^{b z^r} \sin(c z^r)\, dz = -\frac{i z}{2 r} \left(\Gamma\left(\frac{1}{r}, i z^r (c + b i \log(a))\right) (i z^r (c + b i \log(a)))^{-1/r} - \Gamma\left(\frac{1}{r}, -z^r (i c + b \log(a))\right) (-i z^r (c - i b \log(a)))^{-1/r}\right)$$

01.06.21.0226.01

$$\int e^{b z^r} \sin(c z^r)\, dz = -\frac{i z}{2 r} \left((-(b - i c) z^r)^{-1/r}\, \Gamma\left(\frac{1}{r}, -(b - i c) z^r\right) - (-(b + i c) z^r)^{-1/r}\, \Gamma\left(\frac{1}{r}, -(b + i c) z^r\right)\right)$$

01.06.21.0227.01

$$\int a^{b z^2} \sin\left(c z^2\right) dz = -\frac{1}{4 \left(c^2 + b^2 \log^2(a)\right)} \left(\sqrt{\pi} \left(\operatorname{erfi}\left(z \sqrt{i c + b \log(a)}\right) \sqrt{i c + b \log(a)}\, (c + b i \log(a)) + \operatorname{erfi}\left(z \sqrt{-i c + b \log(a)}\right) \sqrt{-i c + b \log(a)}\, (c - i b \log(a))\right)\right)$$

01.06.21.0228.01

$$\int e^{b z^2} \sin\left(c z^2\right) dz = \frac{i \sqrt{\pi} \left(\sqrt{b - i c}\, (b + i c) \operatorname{erfi}\left(\sqrt{b - i c}\, z\right) - (b - i c) \sqrt{b + i c}\, \operatorname{erfi}\left(\sqrt{b + i c}\, z\right)\right)}{4 \left(b^2 + c^2\right)}$$

01.06.21.0229.01

$$\int a^{b\sqrt{z}}\sin\left(c\sqrt{z}\right)dz = \frac{1}{\left(c^2+b^2\log^2(a)\right)^2}\left(2\,a^{b\sqrt{z}}\left(\left(c^2+b\log(a)\left(\sqrt{z}\;c^2+b\log(a)\left(b\sqrt{z}\,\log(a)-1\right)\right)\right)\sin\left(c\sqrt{z}\right)-c\cos\left(c\sqrt{z}\right)\left(\sqrt{z}\;c^2+b\log(a)\left(b\sqrt{z}\,\log(a)-2\right)\right)\right)\right)$$

01.06.21.0230.01

$$\int e^{b\sqrt{z}}\sin\left(c\sqrt{z}\right)dz = \frac{1}{\left(b^2+c^2\right)^2}\left(2\,e^{b\sqrt{z}}\left(\left(c^2+b\left(\sqrt{z}\;c^2+b\left(b\sqrt{z}-1\right)\right)\right)\sin\left(c\sqrt{z}\right)-c\left(\sqrt{z}\;c^2+b\left(b\sqrt{z}-2\right)\right)\cos\left(c\sqrt{z}\right)\right)\right)$$

Involving $a^{b z^r+e}\sin(c z^r)$

01.06.21.0231.01

$$\int a^{b z^r+e}\sin(c z^r)\,dz = -\frac{i z a^e}{2r}\left(\Gamma\left(\frac{1}{r},\, i z^r\,(c+b\,i\log(a))\right)\left(i z^r\,(c+b\,i\log(a))\right)^{-1/r}-\Gamma\left(\frac{1}{r},\,-z^r\,(i c+b\log(a))\right)\left(-i z^r\,(c-i\,b\log(a))\right)^{-1/r}\right)$$

01.06.21.0232.01

$$\int e^{b z^r+e}\sin(c z^r)\,dz = -\frac{i z e^e}{2r}\left(\left(-(b-i c)\,z^r\right)^{-1/r}\Gamma\left(\frac{1}{r},\,-(b-i c)\,z^r\right)-\left(-(b+i c)\,z^r\right)^{-1/r}\Gamma\left(\frac{1}{r},\,-(b+i c)\,z^r\right)\right)$$

01.06.21.0233.01

$$\int a^{b z^2+e}\sin\left(c z^2\right)dz = -\frac{1}{4\left(c^2+b^2\log^2(a)\right)}\sqrt{\pi}\;a^e\left(\operatorname{erfi}\left(z\sqrt{i c+b\log(a)}\right)\sqrt{i c+b\log(a)}\;(c+b\,i\log(a))+\operatorname{erfi}\left(z\sqrt{-i c+b\log(a)}\right)\sqrt{-i c+b\log(a)}\;(c-i\,b\log(a))\right)$$

01.06.21.0234.01

$$\int e^{b z^2+e}\sin\left(c z^2\right)dz = \frac{i\sqrt{\pi}\;e^e\left(\sqrt{b-i c}\;(b+i c)\operatorname{erfi}\left(\sqrt{b-i c}\;z\right)-(b-i c)\sqrt{b+i c}\;\operatorname{erfi}\left(\sqrt{b+i c}\;z\right)\right)}{4\left(b^2+c^2\right)}$$

01.06.21.0235.01

$$\int a^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)dz = \frac{1}{\left(c^2+b^2\log^2(a)\right)^2}\left(2\,a^{b\sqrt{z}+e}\left(\left(c^2+b\log(a)\left(\sqrt{z}\;c^2+b\log(a)\left(b\sqrt{z}\,\log(a)-1\right)\right)\right)\sin\left(c\sqrt{z}\right)-c\cos\left(c\sqrt{z}\right)\left(\sqrt{z}\;c^2+b\log(a)\left(b\sqrt{z}\,\log(a)-2\right)\right)\right)\right)$$

01.06.21.0236.01

$$\int e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)dz = \frac{1}{\left(b^2+c^2\right)^2}\left(2\,e^{b\sqrt{z}+e}\left(\left(c^2+b\left(\sqrt{z}\;c^2+b\left(b\sqrt{z}-1\right)\right)\right)\sin\left(c\sqrt{z}\right)-c\left(\sqrt{z}\;c^2+b\left(b\sqrt{z}-2\right)\right)\cos\left(c\sqrt{z}\right)\right)\right)$$

Involving $a^{b z^r+d z}\sin(c z^r)$

01.06.21.0237.01

$$\int a^{b z^2+d z} \sin(c z^2)\, dz = \frac{1}{4\left(c^2+b^2\log^2(a)\right)} \left(i\sqrt{\pi}\, e^{\frac{b d^2 \log^3(a)}{-2c^2-2b^2\log^2(a)}} \left(e^{\frac{d^2\log^2(a)}{4(i c+b\log(a))}} \operatorname{erfi}\left(\frac{(d+2bz)\log(a)-2icz}{2\sqrt{-ic+b\log(a)}}\right)\sqrt{-ic+b\log(a)}\,(ic+b\log(a)) + e^{\frac{d^2\log^2(a)}{-4ic+4b\log(a)}} \operatorname{erfi}\left(\frac{2icz+(d+2bz)\log(a)}{2\sqrt{ic+b\log(a)}}\right)(ic-b\log(a))\sqrt{ic+b\log(a)}\right)\right)$$

01.06.21.0238.01

$$\int e^{b z^2+d z} \sin(c z^2)\, dz = \frac{i\sqrt{\pi}}{4\left(b^2+c^2\right)} e^{\frac{b d^2}{-2b^2-2c^2}} \left((ic-b)\sqrt{b+ic}\; e^{\frac{d^2}{4b-4ic}} \operatorname{erfi}\left(\frac{d+2bz+2icz}{2\sqrt{b+ic}}\right) + (b+ic)\sqrt{b-ic}\; e^{\frac{d^2}{4(b+ic)}} \operatorname{erfi}\left(\frac{d+2bz-2icz}{2\sqrt{b-ic}}\right)\right)$$

01.06.21.0239.01

$$\int a^{\sqrt{z}\, b+d z} \sin(c\sqrt{z})\, dz = \frac{\sin(c\sqrt{z})\, a^{\sqrt{z}\, b+d z}}{d\log(a)} + \frac{e^{-\frac{(ic-b\log(a))^2}{4d\log(a)}}\sqrt{\pi}\operatorname{erfi}\left(\frac{ic-b\log(a)-2d\sqrt{z}\log(a)}{2\sqrt{d\log(a)}}\right)(c+bi\log(a))}{4(d\log(a))^{3/2}} - \frac{e^{-\frac{(ic+b\log(a))^2}{4d\log(a)}}\sqrt{\pi}\operatorname{erfi}\left(\frac{ic+b\log(a)+2d\sqrt{z}\log(a)}{2\sqrt{d\log(a)}}\right)(c-ib\log(a))}{4(d\log(a))^{3/2}}$$

01.06.21.0240.01

$$\int e^{\sqrt{z}\, b+d z} \sin(c\sqrt{z})\, dz = -\frac{(c-ib)\, e^{-\frac{(b+ic)^2}{4d}}\sqrt{\pi}\operatorname{erfi}\left(\frac{b+ic+2d\sqrt{z}}{2\sqrt{d}}\right)}{4d^{3/2}} + \frac{(c+ib)\, e^{-\frac{(ic-b)^2}{4d}}\sqrt{\pi}\operatorname{erfi}\left(\frac{-b+ic-2d\sqrt{z}}{2\sqrt{d}}\right)}{4d^{3/2}} + \frac{e^{\sqrt{z}\, b+d z}\sin(c\sqrt{z})}{d}$$

Involving $a^{b z^r+d z+e} \sin(c z^r)$

01.06.21.0241.01

$$\int a^{b z^2+d z+e} \sin(c z^2)\, dz = \frac{i a^e\sqrt{\pi}}{4\left(c^2+b^2\log^2(a)\right)} e^{\frac{b d^2 \log^3(a)}{-2c^2-2b^2\log^2(a)}} \left(e^{\frac{d^2\log^2(a)}{4(ic+b\log(a))}} \operatorname{erfi}\left(\frac{(d+2bz)\log(a)-2icz}{2\sqrt{-ic+b\log(a)}}\right)\sqrt{-ic+b\log(a)}\,(ic+b\log(a)) + e^{\frac{d^2\log^2(a)}{-4ic+4b\log(a)}} \operatorname{erfi}\left(\frac{2icz+(d+2bz)\log(a)}{2\sqrt{ic+b\log(a)}}\right)(ic-b\log(a))\sqrt{ic+b\log(a)}\right)$$

01.06.21.0242.01

$$\int e^{b z^2+d z+e} \sin(c z^2)\, dz == \frac{i \sqrt{\pi}}{4 (b^2+c^2)} e^{\frac{b d^2}{-2 b^2-2 c^2}+e} \left((i c-b) \sqrt{b+i c}\; e^{\frac{d^2}{4 b-4 i c}} \operatorname{erfi}\left(\frac{d+2 b z+2 i c z}{2 \sqrt{b+i c}}\right)+(b+i c) \sqrt{b-i c}\; e^{\frac{d^2}{4 (b+i c)}} \operatorname{erfi}\left(\frac{d+2 b z-2 i c z}{2 \sqrt{b-i c}}\right)\right)$$

01.06.21.0243.01

$$\int a^{\sqrt{z}\, b+e+d z} \sin(c \sqrt{z})\, dz == \frac{\sin(c \sqrt{z})\, a^{\sqrt{z}\, b+e+d z}}{d \log(a)} + \frac{e^{e \log(a)-\frac{(i c-b \log(a))^2}{4 d \log(a)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{i c-b \log(a)-2 d \sqrt{z} \log(a)}{2 \sqrt{d \log(a)}}\right)(c+b i \log(a))}{4 (d \log(a))^{3/2}} - \frac{e^{e \log(a)-\frac{(i c+b \log(a))^2}{4 d \log(a)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{i c+b \log(a)+2 d \sqrt{z} \log(a)}{2 \sqrt{d \log(a)}}\right)(c-i b \log(a))}{4 (d \log(a))^{3/2}}$$

01.06.21.0244.01

$$\int e^{\sqrt{z}\, b+e+d z} \sin(c \sqrt{z})\, dz == -\frac{(c-i b)\, e^{e-\frac{(b+i c)^2}{4 d}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b+i c+2 d \sqrt{z}}{2 \sqrt{d}}\right)}{4 d^{3/2}} + \frac{(c+i b)\, e^{e-\frac{(i c-b)^2}{4 d}} \sqrt{\pi} \operatorname{erfi}\left(\frac{-b+i c-2 d \sqrt{z}}{2 \sqrt{d}}\right)}{4 d^{3/2}} + \frac{e^{\sqrt{z}\, b+e+d z} \sin(c \sqrt{z})}{d}$$

Involving $a^{d z} \sin(c z^r + g)$

01.06.21.0245.01

$$\int a^{d z} \sin(c z^2+g)\, dz == -\frac{1}{4 c} \left(e^{-\frac{1}{4} i \left(\frac{d^2 \log^2(a)}{c}+4 g\right)} \sqrt{\pi} \left(\sqrt{-i c} \operatorname{erfi}\left(\frac{d \log(a)-2 i c z}{2 \sqrt{-i c}}\right)+\sqrt{i c}\; e^{\frac{1}{2} i \left(\frac{d^2 \log^2(a)}{c}+4 g\right)} \operatorname{erfi}\left(\frac{2 i c z+d \log(a)}{2 \sqrt{i c}}\right)\right)\right)$$

01.06.21.0246.01

$$\int e^{d z} \sin(c z^2+g)\, dz == -\frac{\sqrt{\pi}}{4 c} e^{-\frac{i d^2}{4 c}-i g} \left(\sqrt{-i c} \operatorname{erfi}\left(\frac{d-2 i c z}{2 \sqrt{-i c}}\right)+\sqrt{i c}\; e^{\frac{i (d^2+4 c g)}{2 c}} \operatorname{erfi}\left(\frac{d+2 i c z}{2 \sqrt{i c}}\right)\right)$$

01.06.21.0247.01

$$\int a^{d z} \sin(\sqrt{z}\, c+g)\, dz == -\frac{1}{4 (d \log(a))^{3/2}} \left(i e^{-i (\sqrt{z}\, c+g)} \left(2 \left(-1+e^{2 i (\sqrt{z}\, c+g)}\right) \sqrt{d \log(a)}\; a^{d z} - i c\, e^{\frac{1}{4} c \left(\frac{c}{d \log(a)}+4 i \sqrt{z}\right)} \sqrt{\pi} \operatorname{erfi}\left(\frac{-i c+2 d \sqrt{z} \log(a)}{2 \sqrt{d \log(a)}}\right) - i c\, e^{\frac{c^2}{4 d \log(a)}+i \sqrt{z}\, c+2 i g} \sqrt{\pi} \operatorname{erfi}\left(\frac{i c+2 d \sqrt{z} \log(a)}{2 \sqrt{d \log(a)}}\right)\right)\right)$$

01.06.21.0248.01

$$\int e^{d z} \sin\left(\sqrt{z}\, c+g\right) dz = -\frac{1}{4 d^{3/2}} \left(i\, e^{-i\left(\sqrt{z}\, c+g\right)} \left(2 \sqrt{d}\, e^{d z} \left(-1+e^{2 i\left(\sqrt{z}\, c+g\right)}\right) - c\, e^{\frac{c\left(c+4 i d \sqrt{z}\right)}{4 d}} \sqrt{\pi}\, \operatorname{erf}\left(\frac{c+2 i d \sqrt{z}}{2 \sqrt{d}}\right) + c\, e^{\frac{c^2}{4 d}+i \sqrt{z}\, c+2 i g} \sqrt{\pi}\, \operatorname{erf}\left(\frac{c-2 i d \sqrt{z}}{2 \sqrt{d}}\right)\right)\right)$$

Involving $a^{d z+e} \sin\left(c z^r+g\right)$

01.06.21.0249.01

$$\int a^{d z+e} \sin\left(c z^2+g\right) dz = -\frac{1}{4 c} \left(a^e\, e^{-\frac{1}{4} i \left(\frac{d^2 \log^2(a)}{c}+4 g\right)} \sqrt{\pi} \left(\sqrt{-i c}\, \operatorname{erfi}\left(\frac{d \log(a)-2 i c z}{2 \sqrt{-i c}}\right) + \sqrt{i c}\, e^{\frac{1}{2} i \left(\frac{d^2 \log^2(a)}{c}+4 g\right)} \operatorname{erfi}\left(\frac{2 i c z+d \log(a)}{2 \sqrt{i c}}\right)\right)\right)$$

01.06.21.0250.01

$$\int e^{d z+e} \sin\left(c z^2+g\right) dz = -\frac{\sqrt{\pi}}{4 c}\, e^{-\frac{i d^2}{4 c}+e-i g} \left(\sqrt{-i c}\, \operatorname{erfi}\left(\frac{d-2 i c z}{2 \sqrt{-i c}}\right) + \sqrt{i c}\, e^{\frac{i\left(d^2+4 c g\right)}{2 c}} \operatorname{erfi}\left(\frac{d+2 i c z}{2 \sqrt{i c}}\right)\right)$$

01.06.21.0251.01

$$\int a^{d z+e} \sin\left(\sqrt{z}\, c+g\right) dz = -\frac{1}{4 (d \log(a))^{3/2}} \left(i\, a^e\, e^{-i\left(\sqrt{z}\, c+g\right)} \left(2 \left(-1+e^{2 i\left(\sqrt{z}\, c+g\right)}\right) \sqrt{d \log(a)}\, a^{d z} - i\, c\, e^{\frac{1}{4} c \left(\frac{c}{d \log(a)}+4 i \sqrt{z}\right)} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{-i c+2 d \sqrt{z}\, \log(a)}{2 \sqrt{d \log(a)}}\right) - i\, c\, e^{\frac{c^2}{4 d \log(a)}+i \sqrt{z}\, c+2 i g} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{i c+2 d \sqrt{z}\, \log(a)}{2 \sqrt{d \log(a)}}\right)\right)\right)$$

01.06.21.0252.01

$$\int e^{d z+e} \sin\left(\sqrt{z}\, c+g\right) dz = -\frac{1}{4 d^{3/2}} \left(i\, e^{e-i\left(\sqrt{z}\, c+g\right)} \left(2 \sqrt{d}\, e^{d z} \left(-1+e^{2 i\left(\sqrt{z}\, c+g\right)}\right) - c\, e^{\frac{c\left(c+4 i d \sqrt{z}\right)}{4 d}} \sqrt{\pi}\, \operatorname{erf}\left(\frac{c+2 i d \sqrt{z}}{2 \sqrt{d}}\right) + c\, e^{\frac{c^2}{4 d}+i \sqrt{z}\, c+2 i g} \sqrt{\pi}\, \operatorname{erf}\left(\frac{c-2 i d \sqrt{z}}{2 \sqrt{d}}\right)\right)\right)$$

Involving $a^{b z^r} \sin\left(c z^r+g\right)$

01.06.21.0253.01

$$\int a^{b z^r} \sin(c z^r+g)\, dz = -\frac{1}{2 r} i z \left(e^{-i g}\, \Gamma\left(\frac{1}{r}, i z^r (c+b i \log(a))\right) (i z^r (c+b i \log(a)))^{-1/r} - e^{i g}\, \Gamma\left(\frac{1}{r}, -z^r (i c+b \log(a))\right) (-z^r (i c+b \log(a)))^{-1/r}\right)$$

01.06.21.0254.01

$$\int e^{b z^r} \sin(c z^r+g)\, dz = \frac{i z}{2 r} \left(e^{i g} (-(b+i c) z^r)^{-1/r}\, \Gamma\left(\frac{1}{r}, -(b+i c) z^r\right) - e^{-i g} (i (c+i b) z^r)^{-1/r}\, \Gamma\left(\frac{1}{r}, i (c+i b) z^r\right)\right)$$

01.06.21.0255.01

$$\int a^{b z^2} \sin(c z^2 + g)\, dz = \frac{1}{4} i \sqrt{\pi} \left(\frac{e^{-i g} \operatorname{erfi}\left(z \sqrt{-i c + b \log(a)}\right)}{\sqrt{-i c + b \log(a)}} - \frac{e^{i g} \operatorname{erfi}\left(z \sqrt{i c + b \log(a)}\right)}{\sqrt{i c + b \log(a)}} \right)$$

01.06.21.0256.01

$$\int e^{b z^2} \sin(c z^2 + g)\, dz = \frac{1}{4} i \sqrt{\pi} \left(\frac{e^{-i g} \operatorname{erfi}\left(\sqrt{b - i c}\; z\right)}{\sqrt{b - i c}} - \frac{e^{i g} \operatorname{erfi}\left(\sqrt{b + i c}\; z\right)}{\sqrt{b + i c}} \right)$$

01.06.21.0257.01

$$\int a^{b \sqrt{z}} \sin(\sqrt{z}\, c + g)\, dz = -\frac{1}{\left(c^2 + b^2 \log^2(a)\right)^2} \left(2 a^{b \sqrt{z}} \left(c \cos(\sqrt{z}\, c + g) \left(\sqrt{z}\, c^2 + b^2 \sqrt{z} \log^2(a) - 2 b \log(a)\right) - \left(b^3 \sqrt{z} \log^3(a) - b^2 \log^2(a) + b c^2 \sqrt{z} \log(a) + c^2\right) \sin(\sqrt{z}\, c + g)\right)\right)$$

01.06.21.0258.01

$$\int e^{b \sqrt{z}} \sin(\sqrt{z}\, c + g)\, dz = \frac{1}{\left(b^2 + c^2\right)^2} \left(2 e^{b \sqrt{z}} \left(\left(\sqrt{z}\, b^3 - b^2 + c^2 \sqrt{z}\, b + c^2\right) \sin(\sqrt{z}\, c + g) - c \left(\sqrt{z}\, b^2 - 2 b + c^2 \sqrt{z}\right) \cos(\sqrt{z}\, c + g)\right)\right)$$

Involving $a^{b z^r + e} \sin(c z^r + g)$

01.06.21.0259.01

$$\int a^{b z^r + e} \sin(c z^r + g)\, dz = \frac{1}{2 r} \left(i a^e e^{-i g} z \left(e^{2 i g} \Gamma\left(\frac{1}{r}, z^r (-i c - b \log(a))\right) (z^r (-i c - b \log(a)))^{-1/r} - \Gamma\left(\frac{1}{r}, i z^r (c + b i \log(a))\right) (i z^r (c + b i \log(a)))^{-1/r} \right) \right)$$

01.06.21.0260.01

$$\int e^{b z^r + e} \sin(c z^r + g)\, dz = \frac{i z}{2 r} \left(e^{e + i g} (-(b + i c) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -(b + i c) z^r\right) - e^{e - i g} (i (c + i b) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i (c + i b) z^r\right) \right)$$

01.06.21.0261.01

$$\int a^{b z^2 + e} \sin(c z^2 + g)\, dz = \frac{1}{4} i a^e e^{-i g} \sqrt{\pi} \left(\frac{\operatorname{erfi}\left(z \sqrt{-i c + b \log(a)}\right)}{\sqrt{-i c + b \log(a)}} - \frac{e^{2 i g} \operatorname{erfi}\left(z \sqrt{i c + b \log(a)}\right)}{\sqrt{i c + b \log(a)}} \right)$$

01.06.21.0262.01

$$\int e^{b z^2 + e} \sin(c z^2 + g)\, dz = \frac{1}{4} i \sqrt{\pi} \left(\frac{e^{e - i g} \operatorname{erfi}\left(\sqrt{b - i c}\; z\right)}{\sqrt{b - i c}} - \frac{e^{e + i g} \operatorname{erfi}\left(\sqrt{b + i c}\; z\right)}{\sqrt{b + i c}} \right)$$

01.06.21.0263.01

$$\int a^{\sqrt{z}\, b + e} \sin(\sqrt{z}\, c + g)\, dz = \frac{1}{\left(c^2 + b^2 \log^2(a)\right)^2} \left(2 a^{\sqrt{z}\, b + e} \left(\left(b^3 \sqrt{z} \log^3(a) - b^2 \log^2(a) + b c^2 \sqrt{z} \log(a) + c^2\right) \sin(\sqrt{z}\, c + g) - c \cos(\sqrt{z}\, c + g) \left(\sqrt{z}\, c^2 + b^2 \sqrt{z} \log^2(a) - 2 b \log(a)\right)\right)\right)$$

01.06.21.0264.01

$$\int e^{b\sqrt{z}+e}\sin\left(\sqrt{z}\,c+g\right)dz = \frac{1}{\left(b^2+c^2\right)^2}\left(2\,e^{b\sqrt{z}+e}\left(\left(\sqrt{z}\,b^3-b^2+c^2\sqrt{z}\,b+c^2\right)\sin\left(\sqrt{z}\,c+g\right)-c\left(\sqrt{z}\,b^2-2\,b+c^2\sqrt{z}\right)\cos\left(\sqrt{z}\,c+g\right)\right)\right)$$

Involving $a^{b z^r+d z}\sin\left(c z^r+g\right)$

01.06.21.0265.01

$$\int a^{b z^2+d z}\sin\left(c z^2+g\right)dz = \frac{1}{4\left(c^2+b^2\log^2(a)\right)}\left(i\,a^{-\frac{b d^2\log^2(a)}{2\left(c^2+b^2\log^2(a)\right)}}\sqrt{\pi}\left(e^{\frac{d^2\log^2(a)}{4 i c+4 b\log(a)}-i g}\operatorname{erfi}\left(\frac{(d+2 b z)\log(a)-2 i c z}{2\sqrt{-i c+b\log(a)}}\right)\sqrt{-i c+b\log(a)}\,(i c+b\log(a))+e^{\frac{d^2\log^2(a)}{-4 i c+4 b\log(a)}+i g}\,i\operatorname{erfi}\left(\frac{2 i c z+(d+2 b z)\log(a)}{2\sqrt{i c+b\log(a)}}\right)(c+b\,i\log(a))\sqrt{i c+b\log(a)}\right)\right)$$

01.06.21.0266.01

$$\int e^{b z^2+d z}\sin\left(c z^2+g\right)dz = \frac{1}{4\left(b^2+c^2\right)}\left(i\,e^{-\frac{b d^2}{2\left(b^2+c^2\right)}-i g}\sqrt{\pi}\left(\sqrt{b-i c}\,(b+i c)\,e^{\frac{d^2}{4 b+4 i c}}\operatorname{erfi}\left(\frac{d+2(b-i c)z}{2\sqrt{b-i c}}\right)-(b-i c)\sqrt{b+i c}\,e^{\frac{d^2}{4 b-4 i c}+2 i g}\operatorname{erfi}\left(\frac{d+2(b+i c)z}{2\sqrt{b+i c}}\right)\right)\right)$$

01.06.21.0267.01

$$\int a^{\sqrt{z}\,b+d z}\sin\left(\sqrt{z}\,c+g\right)dz = -\frac{1}{4\,(d\log(a))^{3/2}}\left(i\,a^{-\frac{b^2}{4 d}}\,e^{-\frac{i\left(b c+2 d\left(\sqrt{z}\,c+g\right)\right)}{2 d}}\left(2\,e^{\frac{i b c}{2 d}}\left(-1+e^{2 i\left(\sqrt{z}\,c+g\right)}\right)\sqrt{d\log(a)}\,a^{\frac{\left(b+2 d\sqrt{z}\right)^2}{4 d}}+e^{\frac{c\left(c+4 i\left(b+d\sqrt{z}\right)\log(a)\right)}{4 d\log(a)}}\sqrt{\pi}\operatorname{erfi}\left(\frac{-i c+\left(b+2 d\sqrt{z}\right)\log(a)}{2\sqrt{d\log(a)}}\right)(-i c+b\log(a))-i\,e^{\frac{c^2}{4 d\log(a)}+i\sqrt{z}\,c+2 i g}\sqrt{\pi}\operatorname{erfi}\left(\frac{i c+\left(b+2 d\sqrt{z}\right)\log(a)}{2\sqrt{d\log(a)}}\right)(c-i b\log(a))\right)\right)$$

01.06.21.0268.01

$$\int e^{\sqrt{z}\,b+d z}\sin\left(\sqrt{z}\,c+g\right)dz = -\frac{1}{4\,d^{3/2}}\left(i\,e^{-\frac{b^2+2 i c b+4 d i\left(\sqrt{z}\,c+g\right)}{4 d}}\left(2\sqrt{d}\,e^{\frac{b^2+2 i c b+4 d\sqrt{z}\,b+4 d^2 z}{4 d}}\left(-1+e^{2 i\left(\sqrt{z}\,c+g\right)}\right)-(b+i c)\,e^{\frac{c^2}{4 d}+i\sqrt{z}\,c+2 i g}\sqrt{\pi}\operatorname{erfi}\left(\frac{b+i c+2 d\sqrt{z}}{2\sqrt{d}}\right)+(b-i c)\,e^{\frac{c\left(c+4 i b+4 i d\sqrt{z}\right)}{4 d}}\sqrt{\pi}\operatorname{erfi}\left(\frac{b-i c+2 d\sqrt{z}}{2\sqrt{d}}\right)\right)\right)$$

Involving $a^{b z^r+d z+e}\sin\left(c z^r+g\right)$

01.06.21.0269.01

$$\int a^{b z^2+d z+e} \sin\left(c z^2+g\right) dz = \frac{1}{4\left(c^2+b^2\log^2(a)\right)}\left(i\, a^{e-\frac{b d^2 \log^2(a)}{2\left(c^2+b^2\log^2(a)\right)}} \sqrt{\pi}\left(e^{\frac{d^2\log^2(a)}{4 i c+4 b \log(a)}-i g} \operatorname{erfi}\left(\frac{(d+2 b z)\log(a)-2 i c z}{2\sqrt{-i c+b\log(a)}}\right)\sqrt{-i c+b\log(a)}\,(i c+b\log(a)) + e^{\frac{d^2\log^2(a)}{-4 i c+4 b\log(a)}+i g}\, i \operatorname{erfi}\left(\frac{2 i c z+(d+2 b z)\log(a)}{2\sqrt{i c+b\log(a)}}\right)(c+b\, i \log(a))\sqrt{i c+b\log(a)}\right)\right)$$

01.06.21.0270.01

$$\int e^{b z^2+d z+e}\sin\left(c z^2+g\right)dz = \frac{1}{4\left(b^2+c^2\right)}\left(i\, e^{-\frac{b d^2}{2\left(b^2+c^2\right)}+e-i g}\sqrt{\pi}\left(\sqrt{b-i c}\,(b+i c)\, e^{\frac{d^2}{4 b+4 i c}} \operatorname{erfi}\left(\frac{d+2(b-i c) z}{2\sqrt{b-i c}}\right)-(b-i c)\sqrt{b+i c}\; e^{\frac{d^2}{4 b-4 i c}+2 i g}\operatorname{erfi}\left(\frac{d+2(b+i c) z}{2\sqrt{b+i c}}\right)\right)\right)$$

01.06.21.0271.01

$$\int a^{\sqrt{z}\, b+d z+e}\sin\left(\sqrt{z}\, c+g\right)dz = -\frac{1}{4(d\log(a))^{3/2}}\left(i\, a^{e-\frac{b^2}{4 d}}\, e^{-\frac{i\left(b c+2 d\left(\sqrt{z}\, c+g\right)\right)}{2 d}}\left(2\, e^{\frac{i b c}{2 d}}\left(-1+e^{2 i\left(\sqrt{z}\, c+g\right)}\right)\sqrt{d\log(a)}\; a^{\frac{\left(b+2 d\sqrt{z}\right)^2}{4 d}} + e^{\frac{c\left(c+4 i\left(b+d\sqrt{z}\right)\log(a)\right)}{4 d\log(a)}}\sqrt{\pi}\operatorname{erfi}\left(\frac{-i c+\left(b+2 d\sqrt{z}\right)\log(a)}{2\sqrt{d\log(a)}}\right)(-i c+b\log(a)) - i\, e^{\frac{c^2}{4 d\log(a)}+i\sqrt{z}\, c+2 i g}\sqrt{\pi}\operatorname{erfi}\left(\frac{i c+\left(b+2 d\sqrt{z}\right)\log(a)}{2\sqrt{d\log(a)}}\right)(c-i\, b\log(a))\right)\right)$$

01.06.21.0272.01

$$\int e^{\sqrt{z}\, b+d z+e}\sin\left(\sqrt{z}\, c+g\right)dz = -\frac{1}{4 d^{3/2}}\left(i\, e^{-\frac{b^2+2 i c b-4 d\left(e-i\left(\sqrt{z}\, c+g\right)\right)}{4 d}}\left(2\sqrt{d}\; e^{\frac{b^2+2 i c b+4 d\sqrt{z}\, b+4 d^2 z}{4 d}}\left(-1+e^{2 i\left(\sqrt{z}\, c+g\right)}\right)-(b+i c)\, e^{\frac{c^2}{4 d}+i\sqrt{z}\, c+2 i g}\sqrt{\pi}\operatorname{erfi}\left(\frac{b+i c+2 d\sqrt{z}}{2\sqrt{d}}\right)+(b-i c)\, e^{\frac{c\left(c+4 i b+4 i d\sqrt{z}\right)}{4 d}}\sqrt{\pi}\operatorname{erfi}\left(\frac{b-i c+2 d\sqrt{z}}{2\sqrt{d}}\right)\right)\right)$$

Involving rational functions of exp

Involving $\left(a+b\, e^{d z}\right)^{-n}\sin(c z+e)$

01.06.21.0273.01

$$\int \frac{\sin(c z)}{\left(a+b\, e^{d z}\right)^n} dz = -\frac{a^{-n}}{2 c}\left(e^{i c z}\, {}_2F_1\left(\frac{i c}{d}, n; \frac{d+i c}{d}; -\frac{b\, e^{d z}}{a}\right)+e^{-i c z}\, {}_2F_1\left(-\frac{i c}{d}, n; \frac{d-i c}{d}; -\frac{b\, e^{d z}}{a}\right)\right) /; n\in\mathbb{N}^+$$

01.06.21.0274.01

$$\int \frac{\sin(e+c\,z)}{\left(a+b\,e^{d\,z}\right)^n}\,dz = -\frac{a^{-n}}{2\,c}\left(e^{i\,e+i\,c\,z}\,{}_2F_1\!\left(\frac{i\,c}{d},\,n;\,\frac{d+i\,c}{d};\,-\frac{b\,e^{d\,z}}{a}\right)+e^{-i\,e-i\,c\,z}\,{}_2F_1\!\left(-\frac{i\,c}{d},\,n;\,\frac{d-i\,c}{d};\,-\frac{b\,e^{d\,z}}{a}\right)\right)/;\,n\in\mathbb{N}^+$$

Involving $e^{p\,z}\left(a+b\,e^{d\,z}\right)^{-n}\sin(c\,z+e)$

01.06.21.0275.01

$$\int \frac{e^{p\,z}\sin(c\,z)}{\left(a+b\,e^{d\,z}\right)^n}\,dz = -\frac{1}{2\,(c+i\,p)\,(c-i\,p)}\left(a^{-n}\left(e^{(-i\,c+p)\,z}\,(c-i\,p)\,{}_2F_1\!\left(\frac{-i\,c+p}{d},\,n;\,\frac{d-i\,c+p}{d};\,-\frac{b\,e^{d\,z}}{a}\right)+ e^{(i\,c+p)\,z}\,(c+i\,p)\,{}_2F_1\!\left(\frac{i\,c+p}{d},\,n;\,\frac{d+i\,c+p}{d};\,-\frac{b\,e^{d\,z}}{a}\right)\right)\right)/;\,n\in\mathbb{N}^+$$

01.06.21.0276.01

$$\int \frac{e^{p\,z}\sin(e+c\,z)}{\left(a+b\,e^{d\,z}\right)^n}\,dz = -\frac{1}{2\,(c+i\,p)\,(c-i\,p)}\left(a^{-n}\,e^{-i\,e}\left(e^{(-i\,c+p)\,z}\,(c-i\,p)\,{}_2F_1\!\left(\frac{-i\,c+p}{d},\,n;\,\frac{d-i\,c+p}{d};\,-\frac{b\,e^{d\,z}}{a}\right)+ e^{2\,i\,e+(i\,c+p)\,z}\,(c+i\,p)\,{}_2F_1\!\left(\frac{i\,c+p}{d},\,n;\,\frac{d+i\,c+p}{d};\,-\frac{b\,e^{d\,z}}{a}\right)\right)\right)/;\,n\in\mathbb{N}^+$$

Involving algebraic functions of exp

Involving $\left(a+b\,e^{d\,z}\right)^{\beta}\sin(c\,+ez)$

01.06.21.0277.01

$$\int \left(a+b\,e^{d\,z}\right)^{\beta}\sin(c\,z)\,dz = -\frac{e^{-i\,c\,z}\left(a+b\,e^{d\,z}\right)^{\beta}}{2\,c}\left(\frac{e^{d\,z}\,b}{a}+1\right)^{-\beta}\left(e^{2\,i\,c\,z}\,{}_2F_1\!\left(\frac{i\,c}{d},\,-\beta;\,1+\frac{i\,c}{d};\,-\frac{b\,e^{d\,z}}{a}\right)+{}_2F_1\!\left(-\frac{i\,c}{d},\,-\beta;\,1-\frac{i\,c}{d};\,-\frac{b\,e^{d\,z}}{a}\right)\right)$$

01.06.21.0278.01

$$\int \left(a+b\,e^{d\,z}\right)^{\beta}\sin(e+c\,z)\,dz = -\frac{1}{2\,c}\,e^{-i\,(e+c\,z)}\left(a+b\,e^{d\,z}\right)^{\beta}\left(\frac{e^{d\,z}\,b}{a}+1\right)^{-\beta}\left(e^{2\,i\,(e+c\,z)}\,{}_2F_1\!\left(\frac{i\,c}{d},\,-\beta;\,1+\frac{i\,c}{d};\,-\frac{b\,e^{d\,z}}{a}\right)+{}_2F_1\!\left(-\frac{i\,c}{d},\,-\beta;\,1-\frac{i\,c}{d};\,-\frac{b\,e^{d\,z}}{a}\right)\right)$$

Involving $e^{p\,z}\left(a+b\,e^{d\,z}\right)^{\beta}\sin(c\,z+e)$

01.06.21.0279.01

$$\int e^{p\,z}\left(a+b\,e^{d\,z}\right)^{\beta}\sin(c\,z)\,dz = -\frac{1}{2\,(c+i\,p)\,(c-i\,p)}\left(a+b\,e^{d\,z}\right)^{\beta}\left(\frac{e^{d\,z}\,b}{a}+1\right)^{-\beta}\left(e^{(-i\,c+p)\,z}\,(c-i\,p)\,{}_2F_1\!\left(\frac{-i\,c+p}{d},\,-\beta;\,\frac{d-i\,c+p}{d};\,-\frac{b\,e^{d\,z}}{a}\right)+e^{(i\,c+p)\,z}\,(c+i\,p)\,{}_2F_1\!\left(\frac{i\,c+p}{d},\,-\beta;\,\frac{d+i\,c+p}{d};\,-\frac{b\,e^{d\,z}}{a}\right)\right)$$

01.06.21.0280.01

$$\int e^{p z}\left(a+b e^{d z}\right)^{\beta}\sin(e+c z)\,dz = -\frac{1}{2(c+i p)(c-i p)}\left(e^{-i e}\left(a+b e^{d z}\right)^{\beta}\left(\frac{e^{d z} b}{a}+1\right)^{-\beta}\left(e^{(-i c+p)z}(c-i p)\,{}_2F_1\left(\frac{-i c+p}{d},-\beta;\frac{d-i c+p}{d};-\frac{b e^{d z}}{a}\right)+ e^{2 i e+(i c+p)z}(c+i p)\,{}_2F_1\left(\frac{i c+p}{d},-\beta;\frac{d+i c+p}{d};-\frac{b e^{d z}}{a}\right)\right)\right)$$

Involving exponential function and a power function

Involving exp and power

Involving $z^{\alpha-1} e^{b z} \sin(c z)$

01.06.21.0281.01

$$\int z^{\alpha-1} e^{b z}\sin(c z)\,dz = -\frac{1}{2} i z^{\alpha}\left((-(b-i c)z)^{-\alpha}\,\Gamma(\alpha,-(b-i c)z)-(-(b+i c)z)^{-\alpha}\,\Gamma(\alpha,-(b+i c)z)\right)$$

01.06.21.0282.01

$$\int z^{\alpha-1} e^{i c z}\sin(c z)\,dz = \frac{1}{2} i z^{\alpha}\left(2^{-\alpha}\,\Gamma(\alpha,-2 i c z)(-i c z)^{-\alpha}+\frac{1}{\alpha}\right)$$

01.06.21.0283.01

$$\int z^{\alpha-1} e^{-i c z}\sin(c z)\,dz = -\frac{1}{2} i z^{\alpha}\left(2^{-\alpha}\,\Gamma(\alpha,2 i c z)(i c z)^{-\alpha}+\frac{1}{\alpha}\right)$$

01.06.21.0284.01

$$\int z^{n} e^{b z}\sin(c z)\,dz = \frac{1}{2} i z^{n+1}\left(((-i c-b)z)^{-n-1}\left(\frac{(-1)^{-n}\,\mathrm{Ei}((i c+b)z)}{(-n-1)!}+e^{(i c+b)z}\sum_{k=0}^{n}\frac{((-i c-b)z)^{k}}{(n+1)_{k-n}}-e^{(i c+b)z}\sum_{k=n+1}^{-1}\frac{((-i c-b)z)^{k}}{(n+1)_{k-n}}\right)- ((i c-b)z)^{-n-1}\left(\frac{(-1)^{-n}\,\mathrm{Ei}((-i c+b)z)}{(-n-1)!}+e^{(-i c+b)z}\sum_{k=0}^{n}\frac{((i c-b)z)^{k}}{(n+1)_{k-n}}-e^{(-i c+b)z}\sum_{k=n+1}^{-1}\frac{((i c-b)z)^{k}}{(n+1)_{k-n}}\right)\right)\;/;\; n\in\mathbb{Z}$$

01.06.21.0285.01

$$\int z^{n} e^{b z}\sin(c z)\,dz = -\frac{i}{2} n!\left((i c-b)^{-n-1} e^{(b-i c)z}\sum_{k=0}^{n}\frac{((i c-b)z)^{k}}{k!}-(-b-i c)^{-n-1} e^{(b+i c)z}\sum_{k=0}^{n}\frac{(-(b+i c)z)^{k}}{k!}\right)\;/;\; n\in\mathbb{N}$$

01.06.21.0286.01

$$\int z\, e^{b z}\sin(c z)\,dz = \frac{e^{b z}\left(\left(z b^{3}-b^{2}+c^{2} z b+c^{2}\right)\sin(c z)-c\left(z b^{2}-2 b+c^{2} z\right)\cos(c z)\right)}{\left(b^{2}+c^{2}\right)^{2}}$$

01.06.21.0287.01

$$\int z\, e^{i c z}\sin(c z)\,dz = \frac{2 i c^{2} z^{2}-e^{2 i c z}(i+2 c z)}{8 c^{2}}$$

01.06.21.0288.01

$$\int z\, e^{-i c z} \sin(c z)\, dz = \frac{1}{8}\left(\frac{e^{-2 i c z}\,(i - 2 c z)}{c^2} - 2\, i\, z^2\right)$$

01.06.21.0289.01

$$\int z^2\, e^{b z} \sin(c z)\, dz = \frac{1}{\left(b^2+c^2\right)^3}\left(e^{b z}\left(\left(z^2 b^5 - 2 z b^4 + 2\left(c^2 z^2+1\right) b^3 + c^2\left(c^2 z^2 - 6\right) b + 2 c^4 z\right)\sin(c z) - c\left(z^2 b^4 - 4 z b^3 + 2\left(c^2 z^2 + 3\right) b^2 - 4 c^2 z b + c^2\left(c^2 z^2 - 2\right)\right)\cos(c z)\right)\right)$$

01.06.21.0290.01

$$\int z^2\, e^{i c z} \sin(c z)\, dz = \frac{4 c^3\, i\, z^3 + e^{2 i c z}\left(-6 c^2 z^2 - 6\, i\, c z + 3\right)}{24 c^3}$$

01.06.21.0291.01

$$\int z^2\, e^{-i c z} \sin(c z)\, dz = \frac{e^{-2 i c z}\left(-2 c^2 z^2 + 2\, i\, c z + 1\right)}{8 c^3} - \frac{i\, z^3}{6}$$

01.06.21.0292.01

$$\int z^3\, e^{b z} \sin(c z)\, dz = \frac{1}{\left(b^2+c^2\right)^4} e^{b z}\left(\left(z^3 b^7 - 3 z^2 b^6 + 3 z\left(c^2 z^2+2\right) b^5 - 3\left(c^2 z^2+2\right) b^4 + 3 c^2 z\left(c^2 z^2 - 4\right) b^3 + 3 c^2\left(c^2 z^2 + 12\right) b^2 + c^4 z\left(c^2 z^2 - 18\right) b + 3 c^4\left(c^2 z^2 - 2\right)\right)\sin(c z) - c\left(z^3 b^6 - 6 z^2 b^5 + 3 z\left(c^2 z^2 + 6\right) b^4 - 12\left(c^2 z^2 + 2\right) b^3 + 3 c^2 z\left(c^2 z^2 + 4\right) b^2 - 6 c^2\left(c^2 z^2 - 4\right) b + c^4 z\left(c^2 z^2 - 6\right)\right)\cos(c z)\right)$$

01.06.21.0293.01

$$\int z^4\, e^{b z} \sin(c z)\, dz = \frac{1}{\left(b^2+c^2\right)^5} e^{b z}\left(\left(z^4 b^9 - 4 z^3 b^8 + 4 z^2\left(c^2 z^2 + 3\right) b^7 - 8 z\left(c^2 z^2 + 3\right) b^6 + 6\left(c^4 z^4 - 2 c^2 z^2 + 4\right) b^5 + 120 c^2 z b^4 + 4 c^2\left(c^4 z^4 - 15 c^2 z^2 - 60\right) b^3 + 8 c^4 z\left(c^2 z^2 + 15\right) b^2 + c^4\left(c^4 z^4 - 36 c^2 z^2 + 120\right) b + 4 c^6 z\left(c^2 z^2 - 6\right)\right)\sin(c z) - c\left(z^4 b^8 - 8 z^3 b^7 + 4 z^2\left(c^2 z^2 + 9\right) b^6 - 24 z\left(c^2 z^2 + 4\right) b^5 + 6\left(c^4 z^4 + 10 c^2 z^2 + 20\right) b^4 - 24 c^4 z^3 b^3 + 4 c^2\left(c^4 z^4 + 3 c^2 z^2 - 60\right) b^2 + \left(96 c^4 z - 8 c^6 z^3\right) b + c^4\left(c^4 z^4 - 12 c^2 z^2 + 24\right)\right)\cos(c z)\right)$$

01.06.21.0294.01

$$\int z^5\, e^{b z} \sin(c z)\, dz = \frac{1}{\left(b^2+c^2\right)^6}\left(e^{b z}\left(\left(z^5 b^{11} - 5 z^4 b^{10} + 5 z^3\left(c^2 z^2 + 4\right) b^9 - 15 z^2\left(c^2 z^2 + 4\right) b^8 + 10 z\left(c^4 z^4 + 12\right) b^7 - 10\left(c^4 z^4 - 24 c^2 z^2 + 12\right) b^6 + 10 c^2 z\left(c^4 z^4 - 12 c^2 z^2 - 108\right) b^5 + 10 c^2\left(c^4 z^4 + 60 c^2 z^2 + 180\right) b^4 + 5 c^4 z\left(c^4 z^4 - 32 c^2 z^2 - 120\right) b^3 + 15 c^4\left(c^4 z^4 + 16 c^2 z^2 - 120\right) b^2 + c^6 z\left(c^4 z^4 - 60 c^2 z^2 + 600\right) b + 5 c^6\left(c^4 z^4 - 12 c^2 z^2 + 24\right)\right)\sin(c z) - c\left(z^5 b^{10} - 10 z^4 b^9 + 5 z^3\left(c^2 z^2 + 12\right) b^8 - 40 z^2\left(c^2 z^2 + 6\right) b^7 + 10 z\left(c^4 z^4 + 16 c^2 z^2 + 60\right) b^6 - 60\left(c^4 z^4 + 4 c^2 z^2 + 12\right) b^5 + 10 c^2 z\left(c^4 z^4 + 12 c^2 z^2 - 60\right) b^4 - 40 c^2\left(c^4 z^4 - 6 c^2 z^2 - 60\right) b^3 + 5 c^4 z\left(c^4 z^4 - 216\right) b^2 - 10 c^4\left(c^4 z^4 - 24 c^2 z^2 + 72\right) b + c^6 z\left(c^4 z^4 - 20 c^2 z^2 + 120\right)\right)\cos(c z)\right)\right)$$

01.06.21.0295.01

$$\int z^{-n}\, e^{b z} \sin(c z)\, dz = \frac{i\, e^{(-b-i c) z}}{2\left(b^2+c^2\right)(n-1)!} \left(-(i c-b)^n (b+i c)\, e^{2 b z} (n-1)! \sum_{k=1}^{n-1} \frac{(i c-b)^{k-n} z^{k-n}}{(1-n)_k} - (-b-i c)^n (i c-b)\, e^{2 (b+i c) z} (n-1)! \sum_{k=1}^{n-1} \frac{(-b-i c)^{k-n} z^{k-n}}{(1-n)_k} + (-1)^n e^{(b+i c) z} \left((b+i c) \operatorname{Ei}((b-i c) z) (i c-b)^n + (-b-i c)^n \operatorname{Ei}((b+i c) z) (i c-b)\right)\right) /;\, n \in \mathbb{N}^+$$

01.06.21.0296.01

$$\int \frac{e^{b z} \sin(c z)}{z}\, dz = \frac{1}{2}\, i \left(\operatorname{Ei}((b-i c) z) - \operatorname{Ei}((b+i c) z)\right)$$

01.06.21.0297.01

$$\int \frac{e^{i c z} \sin(c z)}{z}\, dz = -\frac{1}{2}\, i \left(\operatorname{Ei}(2 i c z) - \log(z)\right)$$

01.06.21.0298.01

$$\int \frac{e^{-i c z} \sin(c z)}{z}\, dz = \frac{1}{2}\, i \left(\operatorname{Ei}(-2 i c z) - \log(z)\right)$$

01.06.21.0299.01

$$\int \frac{e^{b z} \sin(c z)}{z^2}\, dz = \frac{i\, e^{(b-i c) z} \left(-1+e^{2 i c z}\right) + (c+i b)\, z \operatorname{Ei}((b-i c) z) + (c-i b)\, z \operatorname{Ei}((b+i c) z)}{2 z}$$

01.06.21.0300.01

$$\int \frac{e^{i c z} \sin(c z)}{z^2}\, dz = \frac{i \left(-1+e^{2 i c z}\right) + 2 c z \operatorname{Ei}(2 i c z)}{2 z}$$

01.06.21.0301.01

$$\int \frac{e^{-i c z} \sin(c z)}{z^2}\, dz = \frac{i - i\, e^{-2 i c z} + 2 c z \operatorname{Ei}(-2 i c z)}{2 z}$$

01.06.21.0302.01

$$\int \frac{e^{b z} \sin(c z)}{z^3}\, dz = \frac{1}{4 z^2}\, i \left(-(b+i c)^2 \operatorname{Ei}((b+i c) z)\, z^2 + (b-i c)^2 \operatorname{Ei}((b-i c) z)\, z^2 + e^{(b-i c) z} \left(-b z + i c z + e^{2 i c z} (b z + i c z + 1) - 1\right)\right)$$

01.06.21.0303.01

$$\int \frac{e^{b z} \sin(c z)}{z^4}\, dz = -\frac{1}{12}\, i \left(\operatorname{Ei}((b+i c) z)\, (b+i c)^3 + \frac{e^{(b-i c) z} \left((b-i c)^2 z^2 + (b-i c) z + 2\right)}{z^3} - (b-i c)^3 \operatorname{Ei}((b-i c) z) - \frac{e^{(b+i c) z} \left((b+i c)^2 z^2 + (b+i c) z + 2\right)}{z^3}\right)$$

01.06.21.0304.01

$$\int \frac{e^{bz}\sin(cz)}{z^5}\,dz = -\frac{1}{48}\,i\left(\text{Ei}((b+ic)z)(b+ic)^4 + \frac{e^{(b-ic)z}\left((b-ic)^3 z^3 + (b-ic)^2 z^2 + 2(b-ic)z + 6\right)}{z^4} - (b-ic)^4\,\text{Ei}((b-ic)z) - \frac{e^{(b+ic)z}\left((b+ic)^3 z^3 + (b+ic)^2 z^2 + 2(b+ic)z + 6\right)}{z^4}\right)$$

01.06.21.0305.01

$$\int z^{n+\frac{1}{2}} e^{bz}\sin(cz)\,dz = \frac{1}{2}\,i\,z^{n+\frac{3}{2}}\left(((-ic-b)z)^{-n-\frac{3}{2}}\left(\text{erfc}\left(\sqrt{(-ic-b)z}\right)\Gamma\left(n+\frac{3}{2}\right) + e^{(ic+b)z}\sum_{k=0}^{n}\frac{((-ic-b)z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{(ic+b)z}\sum_{k=n+1}^{-1}\frac{((-ic-b)z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right) - ((ic-b)z)^{-n-\frac{3}{2}}\left(\text{erfc}\left(\sqrt{(ic-b)z}\right)\Gamma\left(n+\frac{3}{2}\right) + e^{(-ic+b)z}\sum_{k=0}^{n}\frac{((ic-b)z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{(-ic+b)z}\sum_{k=n+1}^{-1}\frac{((ic-b)z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right)\right) /;\ n \in \mathbb{Z}$$

01.06.21.0306.01

$$\int \sqrt{z}\, e^{bz}\sin(cz)\,dz = -\frac{1}{2}\,i\,z^{3/2}\left(\frac{\frac{1}{2}\sqrt{\pi}\left(\text{erf}\left(\sqrt{-(b+ic)z}\right)-1\right) - e^{(b+ic)z}\sqrt{-(b+ic)z}}{(-(b+ic)z)^{3/2}} + \frac{e^{(b-ic)z}\sqrt{-(b-ic)z} - \frac{1}{2}\sqrt{\pi}\left(\text{erf}\left(\sqrt{-(b-ic)z}\right)-1\right)}{(-(b-ic)z)^{3/2}}\right)$$

01.06.21.0307.01

$$\int z^{3/2} e^{bz}\sin(cz)\,dz = -\frac{1}{8}\,i\,z^{5/2}\left(\frac{2e^{(b+ic)z}\sqrt{-(b+ic)z}\,(2bz+2icz-3) + 3\sqrt{\pi}\,\text{erf}\left(\sqrt{-(b+ic)z}\right) - 3\sqrt{\pi}}{(-(b+ic)z)^{5/2}} + \frac{1}{(-(b-ic)z)^{5/2}}\left(e^{-icz}\left(3e^{icz}\sqrt{\pi} - 2e^{bz}\sqrt{-(b-ic)z}\,(2bz-2icz-3)\right) - 3\sqrt{\pi}\,\text{erf}\left(\sqrt{-(b-ic)z}\right)\right)\right)$$

01.06.21.0308.01

$$\int z^{5/2} e^{bz}\sin(cz)\,dz = -\frac{1}{2}\,i\,z^{7/2}\left(\left(2e^{(b+ic)z}\sqrt{-(b+ic)z}\,\left(4b^2z^2 - 4c^2z^2 - 10icz + 2b(4icz-5)z + 15\right) - 15\sqrt{\pi}\,\text{erf}\left(\sqrt{-(b+ic)z}\right) + 15\sqrt{\pi}\right) \Big/ \left(8(b+ic)^3 z^3\sqrt{-(b+ic)z}\right) + \frac{1}{(-(b-ic)z)^{7/2}}\left(e^{(b-ic)z}(-(b-ic)z)^{5/2} - \frac{5}{8}\left(e^{-icz}\left(2e^{bz}\sqrt{-(b-ic)z}\,(2bz-2icz-3) - 3e^{icz}\sqrt{\pi}\right) + 3\sqrt{\pi}\,\text{erf}\left(\sqrt{-(b-ic)z}\right)\right)\right)\right)$$

01.06.21.0309.01

$$\int z^{7/2} e^{b z} \sin(c z)\, dz = -\frac{1}{2} i z^{9/2} \left(\frac{1}{(-(b - i c) z)^{9/2}} \left(e^{(b-i c) z} (-(b - i c) z)^{7/2} + \frac{7}{16} e^{-i c z} \left(2 e^{b z} \sqrt{-(b - i c) z} \left(4 b^2 z^2 - 4 c^2 z^2 + 10 i c z + 2 b (-4 i c z - 5) z + 15\right) - 15 e^{i c z} \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b - i c) z}\right) + 15 e^{i c z} \sqrt{\pi}\right)\right) - \frac{1}{(-(b + i c) z)^{9/2}} \left(e^{(b+i c) z} (-(b + i c) z)^{7/2} + \frac{7}{16} \left(2 e^{(b+i c) z} \sqrt{-(b + i c) z} \left(4 b^2 z^2 - 4 c^2 z^2 - 10 i c z + 2 b (4 i c z - 5) z + 15\right) - 15 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b + i c) z}\right) + 15 \sqrt{\pi}\right)\right)\right)$$

01.06.21.0310.01

$$\int z^{9/2} e^{b z} \sin(c z)\, dz = -\frac{1}{2} i z^{11/2} \left(\frac{1}{(-(b - i c) z)^{11/2}} \left(e^{(b-i c) z} (-(b - i c) z)^{9/2} + \frac{9}{2} \left(e^{(b-i c) z} (-(b - i c) z)^{7/2} + \frac{7}{16} e^{-i c z} \left(2 e^{b z} \sqrt{-(b - i c) z} \left(4 b^2 z^2 - 4 c^2 z^2 + 10 i c z + 2 b (-4 i c z - 5) z + 15\right) - 15 e^{i c z} \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b - i c) z}\right) + 15 e^{i c z} \sqrt{\pi}\right)\right)\right) - \frac{1}{(-(b + i c) z)^{11/2}} \left(e^{(b+i c) z} (-(b + i c) z)^{9/2} + \frac{9}{2} \left(e^{(b+i c) z} (-(b + i c) z)^{7/2} + \frac{7}{16} \left(2 e^{(b+i c) z} \sqrt{-(b + i c) z} \left(4 b^2 z^2 - 4 c^2 z^2 - 10 i c z + 2 b (4 i c z - 5) z + 15\right) - 15 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b + i c) z}\right) + 15 \sqrt{\pi}\right)\right)\right)\right)$$

01.06.21.0311.01

$$\int \frac{e^{b z} \sin(c z)}{\sqrt{z}}\, dz = \frac{1}{2 \left(b^2 + c^2\right)} \left(i \sqrt{\pi} \left(\sqrt{b - i c}\, (b + i c) \operatorname{erfi}\left(\sqrt{b - i c}\, \sqrt{z}\right) - (b - i c) \sqrt{b + i c}\, \operatorname{erfi}\left(\sqrt{b + i c}\, \sqrt{z}\right)\right)\right)$$

01.06.21.0312.01

$$\int \frac{e^{b z} \sin(c z)}{z^{3/2}}\, dz = -\frac{1}{\sqrt{z}} \left(i \left(-\sqrt{\pi}\, \sqrt{-(b + i c) z}\, \operatorname{erf}\left(\sqrt{-(b + i c) z}\right) - e^{(b+i c) z} + e^{(b-i c) z} + \sqrt{\pi}\, \sqrt{-(b - i c) z}\, \operatorname{erf}\left(\sqrt{-(b - i c) z}\right) + \sqrt{\pi}\, \sqrt{-(b + i c) z} - \sqrt{\pi}\, \sqrt{-(b - i c) z}\right)\right)$$

01.06.21.0313.01

$$\int \frac{e^{b z} \sin(c z)}{z^{5/2}}\, dz = \frac{1}{3 z^{3/2}} \left(i \left(-2 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b + i c) z}\right) (-(b + i c) z)^{3/2} + 2 \sqrt{\pi}\, (-(b + i c) z)^{3/2} - 2 \sqrt{\pi}\, (-(b - i c) z)^{3/2} + e^{(b+i c) z} - e^{(b-i c) z} + 2 (b + i c) e^{(b+i c) z} z - 2 (b - i c) e^{(b-i c) z} z + 2 \sqrt{\pi}\, (-(b - i c) z)^{3/2} \operatorname{erf}\left(\sqrt{-(b - i c) z}\right)\right)\right)$$

01.06.21.0314.01

$$\int \frac{e^{bz}\sin(cz)}{z^{7/2}}\,dz = -\frac{1}{15 z^{5/2}}\left(i\left(-4\sqrt{\pi}\,\operatorname{erf}\left(\sqrt{-(b+ic)z}\right)(-(b+ic)z)^{5/2} + 4\sqrt{\pi}\,(-(b+ic)z)^{5/2} - 4\sqrt{\pi}\,(-(b-ic)z)^{5/2} - 3e^{(b+ic)z} + 3e^{(b-ic)z} - 4(b+ic)^2 e^{(b+ic)z} z^2 + 4(b-ic)^2 e^{(b-ic)z} z^2 - 2(b+ic)e^{(b+ic)z} z + 2(b-ic)e^{(b-ic)z} z + 4\sqrt{\pi}\,(-(b-ic)z)^{5/2}\operatorname{erf}\left(\sqrt{-(b-ic)z}\right)\right)\right)$$

01.06.21.0315.01

$$\int \frac{e^{bz}\sin(cz)}{z^{9/2}}\,dz = \frac{1}{105 z^{7/2}}\left(i\left(-8\sqrt{\pi}\,\operatorname{erf}\left(\sqrt{-(b+ic)z}\right)(-(b+ic)z)^{7/2} + 8\sqrt{\pi}\,(-(b+ic)z)^{7/2} - 8\sqrt{\pi}\,(-(b-ic)z)^{7/2} + 15e^{(b+ic)z} - 15e^{(b-ic)z} + 8(b+ic)^3 e^{(b+ic)z} z^3 - 8(b-ic)^3 e^{(b-ic)z} z^3 + 4(b+ic)^2 e^{(b+ic)z} z^2 - 4(b-ic)^2 e^{(b-ic)z} z^2 + 6(b+ic)e^{(b+ic)z} z - 6(b-ic)e^{(b-ic)z} z + 8\sqrt{\pi}\,(-(b-ic)z)^{7/2}\operatorname{erf}\left(\sqrt{-(b-ic)z}\right)\right)\right)$$

Involving $z^{\alpha-1} e^{bz+e} \sin(cz)$

01.06.21.0316.01

$$\int z^{\alpha-1} e^{bz+e}\sin(cz)\,dz = -\frac{1}{2} i z^{\alpha} e^{e}\left((-(b-ic)z)^{-\alpha}\,\Gamma(\alpha, -(b-ic)z) - (-(b+ic)z)^{-\alpha}\,\Gamma(\alpha, -(b+ic)z)\right)$$

01.06.21.0317.01

$$\int z^{\alpha-1} e^{icz+e}\sin(cz)\,dz = \frac{1}{2} i z^{\alpha} e^{e}\left(2^{-\alpha}\,\Gamma(\alpha, -2icz)(-icz)^{-\alpha} + \frac{1}{\alpha}\right)$$

01.06.21.0318.01

$$\int z^{\alpha-1} e^{e-icz}\sin(cz)\,dz = -\frac{1}{2} i z^{\alpha} e^{e}\left(2^{-\alpha}\,\Gamma(\alpha, 2icz)(icz)^{-\alpha} + \frac{1}{\alpha}\right)$$

01.06.21.0319.01

$$\int z^{n} e^{bz+e}\sin(cz)\,dz = \frac{1}{2} i z^{n+1} e^{e}\left(((-ic-b)z)^{-n-1}\left(\frac{(-1)^{-n}\operatorname{Ei}((ic+b)z)}{(-n-1)!} + e^{(ic+b)z}\sum_{k=0}^{n}\frac{((-ic-b)z)^k}{(n+1)_{k-n}} - e^{(ic+b)z}\sum_{k=n+1}^{-1}\frac{((-ic-b)z)^k}{(n+1)_{k-n}}\right) - ((ic-b)z)^{-n-1}\left(\frac{(-1)^{-n}\operatorname{Ei}((-ic+b)z)}{(-n-1)!} + e^{(-ic+b)z}\sum_{k=0}^{n}\frac{((ic-b)z)^k}{(n+1)_{k-n}} - e^{(-ic+b)z}\sum_{k=n+1}^{-1}\frac{((ic-b)z)^k}{(n+1)_{k-n}}\right)\right) /;\, n \in \mathbb{Z}$$

01.06.21.0320.01

$$\int z^{n} e^{bz+e}\sin(cz)\,dz = -\frac{i e^{e}}{2}\, n!\left((ic-b)^{-n-1} e^{(b-ic)z}\sum_{k=0}^{n}\frac{((ic-b)z)^k}{k!} - (-b-ic)^{-n-1} e^{(b+ic)z}\sum_{k=0}^{n}\frac{(-(b+ic)z)^k}{k!}\right) /;\, n \in \mathbb{N}$$

01.06.21.0321.01

$$\int z\, e^{bz+e}\sin(cz)\,dz = \frac{e^{bz+e}\left(\left(z b^3 - b^2 + c^2 z b + c^2\right)\sin(cz) - c\left(z b^2 - 2b + c^2 z\right)\cos(cz)\right)}{\left(b^2+c^2\right)^2}$$

01.06.21.0322.01

$$\int z\, e^{c z+e} \sin(c z)\, dz = \frac{e^{c z+e} ((1 - c z) \cos(c z) + c z \sin(c z))}{2 c^2}$$

01.06.21.0323.01

$$\int z\, e^{e-c z} \sin(c z)\, dz = -\frac{e^{e-c z} ((c z + 1) \cos(c z) + c z \sin(c z))}{2 c^2}$$

01.06.21.0324.01

$$\int z^2 e^{b z+e} \sin(c z)\, dz = \frac{1}{\left(b^2 + c^2\right)^3} e^{b z+e} \left(\left(z^2 b^5 - 2 z b^4 + 2 \left(c^2 z^2 + 1\right) b^3 + c^2 \left(c^2 z^2 - 6\right) b + 2 c^4 z\right) \sin(c z) - c \left(z^2 b^4 - 4 z b^3 + 2 \left(c^2 z^2 + 3\right) b^2 - 4 c^2 z b + c^2 \left(c^2 z^2 - 2\right)\right) \cos(c z)\right)$$

01.06.21.0325.01

$$\int z^2 e^{c z+e} \sin(c z)\, dz = -\frac{e^{c z+e} (c z - 1) ((c z - 1) \cos(c z) - (c z + 1) \sin(c z))}{2 c^3}$$

01.06.21.0326.01

$$\int z^2 e^{e-c z} \sin(c z)\, dz = -\frac{e^{e-c z} (c z + 1) ((c z + 1) \cos(c z) + (c z - 1) \sin(c z))}{2 c^3}$$

01.06.21.0327.01

$$\int z^3 e^{b z+e} \sin(c z)\, dz = \frac{1}{\left(b^2 + c^2\right)^4} e^{b z+e} \left(\left(z^3 b^7 - 3 z^2 b^6 + 3 z \left(c^2 z^2 + 2\right) b^5 - 3 \left(c^2 z^2 + 2\right) b^4 + 3 c^2 z \left(c^2 z^2 - 4\right) b^3 + 3 c^2 \left(c^2 z^2 + 12\right) b^2 + c^4 z \left(c^2 z^2 - 18\right) b + 3 c^4 \left(c^2 z^2 - 2\right)\right) \sin(c z) - c \left(z^3 b^6 - 6 z^2 b^5 + 3 z \left(c^2 z^2 + 6\right) b^4 - 12 \left(c^2 z^2 + 2\right) b^3 + 3 c^2 z \left(c^2 z^2 + 4\right) b^2 - 6 c^2 \left(c^2 z^2 - 4\right) b + c^4 z \left(c^2 z^2 - 6\right)\right) \cos(c z)\right)$$

01.06.21.0328.01

$$\int z^4 e^{b z+e} \sin(c z)\, dz = \frac{1}{\left(b^2 + c^2\right)^5} e^{b z+e} \left(\left(z^4 b^9 - 4 z^3 b^8 + 4 z^2 \left(c^2 z^2 + 3\right) b^7 - 8 z \left(c^2 z^2 + 3\right) b^6 + 6 \left(c^4 z^4 - 2 c^2 z^2 + 4\right) b^5 + 120 c^2 z b^4 + 4 c^2 \left(c^4 z^4 - 15 c^2 z^2 - 60\right) b^3 + 8 c^4 z \left(c^2 z^2 + 15\right) b^2 + c^4 \left(c^4 z^4 - 36 c^2 z^2 + 120\right) b + 4 c^6 z \left(c^2 z^2 - 6\right)\right) \sin(c z) - c \left(z^4 b^8 - 8 z^3 b^7 + 4 z^2 \left(c^2 z^2 + 9\right) b^6 - 24 z \left(c^2 z^2 + 4\right) b^5 + 6 \left(c^4 z^4 + 10 c^2 z^2 + 20\right) b^4 - 24 c^4 z^3 b^3 + 4 c^2 \left(c^4 z^4 + 3 c^2 z^2 - 60\right) b^2 + \left(96 c^4 z - 8 c^6 z^3\right) b + c^4 \left(c^4 z^4 - 12 c^2 z^2 + 24\right)\right) \cos(c z)\right)$$

01.06.21.0329.01

$$\int z^5 e^{b z+e} \sin(c z)\, dz = \frac{1}{\left(b^2 + c^2\right)^6} e^{b z+e} \left(\left(z^5 b^{11} - 5 z^4 b^{10} + 5 z^3 \left(c^2 z^2 + 4\right) b^9 - 15 z^2 \left(c^2 z^2 + 4\right) b^8 + 10 z \left(c^4 z^4 + 12\right) b^7 - 10 \left(c^4 z^4 - 24 c^2 z^2 + 12\right) b^6 + 10 c^2 z \left(c^4 z^4 - 12 c^2 z^2 - 108\right) b^5 + 10 c^2 \left(c^4 z^4 + 60 c^2 z^2 + 180\right) b^4 + 5 c^4 z \left(c^4 z^4 - 32 c^2 z^2 - 120\right) b^3 + 15 c^4 \left(c^4 z^4 + 16 c^2 z^2 - 120\right) b^2 + c^6 z \left(c^4 z^4 - 60 c^2 z^2 + 600\right) b + 5 c^6 \left(c^4 z^4 - 12 c^2 z^2 + 24\right)\right) \sin(c z) - c \left(z^5 b^{10} - 10 z^4 b^9 + 5 z^3 \left(c^2 z^2 + 12\right) b^8 - 40 z^2 \left(c^2 z^2 + 6\right) b^7 + 10 z \left(c^4 z^4 + 16 c^2 z^2 + 60\right) b^6 - 60 \left(c^4 z^4 + 4 c^2 z^2 + 12\right) b^5 + 10 c^2 z \left(c^4 z^4 + 12 c^2 z^2 - 60\right) b^4 - 40 c^2 \left(c^4 z^4 - 6 c^2 z^2 - 60\right) b^3 + 5 c^4 z \left(c^4 z^4 - 216\right) b^2 - 10 c^4 \left(c^4 z^4 - 24 c^2 z^2 + 72\right) b + c^6 z \left(c^4 z^4 - 20 c^2 z^2 + 120\right)\right) \cos(c z)\right)$$

01.06.21.0330.01

$$\int z^{-n} e^{b z+e} \sin(c z)\, dz = \frac{i\, e^{(-b-i c) z+e}}{2\left(b^2+c^2\right)(n-1)!} \left(-(i c-b)^n (b+i c)\, e^{2 b z} (n-1)! \sum_{k=1}^{n-1} \frac{(i c-b)^{k-n} z^{k-n}}{(1-n)_k} - (-b-i c)^n (i c-b)\, e^{2(b+i c) z} (n-1)! \sum_{k=1}^{n-1} \frac{(-b-i c)^{k-n} z^{k-n}}{(1-n)_k} + (-1)^n e^{(b+i c) z} \left((b+i c) \operatorname{Ei}((b-i c) z) (i c-b)^n + (-b-i c)^n \operatorname{Ei}((b+i c) z) (i c-b)\right)\right) /;\ n \in \mathbb{N}^+$$

01.06.21.0331.01

$$\int \frac{e^{e+b z} \sin(c z)}{z}\, dz = \frac{1}{2}\, i\, e^e \left(\operatorname{Ei}((b-i c) z) - \operatorname{Ei}((b+i c) z)\right)$$

01.06.21.0332.01

$$\int \frac{e^{i c z+e} \sin(c z)}{z}\, dz = -\frac{1}{2}\, i\, e^e \left(\operatorname{Ei}(2 i c z) - \log(z)\right)$$

01.06.21.0333.01

$$\int \frac{e^{e-i c z} \sin(c z)}{z}\, dz = \frac{1}{2}\, i\, e^e \left(\operatorname{Ei}(-2 i c z) - \log(z)\right)$$

01.06.21.0334.01

$$\int \frac{e^{b z+e} \sin(c z)}{z^2}\, dz = e^e\, \frac{i\, e^{(b-i c) z} \left(-1+e^{2 i c z}\right) + (c+i b)\, z \operatorname{Ei}((b-i c) z) + (c-i b)\, z \operatorname{Ei}((b+i c) z)}{2 z}$$

01.06.21.0335.01

$$\int \frac{e^{i c z+e} \sin(c z)}{z^2}\, dz = e^e\, \frac{i\left(-1+e^{2 i c z}\right) + 2 c z \operatorname{Ei}(2 i c z)}{2 z}$$

01.06.21.0336.01

$$\int \frac{e^{e-i c z} \sin(c z)}{z^2}\, dz = e^e\, \frac{i - i\, e^{-2 i c z} + 2 c z \operatorname{Ei}(-2 i c z)}{2 z}$$

01.06.21.0337.01

$$\int \frac{e^{b z+e} \sin(c z)}{z^3}\, dz = \frac{1}{4 z^2}\, i\, e^e \left(-(b+i c)^2 \operatorname{Ei}((b+i c) z)\, z^2 + (b-i c)^2 \operatorname{Ei}((b-i c) z)\, z^2 + e^{(b-i c) z} \left(-b z + i c z + e^{2 i c z} (b z + i c z + 1) - 1\right)\right)$$

01.06.21.0338.01

$$\int \frac{e^{b z+e} \sin(c z)}{z^4}\, dz = -\frac{1}{12}\, i\, e^e \left(\operatorname{Ei}((b+i c) z)\, (b+i c)^3 + \frac{e^{(b-i c) z} \left((b-i c)^2 z^2 + (b-i c) z + 2\right)}{z^3} - (b-i c)^3 \operatorname{Ei}((b-i c) z) - \frac{e^{(b+i c) z} \left((b+i c)^2 z^2 + (b+i c) z + 2\right)}{z^3}\right)$$

01.06.21.0339.01

$$\int \frac{e^{b z+e} \sin(c z)}{z^5} \, dz = -\frac{1}{48} i e^e \left(\text{Ei}((b+i c) z) (b+i c)^4 + \frac{e^{(b-i c) z} \left((b-i c)^3 z^3 + (b-i c)^2 z^2 + 2 (b-i c) z + 6\right)}{z^4} - (b-i c)^4 \text{Ei}((b-i c) z) - \frac{e^{(b+i c) z} \left((b+i c)^3 z^3 + (b+i c)^2 z^2 + 2 (b+i c) z + 6\right)}{z^4} \right)$$

01.06.21.0340.01

$$\int z^{n+\frac{1}{2}} e^{b z+e} \sin(c z) \, dz = \frac{1}{2} i z^{n+\frac{3}{2}} e^e \left(((-i c-b) z)^{-n-\frac{3}{2}} \left(\text{erfc}\left(\sqrt{(-i c-b) z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{(i c+b) z} \sum_{k=0}^{n} \frac{((-i c-b) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{(i c+b) z} \sum_{k=n+1}^{-1} \frac{((-i c-b) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} \right) - ((i c-b) z)^{-n-\frac{3}{2}} \left(\text{erfc}\left(\sqrt{(i c-b) z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{(-i c+b) z} \sum_{k=0}^{n} \frac{((i c-b) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{(-i c+b) z} \sum_{k=n+1}^{-1} \frac{((i c-b) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} \right) \right) /; n \in \mathbb{Z}$$

01.06.21.0341.01

$$\int \sqrt{z} \, e^{b z+e} \sin(c z) \, dz = -\frac{1}{2} i z^{3/2} e^e \left(\frac{\frac{1}{2} \sqrt{\pi} \left(\text{erf}\left(\sqrt{-(b+i c) z}\right) - 1\right) - e^{(b+i c) z} \sqrt{-(b+i c) z}}{(-(b+i c) z)^{3/2}} + \frac{e^{(b-i c) z} \sqrt{-(b-i c) z} - \frac{1}{2} \sqrt{\pi} \left(\text{erf}\left(\sqrt{-(b-i c) z}\right) - 1\right)}{(-(b-i c) z)^{3/2}} \right)$$

01.06.21.0342.01

$$\int z^{3/2} e^{b z+e} \sin(c z) \, dz = -\frac{1}{8} i z^{5/2} e^e \left(\frac{2 e^{(b+i c) z} \sqrt{-(b+i c) z} \, (2 b z + 2 i c z - 3) + 3 \sqrt{\pi} \, \text{erf}\left(\sqrt{-(b+i c) z}\right) - 3 \sqrt{\pi}}{(-(b+i c) z)^{5/2}} + \frac{1}{(-(b-i c) z)^{5/2}} \left(e^{-i c z} \left(3 e^{i c z} \sqrt{\pi} - 2 e^{b z} \sqrt{-(b-i c) z} \, (2 b z - 2 i c z - 3) \right) - 3 \sqrt{\pi} \, \text{erf}\left(\sqrt{-(b-i c) z}\right) \right) \right)$$

01.06.21.0343.01

$$\int z^{5/2} e^{b z+e} \sin(c z) \, dz = -\frac{1}{2} i z^{7/2} e^e \left(\left(2 e^{(b+i c) z} \sqrt{-(b+i c) z} \, \left(4 b^2 z^2 - 4 c^2 z^2 - 10 i c z + 2 b (4 i c z - 5) z + 15\right) - 15 \sqrt{\pi} \, \text{erf}\left(\sqrt{-(b+i c) z}\right) + 15 \sqrt{\pi} \right) \Big/ \left(8 (b+i c)^3 z^3 \sqrt{-(b+i c) z} \right) + \frac{1}{(-(b-i c) z)^{7/2}} \left(e^{(b-i c) z} (-(b-i c) z)^{5/2} - \frac{5}{8} \left(e^{-i c z} \left(2 e^{b z} \sqrt{-(b-i c) z} \, (2 b z - 2 i c z - 3) - 3 e^{i c z} \sqrt{\pi} \right) + 3 \sqrt{\pi} \, \text{erf}\left(\sqrt{-(b-i c) z}\right) \right) \right) \right)$$

01.06.21.0344.01

$$\int z^{7/2}\, e^{b z+e} \sin(c z)\, dz = -\frac{1}{2} i z^{9/2} e^e \left(\frac{1}{(-(b-i c) z)^{9/2}} \left(e^{(b-i c) z} (-(b-i c) z)^{7/2} + \frac{7}{16} e^{-i c z} \left(2 e^{b z} \sqrt{-(b-i c) z} \left(4 b^2 z^2 - 4 c^2 z^2 + 10 i c z + 2 b (-4 i c z - 5) z + 15\right) - 15 e^{i c z} \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b-i c) z}\right) + 15 e^{i c z} \sqrt{\pi}\right)\right) - \frac{1}{(-(b+i c) z)^{9/2}} \left(e^{(b+i c) z} (-(b+i c) z)^{7/2} + \frac{7}{16} \left(2 e^{(b+i c) z} \sqrt{-(b+i c) z} \left(4 b^2 z^2 - 4 c^2 z^2 - 10 i c z + 2 b (4 i c z - 5) z + 15\right) - 15 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b+i c) z}\right) + 15 \sqrt{\pi}\right)\right)\right)$$

01.06.21.0345.01

$$\int z^{9/2}\, e^{b z+e} \sin(c z)\, dz = -\frac{1}{2} i z^{11/2} e^e \left(\frac{1}{(-(b-i c) z)^{11/2}} \left(e^{(b-i c) z} (-(b-i c) z)^{9/2} + \frac{9}{2} \left(e^{(b-i c) z} (-(b-i c) z)^{7/2} + \frac{7}{16} e^{-i c z} \left(2 e^{b z} \sqrt{-(b-i c) z} \left(4 b^2 z^2 - 4 c^2 z^2 + 10 i c z + 2 b (-4 i c z - 5) z + 15\right) - 15 e^{i c z} \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b-i c) z}\right) + 15 e^{i c z} \sqrt{\pi}\right)\right)\right) - \frac{1}{(-(b+i c) z)^{11/2}} \left(e^{(b+i c) z} (-(b+i c) z)^{9/2} + \frac{9}{2} \left(e^{(b+i c) z} (-(b+i c) z)^{7/2} + \frac{7}{16} \left(2 e^{(b+i c) z} \sqrt{-(b+i c) z} \left(4 b^2 z^2 - 4 c^2 z^2 - 10 i c z + 2 b (4 i c z - 5) z + 15\right) - 15 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b+i c) z}\right) + 15 \sqrt{\pi}\right)\right)\right)\right)$$

01.06.21.0346.01

$$\int \frac{e^{b z+e} \sin(c z)}{\sqrt{z}}\, dz = e^e \frac{1}{2 \left(b^2 + c^2\right)} \left(i \sqrt{\pi} \left(\sqrt{b - i c}\, (b + i c) \operatorname{erfi}\left(\sqrt{b - i c}\, \sqrt{z}\right) - (b - i c) \sqrt{b + i c}\, \operatorname{erfi}\left(\sqrt{b + i c}\, \sqrt{z}\right)\right)\right)$$

01.06.21.0347.01

$$\int \frac{e^{e+b z} \sin(c z)}{z^{3/2}}\, dz = -\frac{1}{\sqrt{z}} \left(i e^e \left(-\sqrt{\pi}\, \sqrt{-(b+i c) z}\, \operatorname{erf}\left(\sqrt{-(b+i c) z}\right) - e^{(b+i c) z} + e^{(b-i c) z} + \sqrt{\pi}\, \sqrt{-(b-i c) z}\, \operatorname{erf}\left(\sqrt{-(b-i c) z}\right) + \sqrt{\pi}\, \sqrt{-(b+i c) z} - \sqrt{\pi}\, \sqrt{-(b-i c) z}\right)\right)$$

01.06.21.0348.01

$$\int \frac{e^{b z+e} \sin(c z)}{z^{5/2}}\, dz = \frac{1}{3 z^{3/2}} i e^e \left(-2 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b+i c) z}\right) (-(b+i c) z)^{3/2} + 2 \sqrt{\pi}\, (-(b+i c) z)^{3/2} - 2 \sqrt{\pi}\, (-(b-i c) z)^{3/2} + e^{(b+i c) z} - e^{(b-i c) z} + 2 (b + i c) e^{(b+i c) z} z - 2 (b - i c) e^{(b-i c) z} z + 2 \sqrt{\pi}\, (-(b-i c) z)^{3/2} \operatorname{erf}\left(\sqrt{-(b-i c) z}\right)\right)$$

01.06.21.0349.01

$$\int \frac{e^{b z+e}\sin(c z)}{z^{7/2}}\,dz = -\frac{1}{15 z^{5/2}}\, i\, e^e \Big(-4\sqrt{\pi}\,\mathrm{erf}\Big(\sqrt{-(b+i c) z}\Big)(-(b+i c) z)^{5/2} + 4\sqrt{\pi}\,(-(b+i c) z)^{5/2} - 4\sqrt{\pi}\,(-(b-i c) z)^{5/2} - 3 e^{(b+i c) z} + 3 e^{(b-i c) z} - 4 (b+i c)^2 e^{(b+i c) z} z^2 + 4 (b-i c)^2 e^{(b-i c) z} z^2 - 2 (b+i c) e^{(b+i c) z} z + 2 (b-i c) e^{(b-i c) z} z + 4\sqrt{\pi}\,(-(b-i c) z)^{5/2}\,\mathrm{erf}\Big(\sqrt{-(b-i c) z}\Big)\Big)$$

01.06.21.0350.01

$$\int \frac{e^{b z+e}\sin(c z)}{z^{9/2}}\,dz = \frac{1}{105 z^{7/2}}\, i\, e^e \Big(-8\sqrt{\pi}\,\mathrm{erf}\Big(\sqrt{-(b+i c) z}\Big)(-(b+i c) z)^{7/2} + 8\sqrt{\pi}\,(-(b+i c) z)^{7/2} - 8\sqrt{\pi}\,(-(b-i c) z)^{7/2} + 15 e^{(b+i c) z} - 15 e^{(b-i c) z} + 8 (b+i c)^3 e^{(b+i c) z} z^3 - 8 (b-i c)^3 e^{(b-i c) z} z^3 + 4 (b+i c)^2 e^{(b+i c) z} z^2 - 4 (b-i c)^2 e^{(b-i c) z} z^2 + 6 (b+i c) e^{(b+i c) z} z - 6 (b-i c) e^{(b-i c) z} z + 8\sqrt{\pi}\,(-(b-i c) z)^{7/2}\,\mathrm{erf}\Big(\sqrt{-(b-i c) z}\Big)\Big)$$

Involving $z^{\alpha-1} e^{b z} \sin(c z + d)$

01.06.21.0351.01

$$\int z^{\alpha-1} e^{b z}\sin(c z+d)\,dz = \frac{1}{2}\, i\, e^{-i d} z^{\alpha}\left(e^{2 i d} E_{1-\alpha}(-(b+i c) z) - E_{1-\alpha}(-(b-i c) z)\right)$$

01.06.21.0352.01

$$\int z^n e^{b z}\sin(d+c z)\,dz = \frac{1}{2}\, i\, e^{-i d} z^{n+1}\Bigg(e^{2 i d}((-i c-b) z)^{-n-1}\Bigg(\frac{(-1)^{-n}\,\mathrm{Ei}((i c+b) z)}{(-n-1)!} + e^{(i c+b) z}\sum_{k=0}^{n}\frac{((-i c-b) z)^k}{(n+1)_{k-n}} - e^{(i c+b) z}\sum_{k=n+1}^{-1}\frac{((-i c-b) z)^k}{(n+1)_{k-n}}\Bigg) - ((i c-b) z)^{-n-1}\Bigg(\frac{(-1)^{-n}\,\mathrm{Ei}((-i c+b) z)}{(-n-1)!} + e^{(-i c+b) z}\sum_{k=0}^{n}\frac{((i c-b) z)^k}{(n+1)_{k-n}} - e^{(-i c+b) z}\sum_{k=n+1}^{-1}\frac{((i c-b) z)^k}{(n+1)_{k-n}}\Bigg)\Bigg) \;/;\; n\in\mathbb{Z}$$

01.06.21.0353.01

$$\int z^{n+\frac{1}{2}} e^{b z}\sin(c z+d)\,dz = \frac{1}{2}\, i\, e^{-i d} z^{n+\frac{3}{2}}\Bigg(e^{2 i d}((-i c-b) z)^{-n-\frac{3}{2}}\Bigg(\mathrm{erfc}\Big(\sqrt{(-i c-b) z}\Big)\Gamma\Big(n+\frac{3}{2}\Big) + e^{(i c+b) z}\sum_{k=0}^{n}\frac{((-i c-b) z)^{k+\frac{1}{2}}}{\big(n+\frac{3}{2}\big)_{k-n}} - e^{(i c+b) z}\sum_{k=n+1}^{-1}\frac{((-i c-b) z)^{k+\frac{1}{2}}}{\big(n+\frac{3}{2}\big)_{k-n}}\Bigg) - ((i c-b) z)^{-n-\frac{3}{2}}\Bigg(\mathrm{erfc}\Big(\sqrt{(i c-b) z}\Big)\Gamma\Big(n+\frac{3}{2}\Big) + e^{(-i c+b) z}\sum_{k=0}^{n}\frac{((i c-b) z)^{k+\frac{1}{2}}}{\big(n+\frac{3}{2}\big)_{k-n}} - e^{(-i c+b) z}\sum_{k=n+1}^{-1}\frac{((i c-b) z)^{k+\frac{1}{2}}}{\big(n+\frac{3}{2}\big)_{k-n}}\Bigg)\Bigg) \;/;\; n\in\mathbb{Z}$$

01.06.21.0354.01

$$\int z\, e^{b z}\sin(c z+d)\,dz = \frac{e^{b z}\left(\left(-b^2+\left(b^2+c^2\right) z b+c^2\right)\sin(d+c z) - c\left(\left(b^2+c^2\right) z-2 b\right)\cos(d+c z)\right)}{\left(b^2+c^2\right)^2}$$

Involving $z^{\alpha-1} e^{b z+e} \sin(c z+d)$

01.06.21.0355.01

$$\int z^{\alpha-1} e^{b z+e} \sin(c z+d)\, dz = \frac{1}{2} i\, e^{-i d+e} z^{\alpha} \left(e^{2 i d} E_{1-\alpha}(-(b+i c) z) - E_{1-\alpha}(-(b-i c) z)\right)$$

01.06.21.0356.01

$$\int z^n e^{b z+e} \sin(d+c z)\, dz = \frac{1}{2} i\, e^{e-i d} z^{n+1} \left(e^{2 i d} ((-i c-b) z)^{-n-1} \left(\frac{(-1)^{-n} \operatorname{Ei}((i c+b) z)}{(-n-1)!} + e^{(i c+b) z} \sum_{k=0}^{n} \frac{((-i c-b) z)^k}{(n+1)_{k-n}} - e^{(i c+b) z} \sum_{k=n+1}^{-1} \frac{((-i c-b) z)^k}{(n+1)_{k-n}}\right) - ((i c-b) z)^{-n-1} \left(\frac{(-1)^{-n} \operatorname{Ei}((-i c+b) z)}{(-n-1)!} + e^{(-i c+b) z} \sum_{k=0}^{n} \frac{((i c-b) z)^k}{(n+1)_{k-n}} - e^{(-i c+b) z} \sum_{k=n+1}^{-1} \frac{((i c-b) z)^k}{(n+1)_{k-n}}\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0357.01

$$\int z^{n+\frac{1}{2}} e^{b z+e} \sin(c z+d)\, dz = \frac{1}{2} i\, e^{e-i d} z^{n+\frac{3}{2}} \left(e^{2 i d} ((-i c-b) z)^{-n-\frac{3}{2}} \left(\operatorname{erfc}\left(\sqrt{(-i c-b) z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{(i c+b) z} \sum_{k=0}^{n} \frac{((-i c-b) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{(i c+b) z} \sum_{k=n+1}^{-1} \frac{((-i c-b) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right) - ((i c-b) z)^{-n-\frac{3}{2}} \left(\operatorname{erfc}\left(\sqrt{(i c-b) z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{(-i c+b) z} \sum_{k=0}^{n} \frac{((i c-b) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{(-i c+b) z} \sum_{k=n+1}^{-1} \frac{((i c-b) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0358.01

$$\int z\, e^{b z+e} \sin(c z+d)\, dz = \frac{e^{b z+e} \left(\left(-b^2+\left(b^2+c^2\right) z\, b+c^2\right) \sin(d+c z) - c\left(\left(b^2+c^2\right) z-2 b\right) \cos(d+c z)\right)}{\left(b^2+c^2\right)^2}$$

Involving $z^n e^{b z^r} \sin(c z)$

01.06.21.0359.01

$$\int z^n e^{b z^2} \sin(c z)\, dz = \frac{i}{4 \sqrt{b}} e^{\frac{c^2}{4 b}} \left(\sum_{k=0}^{n} 2^{k-n} b^{-n-\frac{1}{2}} (-i c)^{n-k} (i c+2 b z)^{k+1} \left(-\frac{(i c+2 b z)^2}{b}\right)^{\frac{1}{2}(-k-1)} \binom{n}{k} \Gamma\left(\frac{k+1}{2}, -\frac{(i c+2 b z)^2}{4 b}\right) - \sum_{k=0}^{n} 2^{k-n} b^{-n-\frac{1}{2}} (i c)^{n-k} \left(-\frac{(i c-2 b z)^2}{b}\right)^{\frac{1}{2}(-k-1)} (-i c+2 b z)^{k+1} \binom{n}{k} \Gamma\left(\frac{k+1}{2}, -\frac{(i c-2 b z)^2}{4 b}\right)\right) /; n \in \mathbb{N}$$

01.06.21.0360.01

$$\int z^n e^{b\sqrt{z}} \sin(c\,z)\,dz = i\,2^{-2(n+1)}\,(i\,c)^{-2n-2}\,e^{\frac{i\,b^2}{4c}} \left(e^{-\frac{i\,b^2}{2c}} \sum_{k=0}^{n}\sum_{m=0}^{k}(-1)^{k-m}\,4^k\,b^{-k-m+2n}\left(b-2\,i\,c\sqrt{z}\right)^{k+m}\left(-\frac{i\left(b-2\,i\,c\sqrt{z}\right)^2}{c}\right)^{\frac{1}{2}(-k-m-1)} \binom{k}{m}\binom{n}{k}\left(b\left(b-2\,i\,c\sqrt{z}\right)\Gamma\left(\frac{1}{2}(k+m+1), -\frac{i\left(b-2\,i\,c\sqrt{z}\right)^2}{4c}\right) - 2\,i\,c\sqrt{-\frac{i\left(b-2\,i\,c\sqrt{z}\right)^2}{c}}\;\Gamma\left(\frac{1}{2}(k+m+2), -\frac{i\left(b-2\,i\,c\sqrt{z}\right)^2}{4c}\right)\right) - \sum_{k=0}^{n}\sum_{m=0}^{k}(-1)^{k-m}\,4^k\,b^{-k-m+2n}\left(b+2\,i\,c\sqrt{z}\right)^{k+m}\left(\frac{i\left(b+2\,i\,c\sqrt{z}\right)^2}{c}\right)^{\frac{1}{2}(-k-m-1)} \binom{k}{m}\binom{n}{k} \left(b\left(b+2\,i\,c\sqrt{z}\right)\Gamma\left(\frac{1}{2}(k+m+1), \frac{i\left(b+2\,i\,c\sqrt{z}\right)^2}{4c}\right) + 2\sqrt{\frac{i\left(b+2\,i\,c\sqrt{z}\right)^2}{c}}\;c\,i\,\Gamma\left(\frac{1}{2}(k+m+2), \frac{i\left(b+2\,i\,c\sqrt{z}\right)^2}{4c}\right)\right)\right) /;\; n \in \mathbb{N}$$

Involving $z^n\, e^{b\, z^r + e} \sin(c\, z)$

01.06.21.0361.01

$$\int z^n e^{b\,z^2+e} \sin(c\,z)\,dz = \frac{i}{4\sqrt{b}}\, e^{\frac{c^2}{4b}+e} \left(\sum_{k=0}^{n} 2^{k-n}\, b^{-n-\frac{1}{2}}\,(-i\,c)^{n-k}\,(i\,c+2\,b\,z)^{k+1}\left(-\frac{(i\,c+2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-k-1)} \binom{n}{k}\Gamma\left(\frac{k+1}{2}, -\frac{(i\,c+2\,b\,z)^2}{4b}\right) - \sum_{k=0}^{n} 2^{k-n}\, b^{-n-\frac{1}{2}}\,(i\,c)^{n-k}\left(-\frac{(i\,c-2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-k-1)} (-i\,c+2\,b\,z)^{k+1}\binom{n}{k}\Gamma\left(\frac{k+1}{2}, -\frac{(i\,c-2\,b\,z)^2}{4b}\right)\right) /;\; n \in \mathbb{N}$$

01.06.21.0362.01

$$\int z^n e^{b\sqrt{z}+e}\sin(c\,z)\,dz = i\,2^{-2(n+1)}(i\,c)^{-2n-2}e^{\frac{i\,b^2}{4c}+e}\left(e^{-\frac{i\,b^2}{2c}}\sum_{k=0}^{n}\sum_{m=0}^{k}(-1)^{k-m}\,4^k\,b^{-k-m+2n}\left(b-2\,i\,c\sqrt{z}\right)^{k+m}\left(-\frac{i\left(b-2\,i\,c\sqrt{z}\right)^2}{c}\right)^{\frac{1}{2}(-k-m-1)}\right.$$
$$\binom{k}{m}\binom{n}{k}\left(b\left(b-2\,i\,c\sqrt{z}\right)\Gamma\left(\frac{1}{2}(k+m+1),-\frac{i\left(b-2\,i\,c\sqrt{z}\right)^2}{4c}\right)-\right.$$
$$\left.2\,i\,c\sqrt{-\frac{i\left(b-2\,i\,c\sqrt{z}\right)^2}{c}}\;\Gamma\left(\frac{1}{2}(k+m+2),-\frac{i\left(b-2\,i\,c\sqrt{z}\right)^2}{4c}\right)\right)-$$
$$\sum_{k=0}^{n}\sum_{m=0}^{k}(-1)^{k-m}\,4^k\,b^{-k-m+2n}\left(b+2\,i\,c\sqrt{z}\right)^{k+m}\left(\frac{i\left(b+2\,i\,c\sqrt{z}\right)^2}{c}\right)^{\frac{1}{2}(-k-m-1)}\binom{k}{m}\binom{n}{k}$$
$$\left(b\left(b+2\,i\,c\sqrt{z}\right)\Gamma\left(\frac{1}{2}(k+m+1),\frac{i\left(b+2\,i\,c\sqrt{z}\right)^2}{4c}\right)+\right.$$
$$\left.\left.2\sqrt{\frac{i\left(b+2\,i\,c\sqrt{z}\right)^2}{c}}\;c\,i\,\Gamma\left(\frac{1}{2}(k+m+2),\frac{i\left(b+2\,i\,c\sqrt{z}\right)^2}{4c}\right)\right)\right)/;\,n\in\mathbb{N}$$

Involving $z^n\, e^{b\,z^r+d\,z}\sin(c\,z)$

01.06.21.0363.01

$$\int z^n e^{b\,z^2+d\,z}\sin(c\,z)\,dz = \frac{1}{4}\,i\,b^{-n-1}\left(e^{-\frac{(d+i\,c)^2}{4b}}\sum_{q=0}^{n}2^{q-n}(-d-i\,c)^{n-q}(d+i\,c+2\,b\,z)^{q+1}\left(-\frac{(d+i\,c+2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},-\frac{(d+i\,c+2\,b\,z)^2}{4b}\right)-\right.$$
$$\left.e^{-\frac{(d-i\,c)^2}{4b}}\sum_{q=0}^{n}2^{q-n}(i\,c-d)^{n-q}(d-i\,c+2\,b\,z)^{q+1}\left(-\frac{(d-i\,c+2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},-\frac{(d-i\,c+2\,b\,z)^2}{4b}\right)\right)/;\,n\in\mathbb{N}$$

01.06.21.0364.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin(c z)\, dz = i\, 2^{-2n-2} \left((d-i c)^{-2(n+1)} e^{\frac{b^2}{4 i c-4 d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d-i c)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d-i c)\sqrt{z}\right)^2}{d-i c}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2(d-i c)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d-i c)\sqrt{z}\right)^2}{4(d-i c)}\right) + 2\sqrt{-\frac{\left(b+2(d-i c)\sqrt{z}\right)^2}{d-i c}}\,(d-i c)\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d-i c)\sqrt{z}\right)^2}{4(d-i c)}\right)\right) - (d+i c)^{-2(n+1)} e^{-\frac{b^2}{4(d+i c)}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d+i c)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d+i c)\sqrt{z}\right)^2}{d+i c}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2(d+i c)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d+i c)\sqrt{z}\right)^2}{4(d+i c)}\right) + 2\sqrt{-\frac{\left(b+2(d+i c)\sqrt{z}\right)^2}{d+i c}}\,(d+i c)\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d+i c)\sqrt{z}\right)^2}{4(d+i c)}\right)\right)\right) /;\ n \in \mathbb{N}$$

Involving $z^n e^{b z^r + d z + e} \sin(c z)$

01.06.21.0365.01

$$\int z^n e^{b z^2+d z+e} \sin(c z)\, dz = \frac{i e^e}{4\sqrt{b}} \left(e^{-\frac{(d+i c)^2}{4b}} \sum_{q=0}^{n} 2^{q-n} b^{-n-\frac{1}{2}} (-d-i c)^{n-q} (d+i c+2 b z)^{q+1} \left(-\frac{(d+i c+2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+i c+2 b z)^2}{4b}\right) - e^{-\frac{(i c-d)^2}{4b}} \sum_{q=0}^{n} 2^{q-n} b^{-n-\frac{1}{2}} (i c-d)^{n-q} (d-i c+2 b z)^{q+1} \left(-\frac{(d-i c+2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d-i c+2 b z)^2}{4b}\right)\right) /;\ n \in \mathbb{N}$$

01.06.21.0366.01

$$\int z^n e^{\sqrt{z}\, b+e+d\,z} \sin(c\,z)\, dz = i\, 2^{-2(n+1)} e^e \left((d-i\,c)^{-2(n+1)} e^{\frac{b^2}{4\,i\,c-4\,d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d-i\,c)\sqrt{z}\right)^{h+k} \left(\frac{\left(b+2(d-i\,c)\sqrt{z}\right)^2}{i\,c-d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2(d-i\,c)\sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+k+1), \frac{\left(b+2(d-i\,c)\sqrt{z}\right)^2}{4(i\,c-d)}\right) + 2\sqrt{\frac{\left(b+2(d-i\,c)\sqrt{z}\right)^2}{i\,c-d}}\,(d-i\,c)\,\Gamma\!\left(\frac{1}{2}(h+k+2), \frac{\left(b+2(d-i\,c)\sqrt{z}\right)^2}{4(i\,c-d)}\right)\right) - (d+i\,c)^{-2(n+1)} e^{-\frac{b^2}{4(d+i\,c)}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d+i\,c)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d+i\,c)\sqrt{z}\right)^2}{d+i\,c}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2(d+i\,c)\sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d+i\,c)\sqrt{z}\right)^2}{4(d+i\,c)}\right) + 2\sqrt{-\frac{\left(b+2(d+i\,c)\sqrt{z}\right)^2}{d+i\,c}}\,(d+i\,c)\,\Gamma\!\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d+i\,c)\sqrt{z}\right)^2}{4(d+i\,c)}\right)\right)\right) /;\ n \in \mathbb{N}$$

Involving $z^n e^{b\,z^r} \sin(f\,z+g)$

01.06.21.0367.01

$$\int z^n e^{b\,z^2} \sin(f\,z+g)\, dz = \frac{1}{4}\, i\, b^{-n-1} \left(e^{\frac{f^2}{4b}+i\,g} \sum_{q=0}^{n} 2^{q-n} (-i\,f)^{n-q} (i\,f+2\,b\,z)^{q+1} \left(-\frac{(i\,f+2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\!\left(\frac{q+1}{2}, -\frac{(i\,f+2\,b\,z)^2}{4\,b}\right) - e^{\frac{f^2}{4b}-i\,g} \sum_{q=0}^{n} 2^{q-n} (i\,f)^{n-q} (-i\,f+2\,b\,z)^{q+1} \left(-\frac{(-i\,f+2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\!\left(\frac{q+1}{2}, -\frac{(-i\,f+2\,b\,z)^2}{4\,b}\right)\right) /;\ n \in \mathbb{N}$$

01.06.21.0368.01

$$\int z^n e^{\sqrt{z}\, b} \sin(f z + g)\, dz = i\, 2^{-2(n+1)} e^{-i g} \left(e^{-\frac{i b^2}{4 f}} (-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b - 2 i f \sqrt{z}\right)^{h+k} \left(-\frac{i \left(b - 2 i f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b \left(b - 2 i f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{i \left(b - 2 i f \sqrt{z}\right)^2}{4 f}\right) - 2 i f \sqrt{-\frac{i \left(b - 2 i f \sqrt{z}\right)^2}{f}}\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{i \left(b - 2 i f \sqrt{z}\right)^2}{4 f}\right)\right) - e^{\frac{i b^2}{4 f} + 2 i g} (i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b + 2 i f \sqrt{z}\right)^{h+k} \left(\frac{i \left(b + 2 i f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b \left(b + 2 i f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i \left(b + 2 i f \sqrt{z}\right)^2}{4 f}\right) + 2 \sqrt{\frac{i \left(b + 2 i f \sqrt{z}\right)^2}{f}}\, f\, i\, \Gamma\left(\frac{1}{2}(h+k+2), \frac{i \left(b + 2 i f \sqrt{z}\right)^2}{4 f}\right)\right)\right) /;\, n \in \mathbb{N}$$

Involving $z^n e^{b z^r + e} \sin(f z + g)$

01.06.21.0369.01

$$\int z^n e^{b z^2 + e} \sin(f z + g)\, dz = \frac{1}{4} i\, b^{-n-1} \left(e^{\frac{f^2}{4 b} + e + i g} \sum_{q=0}^{n} 2^{q-n} (-i f)^{n-q} (i f + 2 b z)^{q+1} \left(-\frac{(i f + 2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(i f + 2 b z)^2}{4 b}\right) - e^{\frac{f^2}{4 b} + e - i g} \sum_{q=0}^{n} 2^{q-n} (i f)^{n-q} (-i f + 2 b z)^{q+1} \left(-\frac{(-i f + 2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(-i f + 2 b z)^2}{4 b}\right)\right) /;\, n \in \mathbb{N}$$

01.06.21.0370.01

$$\int z^n e^{\sqrt{z}\, b+e} \sin(f z+g)\, dz = i\, 2^{-2(n+1)} e^{e-i g} \left(e^{-\frac{i b^2}{4 f}} (-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b-2 i f \sqrt{z}\right)^{h+k} \left(-\frac{i \left(b-2 i f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b \left(b-2 i f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{i \left(b-2 i f \sqrt{z}\right)^2}{4 f}\right) - 2 i f \sqrt{-\frac{i \left(b-2 i f \sqrt{z}\right)^2}{f}}\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{i \left(b-2 i f \sqrt{z}\right)^2}{4 f}\right)\right) - e^{\frac{i b^2}{4 f}+2 i g} (i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2 i f \sqrt{z}\right)^{h+k} \left(\frac{i \left(b+2 i f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b \left(b+2 i f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i \left(b+2 i f \sqrt{z}\right)^2}{4 f}\right) + 2 \sqrt{\frac{i \left(b+2 i f \sqrt{z}\right)^2}{f}}\, f\, i\, \Gamma\left(\frac{1}{2}(h+k+2), \frac{i \left(b+2 i f \sqrt{z}\right)^2}{4 f}\right)\right)\right) /;\, n \in \mathbb{N}$$

Involving $z^n e^{b z^r + d z} \sin(f z+g)$

01.06.21.0371.01

$$\int z^n e^{b z^2+d z} \sin(f z+g)\, dz = \frac{1}{4} i\, b^{-n-1} \left(e^{-\frac{(d+i f)^2}{4 b}+i g} \sum_{q=0}^{n} 2^{q-n} (-d-i f)^{n-q} (d+i f+2 b z)^{q+1} \left(-\frac{(d+i f+2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+i f+2 b z)^2}{4 b}\right) - e^{-\frac{(d-i f)^2}{4 b}-i g} \sum_{q=0}^{n} 2^{q-n} (i f-d)^{n-q} (d-i f+2 b z)^{q+1} \left(-\frac{(d-i f+2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d-i f+2 b z)^2}{4 b}\right)\right) /;\, n \in \mathbb{N}$$

01.06.21.0372.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin(g+f z)\, dz = i\, 2^{-2(n+1)} e^{-i g} \left(e^{-\frac{b^2}{4(d-i f)}} (d-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d-i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d-i f)\sqrt{z}\right)^2}{d-i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2(d-i f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right) + 2\sqrt{-\frac{\left(b+2(d-i f)\sqrt{z}\right)^2}{d-i f}}\, (d-i f)\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right)\right) - e^{2 i g-\frac{b^2}{4(d+i f)}} (d+i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d+i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d+i f)\sqrt{z}\right)^2}{d+i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2(d+i f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right) + 2\sqrt{-\frac{\left(b+2(d+i f)\sqrt{z}\right)^2}{d+i f}}\, (d+i f)\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right)\right)\right) /;\, n \in \mathbb{N}$$

Involving $z^n e^{b z^r + d z + e} \sin(f z + g)$

01.06.21.0373.01

$$\int z^n e^{b z^2+d z+e} \sin(f z+g)\, dz = \frac{1}{4} i\, b^{-n-1} \left(e^{-\frac{(d+i f)^2}{4b}+e+i g} \sum_{q=0}^{n} 2^{q-n} (-d-i f)^{n-q} (d+i f+2 b z)^{q+1} \left(-\frac{(d+i f+2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+i f+2 b z)^2}{4b}\right) - e^{-\frac{(d-i f)^2}{4b}+e-i g} \sum_{q=0}^{n} 2^{q-n} (i f-d)^{n-q} (d-i f+2 b z)^{q+1} \left(-\frac{(d-i f+2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d-i f+2 b z)^2}{4b}\right)\right) /;\, n \in \mathbb{N}$$

01.06.21.0374.01

$$\int z^n e^{\sqrt{z}\, b+d\, z+e} \sin(g+f\, z)\, dz = i\, 2^{-2(n+1)}\, e^{e-i g} \left(e^{-\frac{b^2}{4(d-i f)}} (d-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, b^{-h-k+2n} \left(b+2(d-i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d-i f)\sqrt{z}\right)^2}{d-i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2(d-i f)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right) + 2\sqrt{-\frac{\left(b+2(d-i f)\sqrt{z}\right)^2}{d-i f}}\, (d-i f)\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right)\right) - e^{2 i g-\frac{b^2}{4(d+i f)}} (d+i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, b^{-h-k+2n} \left(b+2(d+i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d+i f)\sqrt{z}\right)^2}{d+i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2(d+i f)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right) + 2\sqrt{-\frac{\left(b+2(d+i f)\sqrt{z}\right)^2}{d+i f}}\, (d+i f)\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right)\right)\right) /; n \in \mathbb{N}$$

Involving $z^n\, e^{b z} \sin(c\, z^r)$

01.06.21.0375.01

$$\int z^n e^{b z} \sin(c\, z^2)\, dz = \frac{1}{4}\, i\, (i\, c)^{-n-1}\, e^{\frac{i b^2}{4 c}} \sum_{k=0}^{n} 2^{k-n} (-b)^{n-k} (b+2\, i\, c\, z)^{k+1} \left(\frac{i\,(b+2\, i\, c\, z)^2}{c}\right)^{\frac{1}{2}(-k-1)} \binom{n}{k} \Gamma\left(\frac{k+1}{2}, \frac{i\,(b+2\, i\, c\, z)^2}{4 c}\right) - \frac{1}{4}\, i\, (-i\, c)^{-n-1}\, e^{-\frac{i b^2}{4 c}} \sum_{k=0}^{n} 2^{k-n} (-b)^{n-k} (b-2\, i\, c\, z)^{k+1} \left(-\frac{i\,(b-2\, i\, c\, z)^2}{c}\right)^{\frac{1}{2}(-k-1)} \binom{n}{k} \Gamma\left(\frac{k+1}{2}, -\frac{i\,(b-2\, i\, c\, z)^2}{4 c}\right) /; n \in \mathbb{N}$$

01.06.21.0376.01

$$\int z^n e^{bz}\sin\left(c\sqrt{z}\right)dz = i\,4^{-n-1}\,b^{-2(n+1)}\,e^{\frac{c^2}{4b}}$$

$$\left(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(-i\,c)^{-h-k+2n}\left(-\frac{\left(i\,c-2\,b\sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-k-1)}\left(2\,b\sqrt{z}-i\,c\right)^{h+k}\binom{k}{h}\binom{n}{k}\left(c\,i\left(i\,c-2\,b\sqrt{z}\right)\right.\right.$$

$$\left.\left.\Gamma\left(\frac{1}{2}(h+k+1),-\frac{\left(i\,c-2\,b\sqrt{z}\right)^2}{4\,b}\right)+2\sqrt{-\frac{\left(i\,c-2\,b\sqrt{z}\right)^2}{b}}\;b\,\Gamma\left(\frac{1}{2}(h+k+2),-\frac{\left(i\,c-2\,b\sqrt{z}\right)^2}{4\,b}\right)\right)\right.-$$

$$\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(i\,c)^{-h-k+2n}\left(2\sqrt{z}\;b+i\,c\right)^{h+k}\left(-\frac{\left(2\sqrt{z}\;b+i\,c\right)^2}{b}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}$$

$$\left(c\,i\left(2\sqrt{z}\;b+i\,c\right)\Gamma\left(\frac{1}{2}(h+k+1),-\frac{\left(2\sqrt{z}\;b+i\,c\right)^2}{4\,b}\right)+\right.$$

$$\left.\left.2\sqrt{-\frac{\left(2\sqrt{z}\;b+i\,c\right)^2}{b}}\;b\,\Gamma\left(\frac{1}{2}(h+k+2),-\frac{\left(2\sqrt{z}\;b+i\,c\right)^2}{4\,b}\right)\right)\right)\;/;\;n\in\mathbb{N}$$

Involving $z^n\,e^{b\,z+e}\sin\left(c\,z^r\right)$

01.06.21.0377.01

$$\int z^n e^{b\,z+e}\sin\left(c\,z^2\right)dz =$$

$$\frac{1}{4}\,i\,(i\,c)^{-n-1}\,e^{\frac{i\,b^2}{4c}+e}\sum_{k=0}^{n}2^{k-n}\,(-b)^{n-k}\,(b+2\,i\,c\,z)^{k+1}\left(\frac{i\,(b+2\,i\,c\,z)^2}{c}\right)^{\frac{1}{2}(-k-1)}\binom{n}{k}\Gamma\left(\frac{k+1}{2},\frac{i\,(b+2\,i\,c\,z)^2}{4\,c}\right)-$$

$$\frac{1}{4}\,i\,(-i\,c)^{-n-1}\,e^{e-\frac{i\,b^2}{4c}}\sum_{k=0}^{n}2^{k-n}\,(-b)^{n-k}\,(b-2\,i\,c\,z)^{k+1}\left(-\frac{i\,(b-2\,i\,c\,z)^2}{c}\right)^{\frac{1}{2}(-k-1)}\binom{n}{k}\Gamma\left(\frac{k+1}{2},-\frac{i\,(b-2\,i\,c\,z)^2}{4\,c}\right)\;/;\;n\in\mathbb{N}$$

01.06.21.0378.01

$$\int z^n e^{b z+e} \sin\left(c\sqrt{z}\right) dz = i\, 4^{-n-1}\, b^{-2(n+1)}\, e^{\frac{c^2}{4b}+e} \left(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\, 4^k\, (-i\,c)^{-h-k+2n}\left(-\frac{\left(i\,c-2\,b\sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-k-1)} \left(2\,b\sqrt{z}-i\,c\right)^{h+k}\binom{k}{h}\binom{n}{k}\left(c\,i\left(i\,c-2\,b\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(i\,c-2\,b\sqrt{z}\right)^2}{4\,b}\right)+2\sqrt{-\frac{\left(i\,c-2\,b\sqrt{z}\right)^2}{b}}\; b\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(i\,c-2\,b\sqrt{z}\right)^2}{4\,b}\right)\right) - \sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\, 4^k\,(i\,c)^{-h-k+2n}\left(2\sqrt{z}\,b+i\,c\right)^{h+k}\left(-\frac{\left(2\sqrt{z}\,b+i\,c\right)^2}{b}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}\left(c\,i\left(2\sqrt{z}\,b+i\,c\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2\sqrt{z}\,b+i\,c\right)^2}{4\,b}\right)+ 2\sqrt{-\frac{\left(2\sqrt{z}\,b+i\,c\right)^2}{b}}\; b\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2\sqrt{z}\,b+i\,c\right)^2}{4\,b}\right)\right)\right) /;\, n\in\mathbb{N}$$

Involving $z^{\alpha-1} e^{b z^r} \sin(c\, z^r)$

01.06.21.0379.01

$$\int z^{\alpha-1} e^{b z^r} \sin(c\, z^r)\, dz = \frac{i\, z^\alpha}{2\,r}\left(((-b-i\,c)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r}, (-b-i\,c)\,z^r\right) - ((i\,c-b)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r}, (i\,c-b)\,z^r\right)\right)$$

01.06.21.0380.01

$$\int \frac{e^{b z^r} \sin(c\, z^r)}{z}\, dz = \frac{i\,(\mathrm{Ei}((b-i\,c)\,z^r) - \mathrm{Ei}((b+i\,c)\,z^r))}{2\,r}$$

01.06.21.0381.01

$$\int z^{2n} e^{b z^2} \sin(c z^2)\, dz = \frac{1}{4} i z \left(\frac{1}{\sqrt{(-b - i c) z^2}} \left((-b - i c)^{-n} \left(\operatorname{erfc}\left(\sqrt{(-b - i c) z^2}\right) \Gamma\left(n + \frac{1}{2}\right) + e^{(b + i c) z^2} \sum_{k=0}^{n-1} \frac{\left((-b - i c) z^2\right)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}} - e^{(b + i c) z^2} \sum_{k=n}^{-1} \frac{\left((-b - i c) z^2\right)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}} \right) \right) - \frac{1}{\sqrt{(i c - b) z^2}} \left((i c - b)^{-n} \left(\operatorname{erfc}\left(\sqrt{(i c - b) z^2}\right) \Gamma\left(n + \frac{1}{2}\right) + e^{(b - i c) z^2} \sum_{k=0}^{n-1} \frac{\left((i c - b) z^2\right)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}} - e^{(b - i c) z^2} \sum_{k=n}^{-1} \frac{\left((i c - b) z^2\right)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}} \right) \right) \right) /; n \in \mathbb{Z}$$

01.06.21.0382.01

$$\int z^{2n-1} e^{b z^2} \sin(c z^2)\, dz = \frac{1}{4} i \left((-b - i c)^{-n} \left(\frac{(-1)^{n-1} \operatorname{Ei}\left((b + i c) z^2\right)}{(-n)!} + e^{(b + i c) z^2} \sum_{k=0}^{n-1} \frac{\left((-b - i c) z^2\right)^k}{(n)_{k-n+1}} - e^{(b + i c) z^2} \sum_{k=n}^{-1} \frac{\left((-b - i c) z^2\right)^k}{(n)_{k-n+1}} \right) - (i c - b)^{-n} \left(\frac{(-1)^{n-1} \operatorname{Ei}\left((b - i c) z^2\right)}{(-n)!} + e^{(b - i c) z^2} \sum_{k=0}^{n-1} \frac{\left((i c - b) z^2\right)^k}{(n)_{k-n+1}} - e^{(b - i c) z^2} \sum_{k=n}^{-1} \frac{\left((i c - b) z^2\right)^k}{(n)_{k-n+1}} \right) \right) /; n \in \mathbb{Z}$$

01.06.21.0383.01

$$\int z\, e^{b z^2} \sin(c z^2)\, dz = \frac{e^{b z^2} \left(b \sin(c z^2) - c \cos(c z^2)\right)}{2 \left(b^2 + c^2\right)}$$

01.06.21.0384.01

$$\int z^2 e^{b z^2} \sin(c z^2)\, dz = -\frac{1}{4} i z^3 \left(\frac{\frac{1}{2} \sqrt{\pi} \left(\operatorname{erf}\left(\sqrt{-(b + i c) z^2}\right) - 1 \right) - e^{(b + i c) z^2} \sqrt{-(b + i c) z^2}}{\left(-(b + i c) z^2\right)^{3/2}} + \frac{e^{(b - i c) z^2} \sqrt{-(b - i c) z^2} - \frac{1}{2} \sqrt{\pi} \left(\operatorname{erf}\left(\sqrt{-(b - i c) z^2}\right) - 1 \right)}{\left(-(b - i c) z^2\right)^{3/2}} \right)$$

01.06.21.0385.01

$$\int z^3 e^{b z^2} \sin(c z^2)\, dz = \frac{e^{b z^2} \left(\left(z^2 b^3 - b^2 + c^2 z^2 b + c^2\right) \sin(c z^2) - c \left(b^2 z^2 + c^2 z^2 - 2 b\right) \cos(c z^2) \right)}{2 \left(b^2 + c^2\right)^2}$$

01.06.21.0386.01

$$\int z^4 e^{b z^2} \sin(c z^2)\, dz = -\frac{1}{16} i z^5 \left(\frac{1}{\left(-(b+i c) z^2\right)^{5/2}} \left(2 e^{(b+i c) z^2} \sqrt{-(b+i c) z^2} \left(2 b z^2 + 2 c i z^2 - 3\right) + 3 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right) - 3 \sqrt{\pi}\right) + \frac{1}{\left(-(b-i c) z^2\right)^{5/2}} \left(-2 e^{(b-i c) z^2} \sqrt{-(b-i c) z^2} \left(2 b z^2 - 2 i c z^2 - 3\right) - 3 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right) + 3 \sqrt{\pi}\right)\right)$$

01.06.21.0387.01

$$\int z^5 e^{b z^2} \sin(c z^2)\, dz = \frac{1}{2 \left(b^2 + c^2\right)^3} \left(e^{b z^2} \left(\left(z^4 b^5 - 2 z^2 b^4 + 2 \left(c^2 z^4 + 1\right) b^3 + c^2 \left(c^2 z^4 - 6\right) b + 2 c^4 z^2\right) \sin(c z^2) - c \left(b^4 z^4 - 4 b^3 z^2 - 4 b c^2 z^2 + c^2 \left(c^2 z^4 - 2\right) + 2 b^2 \left(c^2 z^4 + 3\right)\right) \cos(c z^2)\right)\right)$$

01.06.21.0388.01

$$\int \frac{e^{b z^2} \sin(c z^2)}{z}\, dz = \frac{1}{4} i \left(\operatorname{Ei}\left((b - i c) z^2\right) - \operatorname{Ei}\left((b + i c) z^2\right)\right)$$

01.06.21.0389.01

$$\int \frac{e^{b z^2} \sin(c z^2)}{z^2}\, dz = -\frac{1}{2 z} \left(i \left(-\sqrt{\pi} \sqrt{-(b+i c) z^2} \operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right) - e^{(b+i c) z^2} + e^{(b-i c) z^2} + \sqrt{\pi} \sqrt{-(b-i c) z^2} \operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right) + \sqrt{\pi} \sqrt{-(b+i c) z^2} - \sqrt{\pi} \sqrt{-(b-i c) z^2}\right)\right)$$

01.06.21.0390.01

$$\int \frac{e^{b z^2} \sin(c z^2)}{z^3}\, dz = \frac{(c - i b) \operatorname{Ei}\left((b+i c) z^2\right) z^2 + (c + i b) \operatorname{Ei}\left((b - i c) z^2\right) z^2 + e^{(b-i c) z^2} \left(-1 + e^{2 i c z^2}\right) i}{4 z^2}$$

01.06.21.0391.01

$$\int \frac{e^{b z^2} \sin(c z^2)}{z^4}\, dz = \frac{1}{6 z^3} \left(i \left(-2 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right) \left(-(b+i c) z^2\right)^{3/2} + 2 \sqrt{\pi} \left(-(b+i c) z^2\right)^{3/2} - 2 \sqrt{\pi} \left(-(b-i c) z^2\right)^{3/2} + e^{(b+i c) z^2} - e^{(b-i c) z^2} + 2 (b + i c) e^{(b+i c) z^2} z^2 - 2 (b - i c) e^{(b-i c) z^2} z^2 + 2 \sqrt{\pi} \left(-(b-i c) z^2\right)^{3/2} \operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right)\right)\right)$$

01.06.21.0392.01

$$\int \frac{e^{b z^2} \sin(c z^2)}{z^5}\, dz = \frac{1}{8 z^4} \left(i \left(-(b+i c)^2 \operatorname{Ei}\left((b+i c) z^2\right) z^4 + (b - i c)^2 \operatorname{Ei}\left((b - i c) z^2\right) z^4 + e^{(b-i c) z^2} \left(-b z^2 + c i z^2 + e^{2 i c z^2} \left(b z^2 + c i z^2 + 1\right) - 1\right)\right)\right)$$

01.06.21.0393.01

$$\int z^n e^{b\sqrt{z}} \sin\left(c\sqrt{z}\right) dz = i\left((b+i c)^{-2(n+1)}\left(\frac{(-1)^{2n+1}\operatorname{Ei}\left((b+i c)\sqrt{z}\right)}{(-2n-2)!} + e^{(b+i c)\sqrt{z}} \sum_{k=0}^{2n+1} \frac{\left((-b-i c)\sqrt{z}\right)^k}{(2n+2)_{k-2n-1}} - e^{(b+i c)\sqrt{z}} \sum_{k=2n+2}^{-1} \frac{\left((-b-i c)\sqrt{z}\right)^k}{(2n+2)_{k-2n-1}}\right) - (b-i c)^{-2(n+1)} \left(\frac{(-1)^{2n+1}\operatorname{Ei}\left((b-i c)\sqrt{z}\right)}{(-2n-2)!} + e^{(b-i c)\sqrt{z}} \sum_{k=0}^{2n+1} \frac{\left((i c-b)\sqrt{z}\right)^k}{(2n+2)_{k-2n-1}} - e^{(b-i c)\sqrt{z}} \sum_{k=2n+2}^{-1} \frac{\left((i c-b)\sqrt{z}\right)^k}{(2n+2)_{k-2n-1}}\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0394.01

$$\int z\, e^{b\sqrt{z}} \sin\left(c\sqrt{z}\right) dz = \frac{2}{\left(b^2+c^2\right)^4} e^{b\sqrt{z}} \left(\left(b^7 z^{3/2} - 3b^6 z + b c^4 \left(c^2 z - 18\right)\sqrt{z} + 3b^3 c^2 \left(c^2 z - 4\right)\sqrt{z} + 3b^5\left(z c^2+2\right)\sqrt{z} + 3c^4\left(c^2 z - 2\right) - 3b^4\left(z c^2+2\right) + 3b^2 c^2\left(z c^2 + 12\right)\right)\sin\left(c\sqrt{z}\right) - c\left(b^6 z^{3/2} - 6b^5 z + c^4\left(c^2 z - 6\right)\sqrt{z} + 3b^2 c^2\left(z c^2+4\right)\sqrt{z} + 3b^4\left(z c^2+6\right)\sqrt{z} - 6 b c^2\left(c^2 z - 4\right) - 12 b^3\left(z c^2+2\right)\right)\cos\left(c\sqrt{z}\right)\right)$$

01.06.21.0395.01

$$\int z^2 e^{b\sqrt{z}} \sin\left(c\sqrt{z}\right) dz = \frac{2}{\left(b^2+c^2\right)^6} e^{b\sqrt{z}} \left(\left(20b\left(b^2+c^2\right)^3\left(b^2-3c^2\right)z^{3/2} + b\left(b^2+c^2\right)^5 z^{5/2} - 5(b-c)(b+c)\left(b^2+c^2\right)^4 z^2 - 60\left(b^2+c^2\right)^2\left(b^4-6c^2b^2+c^4\right)z + 120b\left(b^2+c^2\right)\left(b^4-10c^2b^2+5c^4\right)\sqrt{z} - 120\left(b^6-15c^2b^4+15c^4b^2-c^6\right)\right)\sin\left(c\sqrt{z}\right) - c\left(20\left(3b^2-c^2\right)\left(b^2+c^2\right)^3 z^{3/2} + \left(b^2+c^2\right)^5 z^{5/2} - 10b\left(b^2+c^2\right)^4 z^2 - 240b(b-c)(b+c)\left(b^2+c^2\right)^2 z + 120\left(b^2+c^2\right)\left(5b^4-10c^2b^2+c^4\right)\sqrt{z} - 240b\left(3b^4-10c^2b^2+3c^4\right)\right)\cos\left(c\sqrt{z}\right)\right)$$

01.06.21.0396.01

$$\int z^3 e^{b\sqrt{z}} \sin\left(c\sqrt{z}\right) dz = \frac{2}{\left(b^2+c^2\right)^8} e^{b\sqrt{z}} \left(\left(840b\left(b^2+c^2\right)^3\left(b^4-10c^2b^2+5c^4\right)z^{3/2} + 42b\left(b^2+c^2\right)^5\left(b^2-3c^2\right)z^{5/2} + b\left(b^2+c^2\right)^7 z^{7/2} - 7(b-c)(b+c)\left(b^2+c^2\right)^6 z^3 - 210\left(b^2+c^2\right)^4\left(b^4-6c^2b^2+c^4\right)z^2 - 2520\left(b^2+c^2\right)^2\left(b^6-15c^2b^4+15c^4b^2-c^6\right)z + 5040b\left(b^2+c^2\right)\left(b^6-21c^2b^4+35c^4b^2-7c^6\right)\sqrt{z} - 5040\left(b^8-28c^2b^6+70c^4b^4-28c^6b^2+c^8\right)\right)\sin\left(c\sqrt{z}\right) - c\left(840\left(b^2+c^2\right)^3\left(5b^4-10c^2b^2+c^4\right)z^{3/2} + 42\left(3b^2-c^2\right)\left(b^2+c^2\right)^5 z^{5/2} + \left(b^2+c^2\right)^7 z^{7/2} - 14b\left(b^2+c^2\right)^6 z^3 - 840b(b-c)(b+c)\left(b^2+c^2\right)^4 z^2 - 5040b\left(b^2+c^2\right)^2\left(3b^4-10c^2b^2+3c^4\right)z + 5040\left(b^2+c^2\right)\left(7b^6-35c^2b^4+21c^4b^2-c^6\right)\sqrt{z} - 40320b\left(b^6-7c^2b^4+7c^4b^2-c^6\right)\right)\cos\left(c\sqrt{z}\right)\right)$$

01.06.21.0397.01

$$\int z^4 e^{b\sqrt{z}} \sin\left(c\sqrt{z}\right) dz = \frac{2}{\left(b^2+c^2\right)^{10}} e^{b\sqrt{z}} \Big(\Big(60480\, b \left(b^2+c^2\right)^3 \left(b^6-21 c^2 b^4+35 c^4 b^2-7 c^6\right) z^{3/2}+3024\, b \left(b^2+c^2\right)^5 \left(b^4-10 c^2 b^2+5 c^4\right) z^{5/2}+ 72\, b \left(b^2+c^2\right)^7 \left(b^2-3 c^2\right) z^{7/2}+b \left(b^2+c^2\right)^9 z^{9/2}-9 (b-c) (b+c) \left(b^2+c^2\right)^8 z^4- 504 \left(b^2+c^2\right)^6 \left(b^4-6 c^2 b^2+c^4\right) z^3-15120 \left(b^2+c^2\right)^4 \left(b^6-15 c^2 b^4+15 c^4 b^2-c^6\right) z^2-181440 \left(b^2+c^2\right)^2 \left(b^8-28 c^2 b^6+70 c^4 b^4-28 c^6 b^2+c^8\right) z+362880\, b \left(b^2+c^2\right) \left(b^2-3 c^2\right) \left(b^6-33 c^2 b^4+27 c^4 b^2-3 c^6\right) \sqrt{z}- 362880 \left(b^{10}-45 c^2 b^8+210 c^4 b^6-210 c^6 b^4+45 c^8 b^2-c^{10}\right)\Big) \sin\left(c\sqrt{z}\right)- c \Big(60480 \left(b^2+c^2\right)^3 \left(7 b^6-35 c^2 b^4+21 c^4 b^2-c^6\right) z^{3/2}+3024 \left(b^2+c^2\right)^5 \left(5 b^4-10 c^2 b^2+c^4\right) z^{5/2}+ 72 \left(3 b^2-c^2\right) \left(b^2+c^2\right)^7 z^{7/2}+\left(b^2+c^2\right)^9 z^{9/2}-18\, b \left(b^2+c^2\right)^8 z^4-2016\, b (b-c) (b+c) \left(b^2+c^2\right)^6 z^3- 30240\, b \left(b^2+c^2\right)^4 \left(3 b^4-10 c^2 b^2+3 c^4\right) z^2-1451520\, b \left(b^2+c^2\right)^2 \left(b^6-7 c^2 b^4+7 c^4 b^2-c^6\right) z+ 362880 \left(9 b^{10}-75 c^2 b^8+42 c^4 b^6+90 c^6 b^4-35 c^8 b^2+c^{10}\right) \sqrt{z}- 725760\, b \left(5 b^4-10 c^2 b^2+c^4\right) \left(b^4-10 c^2 b^2+5 c^4\right)\Big) \cos\left(c\sqrt{z}\right)\Big)$$

01.06.21.0398.01

$$\int z^5 e^{b\sqrt{z}} \sin\left(c\sqrt{z}\right) dz = \frac{1}{\left(b^2+c^2\right)^{12}}$$
$$\Big(2 e^{b\sqrt{z}} \Big(\big(330 b^{15} \left(z^4 c^8 - 8 z^3 c^6 - 1056 z^2 c^4 - 16128 z c^2 + 20160\right) z^{3/2} + 165 b^{17} \left(z^3 c^6 + 6 z^2 c^4 - 144 z c^2 + 2016\right) z^{5/2} +$$
$$55 b^{19} \left(z^2 c^4 + 12 z c^2 + 144\right) z^{7/2} + 11 b^{21} \left(z c^2 + 10\right) z^{9/2} + b^{23} z^{11/2} - 11 b^{22} z^5 - 99 b^{20} \left(z c^2 + 10\right) z^4 -$$
$$55 b^{18} \left(7 z^2 c^4 + 36 z c^2 + 1008\right) z^3 - 165 b^{16} \left(5 z^3 c^6 - 114 z^2 c^4 - 3024 z c^2 + 10080\right) z^2 -$$
$$990 b^{14} \left(z^4 c^8 - 104 z^3 c^6 - 3360 z^2 c^4 - 40320 z c^2 + 20160\right) z +$$
$$462 b^{13} \left(z^5 c^{10} - 30 z^4 c^8 - 2400 z^3 c^6 - 43200 z^2 c^4 - 475200 z c^2 + 86400\right) \sqrt{z} +$$
$$462 b^{11} c^2 \left(z^5 c^{10} - 60 z^4 c^8 - 3600 z^3 c^6 - 23040 z^2 c^4 + 302400 z c^2 - 4665600\right) \sqrt{z} +$$
$$330 b^9 c^4 \left(z^5 c^{10} - 98 z^4 c^8 - 3696 z^3 c^6 + 110880 z^2 c^4 + 3769920 z c^2 + 33264000\right) \sqrt{z} +$$
$$165 b^7 c^6 \left(z^5 c^{10} - 144 z^4 c^8 - 1344 z^3 c^6 + 354816 z^2 c^4 + 3991680 z c^2 - 31933440\right) \sqrt{z} +$$
$$55 b^5 c^8 \left(z^5 c^{10} - 198 z^4 c^8 + 5184 z^3 c^6 + 508032 z^2 c^4 - 11975040 z c^2 - 215550720\right) \sqrt{z} +$$
$$11 b^3 c^{10} \left(z^5 c^{10} - 260 z^4 c^8 + 18000 z^3 c^6 - 34473600 z c^2 + 558835200\right) \sqrt{z} +$$
$$b c^{12} \left(z^5 c^{10} - 330 z^4 c^8 + 39600 z^3 c^6 - 2328480 z^2 c^4 + 59875200 z c^2 - 439084800\right) \sqrt{z} +$$
$$990 b^8 c^4 \left(z^5 c^{10} + 238 z^4 c^8 - 3696 z^3 c^6 - 332640 z^2 c^4 - 3326400 z c^2 - 19958400\right) +$$
$$462 b^{10} c^2 \left(z^5 c^{10} + 660 z^4 c^8 + 7920 z^3 c^6 - 316800 z^2 c^4 - 5227200 z c^2 + 5702400\right) +$$
$$99 b^2 c^{10} \left(z^5 c^{10} - 20 z^4 c^8 - 5040 z^3 c^6 + 403200 z^2 c^4 - 8668800 z c^2 + 26611200\right) +$$
$$11 c^{12} \left(z^5 c^{10} - 90 z^4 c^8 + 5040 z^3 c^6 - 151200 z^2 c^4 + 1814400 z c^2 - 3628800\right) -$$
$$462 b^{12} \left(z^5 c^{10} - 510 z^4 c^8 - 13920 z^3 c^6 - 129600 z^2 c^4 - 1857600 z c^2 + 86400\right) +$$
$$165 b^6 c^6 \left(5 z^5 c^{10} + 624 z^4 c^8 - 38976 z^3 c^6 - 887040 z^2 c^4 + 19958400 z c^2 + 223534080\right) +$$
$$55 b^4 c^8 \left(7 z^5 c^{10} + 342 z^4 c^8 - 60480 z^3 c^6 + 1088640 z^2 c^4 + 43908480 z c^2 - 359251200\right)\big) \sin\left(c\sqrt{z}\right) -$$
$$c \big(330 b^{14} \left(z^4 c^8 + 72 z^3 c^6 + 864 z^2 c^4 + 181440\right) z^{3/2} + 165 b^{16} \left(z^3 c^6 + 66 z^2 c^4 + 1200 z c^2 + 14112\right) z^{5/2} +$$
$$55 b^{18} \left(z^2 c^4 + 52 z c^2 + 720\right) z^{7/2} + 11 b^{20} \left(z c^2 + 30\right) z^{9/2} + b^{22} z^{11/2} - 22 b^{21} z^5 - 220 b^{19} \left(z c^2 + 18\right) z^4 -$$
$$990 b^{17} \left(z^2 c^4 + 28 z c^2 + 336\right) z^3 - 2640 b^{15} \left(z^3 c^6 + 30 z^2 c^4 + 336 z c^2 + 5040\right) z^2 -$$
$$4620 b^{13} \left(z^4 c^8 + 24 z^3 c^6 - 288 z^2 c^4 - 8640 z c^2 + 43200\right) z +$$
$$165 b^6 c^6 \left(z^5 c^{10} + 16 z^4 c^8 - 6720 z^3 c^6 + 64512 z^2 c^4 + 7539840 z c^2 + 31933440\right) \sqrt{z} +$$
$$330 b^8 c^4 \left(z^5 c^{10} + 42 z^4 c^8 - 5040 z^3 c^6 - 110880 z^2 c^4 + 1995840 z c^2 + 35925120\right) \sqrt{z} +$$
$$462 b^{10} c^2 \left(z^5 c^{10} + 60 z^4 c^8 - 2640 z^3 c^6 - 126720 z^2 c^4 - 1425600 z c^2 - 13305600\right) \sqrt{z} +$$
$$462 b^{12} \left(z^5 c^{10} + 70 z^4 c^8 - 480 z^3 c^6 - 60480 z^2 c^4 - 820800 z c^2 + 950400\right) \sqrt{z} +$$
$$55 b^4 c^8 \left(z^5 c^{10} - 18 z^4 c^8 - 6336 z^3 c^6 + 362880 z^2 c^4 + 2540160 z c^2 - 199584000\right) \sqrt{z} +$$
$$11 b^2 c^{10} \left(z^5 c^{10} - 60 z^4 c^8 - 2160 z^3 c^6 + 483840 z^2 c^4 - 19958400 z c^2 + 195955200\right) \sqrt{z} +$$
$$c^{12} \left(z^5 c^{10} - 110 z^4 c^8 + 7920 z^3 c^6 - 332640 z^2 c^4 + 6652800 z c^2 - 39916800\right) \sqrt{z} -$$
$$5544 b^{11} \left(z^5 c^{10} + 10 z^4 c^8 - 1440 z^3 c^6 - 36000 z^2 c^4 - 360000 z c^2 + 86400\right) -$$
$$4620 b^9 c^2 \left(z^5 c^{10} - 12 z^4 c^8 - 2640 z^3 c^6 - 31680 z^2 c^4 + 95040 z c^2 - 1900800\right) -$$
$$2640 b^7 c^4 \left(z^5 c^{10} - 42 z^4 c^8 - 3024 z^3 c^6 + 55440 z^2 c^4 + 1995840 z c^2 + 11975040\right) -$$
$$990 b^5 c^6 \left(z^5 c^{10} - 80 z^4 c^8 - 1344 z^3 c^6 + 201600 z^2 c^4 + 443520 z c^2 - 31933440\right) -$$
$$220 b^3 c^8 \left(z^5 c^{10} - 126 z^4 c^8 + 4032 z^3 c^6 + 181440 z^2 c^4 - 9072000 z c^2 + 39916800\right) -$$
$$22 b c^{10} \left(z^5 c^{10} - 180 z^4 c^8 + 15120 z^3 c^6 - 604800 z^2 c^4 + 9072000 z c^2 - 21772800\right)\big) \cos\left(c\sqrt{z}\right)\Big)\Big)$$

01.06.21.0399.01

$$\int \frac{e^{b\sqrt{z}}\sin(c\sqrt{z})}{z}\,dz = i\left(\text{Ei}\left((b-i\,c)\sqrt{z}\right)-\text{Ei}\left((b+i\,c)\sqrt{z}\right)\right)$$

01.06.21.0400.01

$$\int \frac{e^{b\sqrt{z}}\sin(c\sqrt{z})}{z^2}\,dz = \frac{1}{2\,z}\left(i\left(-z\,\text{Ei}\left((b+i\,c)\sqrt{z}\right)(b+i\,c)^2+ e^{(b-i\,c)\sqrt{z}}\left(-\sqrt{z}\,b+e^{2\,i\,c\sqrt{z}}\left(\sqrt{z}\,b+i\,c\sqrt{z}+1\right)+i\,c\sqrt{z}-1\right)+(b-i\,c)^2\,z\,\text{Ei}\left((b-i\,c)\sqrt{z}\right)\right)\right)$$

01.06.21.0401.01

$$\int \frac{e^{b\sqrt{z}}\sin(c\sqrt{z})}{z^3}\,dz = -\frac{1}{24}\,i\left(\text{Ei}\left((b+i\,c)\sqrt{z}\right)(b+i\,c)^4+\frac{e^{(b-i\,c)\sqrt{z}}\left((b-i\,c)^3\,z^{3/2}+(b-i\,c)^2\,z+2\,(b-i\,c)\sqrt{z}+6\right)}{z^2}-(b-i\,c)^4\,\text{Ei}\left((b-i\,c)\sqrt{z}\right)-\frac{e^{(b+i\,c)\sqrt{z}}\left((b+i\,c)^3\,z^{3/2}+(b+i\,c)^2\,z+2\,(b+i\,c)\sqrt{z}+6\right)}{z^2}\right)$$

01.06.21.0402.01

$$\int \frac{e^{b\sqrt{z}}\sin(c\sqrt{z})}{z^4}\,dz = -\frac{1}{720}\,i\left(\text{Ei}\left((b+i\,c)\sqrt{z}\right)(b+i\,c)^6-\frac{1}{z^3}\left(e^{(b+i\,c)\sqrt{z}}\left(2\,(b+i\,c)^3\,z^{3/2}+(b+i\,c)^5\,z^{5/2}+(b+i\,c)^4\,z^2+6\,(b+i\,c)^2\,z+24\,(b+i\,c)\sqrt{z}+120\right)\right)+\frac{1}{z^3}\left(e^{(b-i\,c)\sqrt{z}}\left(2\,(b-i\,c)^3\,z^{3/2}+(b-i\,c)^5\,z^{5/2}+(b-i\,c)^4\,z^2+6\,(b-i\,c)^2\,z+24\,(b-i\,c)\sqrt{z}+120\right)\right)-(b-i\,c)^6\,\text{Ei}\left((b-i\,c)\sqrt{z}\right)\right)$$

01.06.21.0403.01

$$\int \frac{e^{b\sqrt{z}}\sin(c\sqrt{z})}{z^5}\,dz = -\frac{1}{40\,320}\left(i\left(\text{Ei}\left((b+i\,c)\sqrt{z}\right)(b+i\,c)^8-\frac{1}{z^4}\left(e^{(b+i\,c)\sqrt{z}}\left(24\,(b+i\,c)^3\,z^{3/2}+2\,(b+i\,c)^5\,z^{5/2}+(b+i\,c)^7\,z^{7/2}+(b+i\,c)^6\,z^3+6\,(b+i\,c)^4\,z^2+120\,(b+i\,c)^2\,z+720\,(b+i\,c)\sqrt{z}+5040\right)\right)+\frac{1}{z^4}\left(e^{(b-i\,c)\sqrt{z}}\left(24\,(b-i\,c)^3\,z^{3/2}+2\,(b-i\,c)^5\,z^{5/2}+(b-i\,c)^7\,z^{7/2}+(b-i\,c)^6\,z^3+6\,(b-i\,c)^4\,z^2+120\,(b-i\,c)^2\,z+720\,(b-i\,c)\sqrt{z}+5040\right)\right)-(b-i\,c)^8\,\text{Ei}\left((b-i\,c)\sqrt{z}\right)\right)\right)$$

Involving $z^{\alpha-1}\,e^{b\,z^r+e}\sin(c\,z^r)$

01.06.21.0404.01

$$\int z^{\alpha-1} e^{b z^r+e} \sin(c z^r)\, dz = \frac{i z^\alpha}{2r} e^e \left(((-b-i c) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b-i c) z^r\right) - ((i c-b) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (i c-b) z^r\right)\right)$$

01.06.21.0405.01

$$\int \frac{e^{b z^r+e} \sin(c z^r)}{z}\, dz = \frac{i e^e (\mathrm{Ei}((b-i c) z^r) - \mathrm{Ei}((b+i c) z^r))}{2r}$$

01.06.21.0406.01

$$\int z^{2n} e^{b z^2+e} \sin(c z^2)\, dz = \frac{1}{4} i z e^e \left(\frac{1}{\sqrt{(-b-i c) z^2}} \left((-b-i c)^{-n} \left(\mathrm{erfc}\left(\sqrt{(-b-i c) z^2}\right) \Gamma\left(n+\frac{1}{2}\right) + e^{(b+i c) z^2} \sum_{k=0}^{n-1} \frac{((-b-i c) z^2)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}} - e^{(b+i c) z^2} \sum_{k=n}^{-1} \frac{((-b-i c) z^2)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}\right)\right) - \frac{1}{\sqrt{(i c-b) z^2}} \left((i c-b)^{-n} \left(\mathrm{erfc}\left(\sqrt{(i c-b) z^2}\right) \Gamma\left(n+\frac{1}{2}\right) + e^{(b-i c) z^2} \sum_{k=0}^{n-1} \frac{((i c-b) z^2)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}} - e^{(b-i c) z^2} \sum_{k=n}^{-1} \frac{((i c-b) z^2)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}\right)\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0407.01

$$\int z^{2n-1} e^{b z^2+e} \sin(c z^2)\, dz = \frac{1}{4} i e^e \left((-b-i c)^{-n} \left(\frac{(-1)^{n-1} \mathrm{Ei}((b+i c) z^2)}{(-n)!} + e^{(b+i c) z^2} \sum_{k=0}^{n-1} \frac{((-b-i c) z^2)^k}{(n)_{k-n+1}} - e^{(b+i c) z^2} \sum_{k=n}^{-1} \frac{((-b-i c) z^2)^k}{(n)_{k-n+1}}\right) - (i c-b)^{-n} \left(\frac{(-1)^{n-1} \mathrm{Ei}((b-i c) z^2)}{(-n)!} + e^{(b-i c) z^2} \sum_{k=0}^{n-1} \frac{((i c-b) z^2)^k}{(n)_{k-n+1}} - e^{(b-i c) z^2} \sum_{k=n}^{-1} \frac{((i c-b) z^2)^k}{(n)_{k-n+1}}\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0408.01

$$\int z e^{b z^2+e} \sin(c z^2)\, dz = \frac{e^{b z^2+e} (b \sin(c z^2) - c \cos(c z^2))}{2 (b^2+c^2)}$$

01.06.21.0409.01

$$\int z^2 e^{b z^2+e} \sin(c z^2)\, dz = -\frac{1}{4} i z^3 e^e \left(\frac{\frac{1}{2}\sqrt{\pi} \left(\mathrm{erf}\left(\sqrt{-(b+i c) z^2}\right) - 1\right) - e^{(b+i c) z^2} \sqrt{-(b+i c) z^2}}{(-(b+i c) z^2)^{3/2}} + \frac{e^{(b-i c) z^2} \sqrt{-(b-i c) z^2} - \frac{1}{2}\sqrt{\pi} \left(\mathrm{erf}\left(\sqrt{-(b-i c) z^2}\right) - 1\right)}{(-(b-i c) z^2)^{3/2}}\right)$$

01.06.21.0410.01

$$\int z^3 e^{b z^2+e} \sin(c z^2)\, dz = \frac{e^{b z^2+e} \left((z^2 b^3 - b^2 + c^2 z^2 b + c^2) \sin(c z^2) - c (b^2 z^2 + c^2 z^2 - 2b) \cos(c z^2)\right)}{2 (b^2+c^2)^2}$$

01.06.21.0411.01

$$\int z^4 e^{b z^2+e} \sin(c z^2)\, dz = -\frac{1}{16} i z^5 e^e \left(\frac{1}{\left(-(b+i c) z^2\right)^{5/2}} \left(2 e^{(b+i c) z^2} \sqrt{-(b+i c) z^2} \left(2 b z^2+2 c i z^2-3\right)+3 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right)-3 \sqrt{\pi}\right)+\frac{1}{\left(-(b-i c) z^2\right)^{5/2}} \left(-2 e^{(b-i c) z^2} \sqrt{-(b-i c) z^2} \left(2 b z^2-2 i c z^2-3\right)-3 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right)+3 \sqrt{\pi}\right)\right)$$

01.06.21.0412.01

$$\int z^5 e^{b z^2+e} \sin(c z^2)\, dz = \frac{1}{2 \left(b^2+c^2\right)^3} e^{b z^2+e} \left(\left(z^4 b^5-2 z^2 b^4+2 \left(c^2 z^4+1\right) b^3+c^2 \left(c^2 z^4-6\right) b+2 c^4 z^2\right) \sin(c z^2)-c \left(b^4 z^4-4 b^3 z^2-4 b c^2 z^2+c^2 \left(c^2 z^4-2\right)+2 b^2 \left(c^2 z^4+3\right)\right) \cos(c z^2)\right)$$

01.06.21.0413.01

$$\int \frac{e^{b z^2+e} \sin(c z^2)}{z}\, dz = \frac{1}{4} i e^e \left(\operatorname{Ei}\left((b-i c) z^2\right)-\operatorname{Ei}\left((b+i c) z^2\right)\right)$$

01.06.21.0414.01

$$\int \frac{e^{b z^2+e} \sin(c z^2)}{z^2}\, dz = -\frac{1}{2 z} i e^e \left(-\sqrt{\pi} \sqrt{-(b+i c) z^2} \operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right)-e^{(b+i c) z^2}+e^{(b-i c) z^2}+\sqrt{\pi} \sqrt{-(b-i c) z^2} \operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right)+\sqrt{\pi} \sqrt{-(b+i c) z^2}-\sqrt{\pi} \sqrt{-(b-i c) z^2}\right)$$

01.06.21.0415.01

$$\int \frac{e^{b z^2+e} \sin(c z^2)}{z^3}\, dz = e^e \frac{(c-i b) \operatorname{Ei}\left((b+i c) z^2\right) z^2+(c+i b) \operatorname{Ei}\left((b-i c) z^2\right) z^2+e^{(b-i c) z^2} \left(-1+e^{2 i c z^2}\right) i}{4 z^2}$$

01.06.21.0416.01

$$\int \frac{e^{b z^2+e} \sin(c z^2)}{z^4}\, dz = \frac{1}{6 z^3} i e^e \left(-2 \sqrt{\pi} \operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right) \left(-(b+i c) z^2\right)^{3/2}+2 \sqrt{\pi} \left(-(b+i c) z^2\right)^{3/2}-2 \sqrt{\pi} \left(-(b-i c) z^2\right)^{3/2}+e^{(b+i c) z^2}-e^{(b-i c) z^2}+2 (b+i c) e^{(b+i c) z^2} z^2-2 (b-i c) e^{(b-i c) z^2} z^2+2 \sqrt{\pi} \left(-(b-i c) z^2\right)^{3/2} \operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right)\right)$$

01.06.21.0417.01

$$\int \frac{e^{b z^2+e} \sin(c z^2)}{z^5}\, dz = \frac{1}{8 z^4} \left(i e^e \left(-(b+i c)^2 \operatorname{Ei}\left((b+i c) z^2\right) z^4+(b-i c)^2 \operatorname{Ei}\left((b-i c) z^2\right) z^4+e^{(b-i c) z^2} \left(-b z^2+c i z^2+e^{2 i c z^2} \left(b z^2+c i z^2+1\right)-1\right)\right)\right)$$

01.06.21.0418.01

$$\int z^n e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)dz = i\, e^e \left((b+i\,c)^{-2(n+1)}\left(\frac{(-1)^{2n+1}\operatorname{Ei}\left((b+i\,c)\sqrt{z}\right)}{(-2n-2)!}+e^{(b+i\,c)\sqrt{z}}\sum_{k=0}^{2n+1}\frac{\left((-b-i\,c)\sqrt{z}\right)^k}{(2n+2)_{k-2n-1}}-e^{(b+i\,c)\sqrt{z}}\sum_{k=2n+2}^{-1}\frac{\left((-b-i\,c)\sqrt{z}\right)^k}{(2n+2)_{k-2n-1}}\right)-(b-i\,c)^{-2(n+1)}\left(\frac{(-1)^{2n+1}\operatorname{Ei}\left((b-i\,c)\sqrt{z}\right)}{(-2n-2)!}+e^{(b-i\,c)\sqrt{z}}\sum_{k=0}^{2n+1}\frac{\left((i\,c-b)\sqrt{z}\right)^k}{(2n+2)_{k-2n-1}}-e^{(b-i\,c)\sqrt{z}}\sum_{k=2n+2}^{-1}\frac{\left((i\,c-b)\sqrt{z}\right)^k}{(2n+2)_{k-2n-1}}\right)\right)\,/;\, n\in\mathbb{Z}$$

01.06.21.0419.01

$$\int z\, e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)dz = \frac{2}{\left(b^2+c^2\right)^4}e^{b\sqrt{z}+e}\left(\left(b^7 z^{3/2}-3b^6 z+b c^4\left(c^2 z-18\right)\sqrt{z}+3b^3c^2\left(c^2z-4\right)\sqrt{z}+3b^5\left(zc^2+2\right)\sqrt{z}+3c^4\left(c^2z-2\right)-3b^4\left(zc^2+2\right)+3b^2c^2\left(zc^2+12\right)\right)\sin\left(c\sqrt{z}\right)-c\left(b^6z^{3/2}-6b^5z+c^4\left(c^2z-6\right)\sqrt{z}+3b^2c^2\left(zc^2+4\right)\sqrt{z}+3b^4\left(zc^2+6\right)\sqrt{z}-6bc^2\left(c^2z-4\right)-12b^3\left(zc^2+2\right)\right)\cos\left(c\sqrt{z}\right)\right)$$

01.06.21.0420.01

$$\int z^2 e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)dz = \frac{2}{\left(b^2+c^2\right)^6}e^{b\sqrt{z}+e}\left(\left(20b\left(b^2+c^2\right)^3\left(b^2-3c^2\right)z^{3/2}+b\left(b^2+c^2\right)^5z^{5/2}-5(b-c)(b+c)\left(b^2+c^2\right)^4z^2-60\left(b^2+c^2\right)^2\left(b^4-6c^2b^2+c^4\right)z+120b\left(b^2+c^2\right)\left(b^4-10c^2b^2+5c^4\right)\sqrt{z}-120\left(b^6-15c^2b^4+15c^4b^2-c^6\right)\right)\sin\left(c\sqrt{z}\right)-c\left(20\left(3b^2-c^2\right)\left(b^2+c^2\right)^3z^{3/2}+\left(b^2+c^2\right)^5z^{5/2}-10b\left(b^2+c^2\right)^4z^2-240b(b-c)(b+c)\left(b^2+c^2\right)^2z+120\left(b^2+c^2\right)\left(5b^4-10c^2b^2+c^4\right)\sqrt{z}-240b\left(3b^4-10c^2b^2+3c^4\right)\right)\cos\left(c\sqrt{z}\right)\right)$$

01.06.21.0421.01

$$\int z^3 e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)dz = \frac{2}{\left(b^2+c^2\right)^8}e^{b\sqrt{z}+e}\left(\left(840b\left(b^2+c^2\right)^3\left(b^4-10c^2b^2+5c^4\right)z^{3/2}+42b\left(b^2+c^2\right)^5\left(b^2-3c^2\right)z^{5/2}+b\left(b^2+c^2\right)^7z^{7/2}-7(b-c)(b+c)\left(b^2+c^2\right)^6z^3-210\left(b^2+c^2\right)^4\left(b^4-6c^2b^2+c^4\right)z^2-2520\left(b^2+c^2\right)^2\left(b^6-15c^2b^4+15c^4b^2-c^6\right)z+5040b\left(b^2+c^2\right)\left(b^6-21c^2b^4+35c^4b^2-7c^6\right)\sqrt{z}-5040\left(b^8-28c^2b^6+70c^4b^4-28c^6b^2+c^8\right)\right)\sin\left(c\sqrt{z}\right)-c\left(840\left(b^2+c^2\right)^3\left(5b^4-10c^2b^2+c^4\right)z^{3/2}+42\left(3b^2-c^2\right)\left(b^2+c^2\right)^5z^{5/2}+\left(b^2+c^2\right)^7z^{7/2}-14b\left(b^2+c^2\right)^6z^3-840b(b-c)(b+c)\left(b^2+c^2\right)^4z^2-5040b\left(b^2+c^2\right)^2\left(3b^4-10c^2b^2+3c^4\right)z+5040\left(b^2+c^2\right)\left(7b^6-35c^2b^4+21c^4b^2-c^6\right)\sqrt{z}-40320b\left(b^6-7c^2b^4+7c^4b^2-c^6\right)\right)\cos\left(c\sqrt{z}\right)\right)$$

01.06.21.0422.01

$$\int z^4 e^{b\sqrt{z}+e} \sin\left(c\sqrt{z}\right) dz = \frac{2}{\left(b^2+c^2\right)^{10}} e^{b\sqrt{z}+e} \Big(\Big(60480\, b \left(b^2+c^2\right)^3 \left(b^6 - 21 c^2 b^4 + 35 c^4 b^2 - 7 c^6\right) z^{3/2} + 3024\, b \left(b^2+c^2\right)^5 \left(b^4 - 10 c^2 b^2 + 5 c^4\right) z^{5/2} + 72\, b \left(b^2+c^2\right)^7 \left(b^2 - 3 c^2\right) z^{7/2} + b \left(b^2+c^2\right)^9 z^{9/2} - 9 (b-c)(b+c) \left(b^2+c^2\right)^8 z^4 - 504 \left(b^2+c^2\right)^6 \left(b^4 - 6 c^2 b^2 + c^4\right) z^3 - 15120 \left(b^2+c^2\right)^4 \left(b^6 - 15 c^2 b^4 + 15 c^4 b^2 - c^6\right) z^2 - 181440 \left(b^2+c^2\right)^2 \left(b^8 - 28 c^2 b^6 + 70 c^4 b^4 - 28 c^6 b^2 + c^8\right) z + 362880\, b \left(b^2+c^2\right) \left(b^2 - 3 c^2\right) \left(b^6 - 33 c^2 b^4 + 27 c^4 b^2 - 3 c^6\right) \sqrt{z} - 362880 \left(b^{10} - 45 c^2 b^8 + 210 c^4 b^6 - 210 c^6 b^4 + 45 c^8 b^2 - c^{10}\right)\Big) \sin\left(c\sqrt{z}\right) - c\Big(60480 \left(b^2+c^2\right)^3 \left(7 b^6 - 35 c^2 b^4 + 21 c^4 b^2 - c^6\right) z^{3/2} + 3024 \left(b^2+c^2\right)^5 \left(5 b^4 - 10 c^2 b^2 + c^4\right) z^{5/2} + 72 \left(3 b^2 - c^2\right) \left(b^2+c^2\right)^7 z^{7/2} + \left(b^2+c^2\right)^9 z^{9/2} - 18\, b \left(b^2+c^2\right)^8 z^4 - 2016\, b (b-c)(b+c) \left(b^2+c^2\right)^6 z^3 - 30240\, b \left(b^2+c^2\right)^4 \left(3 b^4 - 10 c^2 b^2 + 3 c^4\right) z^2 - 1451520\, b \left(b^2+c^2\right)^2 \left(b^6 - 7 c^2 b^4 + 7 c^4 b^2 - c^6\right) z + 362880 \left(9 b^{10} - 75 c^2 b^8 + 42 c^4 b^6 + 90 c^6 b^4 - 35 c^8 b^2 + c^{10}\right) \sqrt{z} - 725760\, b \left(5 b^4 - 10 c^2 b^2 + c^4\right) \left(b^4 - 10 c^2 b^2 + 5 c^4\right)\Big) \cos\left(c\sqrt{z}\right)\Big)$$

01.06.21.0423.01

$$\int z^5 e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)dz = \frac{1}{\left(b^2+c^2\right)^{12}}$$
$$\Big(2 e^{b\sqrt{z}+e}\Big(\Big(330 b^{15}\left(z^4 c^8-8 z^3 c^6-1056 z^2 c^4-16128 z c^2+20160\right) z^{3/2}+165 b^{17}\left(z^3 c^6+6 z^2 c^4-144 z c^2+2016\right) z^{5/2}+$$
$$55 b^{19}\left(z^2 c^4+12 z c^2+144\right) z^{7/2}+11 b^{21}\left(z c^2+10\right) z^{9/2}+b^{23} z^{11/2}-11 b^{22} z^5-99 b^{20}\left(z c^2+10\right) z^4-$$
$$55 b^{18}\left(7 z^2 c^4+36 z c^2+1008\right) z^3-165 b^{16}\left(5 z^3 c^6-114 z^2 c^4-3024 z c^2+10080\right) z^2-$$
$$990 b^{14}\left(z^4 c^8-104 z^3 c^6-3360 z^2 c^4-40320 z c^2+20160\right) z+$$
$$462 b^{13}\left(z^5 c^{10}-30 z^4 c^8-2400 z^3 c^6-43200 z^2 c^4-475200 z c^2+86400\right)\sqrt{z}+$$
$$462 b^{11} c^2\left(z^5 c^{10}-60 z^4 c^8-3600 z^3 c^6-23040 z^2 c^4+302400 z c^2-4665600\right)\sqrt{z}+$$
$$330 b^9 c^4\left(z^5 c^{10}-98 z^4 c^8-3696 z^3 c^6+110880 z^2 c^4+3769920 z c^2+33264000\right)\sqrt{z}+$$
$$165 b^7 c^6\left(z^5 c^{10}-144 z^4 c^8-1344 z^3 c^6+354816 z^2 c^4+3991680 z c^2-31933440\right)\sqrt{z}+$$
$$55 b^5 c^8\left(z^5 c^{10}-198 z^4 c^8+5184 z^3 c^6+508032 z^2 c^4-11975040 z c^2-215550720\right)\sqrt{z}+$$
$$11 b^3 c^{10}\left(z^5 c^{10}-260 z^4 c^8+18000 z^3 c^6-34473600 z c^2+558835200\right)\sqrt{z}+$$
$$b c^{12}\left(z^5 c^{10}-330 z^4 c^8+39600 z^3 c^6-2328480 z^2 c^4+59875200 z c^2-439084800\right)\sqrt{z}+$$
$$990 b^8 c^4\left(z^5 c^{10}+238 z^4 c^8-3696 z^3 c^6-332640 z^2 c^4-3326400 z c^2-19958400\right)+$$
$$462 b^{10} c^2\left(z^5 c^{10}+660 z^4 c^8+7920 z^3 c^6-316800 z^2 c^4-5227200 z c^2+5702400\right)+$$
$$99 b^2 c^{10}\left(z^5 c^{10}-20 z^4 c^8-5040 z^3 c^6+403200 z^2 c^4-8668800 z c^2+26611200\right)+$$
$$11 c^{12}\left(z^5 c^{10}-90 z^4 c^8+5040 z^3 c^6-151200 z^2 c^4+1814400 z c^2-3628800\right)-$$
$$462 b^{12}\left(z^5 c^{10}-510 z^4 c^8-13920 z^3 c^6-129600 z^2 c^4-1857600 z c^2+86400\right)+$$
$$165 b^6 c^6\left(5 z^5 c^{10}+624 z^4 c^8-38976 z^3 c^6-887040 z^2 c^4+19958400 z c^2+223534080\right)+$$
$$55 b^4 c^8\left(7 z^5 c^{10}+342 z^4 c^8-60480 z^3 c^6+1088640 z^2 c^4+43908480 z c^2-359251200\right)\Big)\sin\left(c\sqrt{z}\right)-$$
$$c\Big(330 b^{14}\left(z^4 c^8+72 z^3 c^6+864 z^2 c^4+181440\right) z^{3/2}+165 b^{16}\left(z^3 c^6+66 z^2 c^4+1200 z c^2+14112\right) z^{5/2}+$$
$$55 b^{18}\left(z^2 c^4+52 z c^2+720\right) z^{7/2}+11 b^{20}\left(z c^2+30\right) z^{9/2}+b^{22} z^{11/2}-22 b^{21} z^5-220 b^{19}\left(z c^2+18\right) z^4-$$
$$990 b^{17}\left(z^2 c^4+28 z c^2+336\right) z^3-2640 b^{15}\left(z^3 c^6+30 z^2 c^4+336 z c^2+5040\right) z^2-$$
$$4620 b^{13}\left(z^4 c^8+24 z^3 c^6-288 z^2 c^4-8640 z c^2+43200\right) z+$$
$$165 b^6 c^6\left(z^5 c^{10}+16 z^4 c^8-6720 z^3 c^6+64512 z^2 c^4+7539840 z c^2+31933440\right)\sqrt{z}+$$
$$330 b^8 c^4\left(z^5 c^{10}+42 z^4 c^8-5040 z^3 c^6-110880 z^2 c^4+1995840 z c^2+35925120\right)\sqrt{z}+$$
$$462 b^{10} c^2\left(z^5 c^{10}+60 z^4 c^8-2640 z^3 c^6-126720 z^2 c^4-1425600 z c^2-13305600\right)\sqrt{z}+$$
$$462 b^{12}\left(z^5 c^{10}+70 z^4 c^8-480 z^3 c^6-60480 z^2 c^4-820800 z c^2+950400\right)\sqrt{z}+$$
$$55 b^4 c^8\left(z^5 c^{10}-18 z^4 c^8-6336 z^3 c^6+362880 z^2 c^4+2540160 z c^2-199584000\right)\sqrt{z}+$$
$$11 b^2 c^{10}\left(z^5 c^{10}-60 z^4 c^8-2160 z^3 c^6+483840 z^2 c^4-19958400 z c^2+195955200\right)\sqrt{z}+$$
$$c^{12}\left(z^5 c^{10}-110 z^4 c^8+7920 z^3 c^6-332640 z^2 c^4+6652800 z c^2-39916800\right)\sqrt{z}-$$
$$5544 b^{11}\left(z^5 c^{10}+10 z^4 c^8-1440 z^3 c^6-36000 z^2 c^4-360000 z c^2+86400\right)-$$
$$4620 b^9 c^2\left(z^5 c^{10}-12 z^4 c^8-2640 z^3 c^6-31680 z^2 c^4+95040 z c^2-1900800\right)-$$
$$2640 b^7 c^4\left(z^5 c^{10}-42 z^4 c^8-3024 z^3 c^6+55440 z^2 c^4+1995840 z c^2+11975040\right)-$$
$$990 b^5 c^6\left(z^5 c^{10}-80 z^4 c^8-1344 z^3 c^6+201600 z^2 c^4+443520 z c^2-31933440\right)-$$
$$220 b^3 c^8\left(z^5 c^{10}-126 z^4 c^8+4032 z^3 c^6+181440 z^2 c^4-9072000 z c^2+39916800\right)-$$
$$22 b c^{10}\left(z^5 c^{10}-180 z^4 c^8+15120 z^3 c^6-604800 z^2 c^4+9072000 z c^2-21772800\right)\Big)\cos\left(c\sqrt{z}\right)\Big)\Big)$$

01.06.21.0424.01

$$\int \frac{e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)}{z}\,dz = i\,e^{e}\left(\operatorname{Ei}\left((b-i\,c)\sqrt{z}\right)-\operatorname{Ei}\left((b+i\,c)\sqrt{z}\right)\right)$$

01.06.21.0425.01

$$\int \frac{e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)}{z^2}\,dz = \frac{1}{2\,z}\,i\,e^{e}\left(-z\operatorname{Ei}\left((b+i\,c)\sqrt{z}\right)(b+i\,c)^2+ e^{(b-i\,c)\sqrt{z}}\left(-\sqrt{z}\,b+e^{2\,i\,c\sqrt{z}}\left(\sqrt{z}\,b+i\,c\sqrt{z}+1\right)+i\,c\sqrt{z}-1\right)+(b-i\,c)^2\,z\operatorname{Ei}\left((b-i\,c)\sqrt{z}\right)\right)$$

01.06.21.0426.01

$$\int \frac{e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)}{z^3}\,dz = -\frac{1}{24}\,i\,e^{e}\left(\operatorname{Ei}\left((b+i\,c)\sqrt{z}\right)(b+i\,c)^4+\frac{e^{(b-i\,c)\sqrt{z}}\left((b-i\,c)^3z^{3/2}+(b-i\,c)^2z+2\,(b-i\,c)\sqrt{z}+6\right)}{z^2}- (b-i\,c)^4\operatorname{Ei}\left((b-i\,c)\sqrt{z}\right)-\frac{e^{(b+i\,c)\sqrt{z}}\left((b+i\,c)^3z^{3/2}+(b+i\,c)^2z+2\,(b+i\,c)\sqrt{z}+6\right)}{z^2}\right)$$

01.06.21.0427.01

$$\int \frac{e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)}{z^4}\,dz = -\frac{1}{720}\,i\,e^{e}\left(\operatorname{Ei}\left((b+i\,c)\sqrt{z}\right)(b+i\,c)^6- \frac{1}{z^3}\left(e^{(b+i\,c)\sqrt{z}}\left(2\,(b+i\,c)^3z^{3/2}+(b+i\,c)^5z^{5/2}+(b+i\,c)^4z^2+6\,(b+i\,c)^2z+24\,(b+i\,c)\sqrt{z}+120\right)\right)+ \frac{1}{z^3}\left(e^{(b-i\,c)\sqrt{z}}\left(2\,(b-i\,c)^3z^{3/2}+(b-i\,c)^5z^{5/2}+(b-i\,c)^4z^2+6\,(b-i\,c)^2z+24\,(b-i\,c)\sqrt{z}+120\right)\right)- (b-i\,c)^6\operatorname{Ei}\left((b-i\,c)\sqrt{z}\right)\right)$$

01.06.21.0428.01

$$\int \frac{e^{b\sqrt{z}+e}\sin\left(c\sqrt{z}\right)}{z^5}\,dz = -\frac{1}{40\,320}\,i\,e^{e}\left(\operatorname{Ei}\left((b+i\,c)\sqrt{z}\right)(b+i\,c)^8-\frac{1}{z^4}\left(e^{(b+i\,c)\sqrt{z}}\left(24\,(b+i\,c)^3z^{3/2}+2\,(b+i\,c)^5z^{5/2}+(b+i\,c)^7z^{7/2}+ (b+i\,c)^6z^3+6\,(b+i\,c)^4z^2+120\,(b+i\,c)^2z+720\,(b+i\,c)\sqrt{z}+5040\right)\right)+ \frac{1}{z^4}\left(e^{(b-i\,c)\sqrt{z}}\left(24\,(b-i\,c)^3z^{3/2}+2\,(b-i\,c)^5z^{5/2}+(b-i\,c)^7z^{7/2}+(b-i\,c)^6z^3+6\,(b-i\,c)^4z^2+ 120\,(b-i\,c)^2z+720\,(b-i\,c)\sqrt{z}+5040\right)\right)-(b-i\,c)^8\operatorname{Ei}\left((b-i\,c)\sqrt{z}\right)\right)$$

Involving $z^n\,e^{b\,z^r+d\,z}\sin\left(c\,z^r\right)$

01.06.21.0429.01

$$\int z^n e^{b z^2+d z} \sin(c z^2)\, dz = \frac{i}{4\sqrt{b+i c}} e^{-\frac{d^2}{4(b+i c)}} \sum_{q=0}^{n} 2^{q-n} (b+i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d+2(b+i c) z)^{q+1} \left(-\frac{(d+2(b+i c) z)^2}{b+i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2(b+i c) z)^2}{4(b+i c)}\right) - \frac{i}{4\sqrt{b-i c}} e^{\frac{d^2}{4 i c-4 b}} \sum_{q=0}^{n} 2^{q-n} (b-i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d+2(b-i c) z)^{q+1} \left(-\frac{(d+2(b-i c) z)^2}{b-i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2(b-i c) z)^2}{4(b-i c)}\right) /; n \in \mathbb{N}$$

01.06.21.0430.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin(c\sqrt{z})\, dz = i\, 2^{-2(n+1)} d^{-2(n+1)} e^{-\frac{b^2-c^2}{2d}} \left(e^{\frac{(b+i c)^2}{4d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b-i c)^{-h-k+2n} \left(b-i c+2 d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b-i c+2 d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b-i c)\left(b-i c+2 d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b-i c+2 d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b-i c+2 d\sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b-i c+2 d\sqrt{z}\right)^2}{4d}\right)\right) - e^{\frac{(i c-b)^2}{4d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+i c)^{-h-k+2n} \left(b+i c+2 d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+i c+2 d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b+i c)\left(b+i c+2 d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+i c+2 d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+i c+2 d\sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+i c+2 d\sqrt{z}\right)^2}{4d}\right)\right)\right) /; n \in \mathbb{N}$$

Involving $z^n e^{b z^r+d z+e} \sin(c z^r)$

01.06.21.0431.01

$$\int z^n e^{b z^2+d z+e} \sin\left(c z^2\right) dz = \frac{1}{4} i e^e \left(\frac{1}{\sqrt{b+i c}} e^{-\frac{d^2}{4(b+i c)}} \sum_{q=0}^{n} 2^{q-n} (b+i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d+2(b+i c) z)^{q+1} \left(-\frac{(d+2(b+i c) z)^2}{b+i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2(b+i c) z)^2}{4(b+i c)}\right) - \frac{1}{\sqrt{b-i c}} e^{\frac{d^2}{4 i c-4 b}} \sum_{q=0}^{n} 2^{q-n} (b-i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d+2(b-i c) z)^{q+1} \left(\frac{(d+2(b-i c) z)^2}{i c-b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{(d+2(b-i c) z)^2}{4(i c-b)}\right)\right) /; n \in \mathbb{N}$$

01.06.21.0432.01

$$\int z^n e^{\sqrt{z}\, b+d z+e} \sin\left(c \sqrt{z}\right) dz = i\, 2^{-2(n+1)} d^{-2(n+1)} e^{-\frac{b^2-c^2-2 d e}{2 d}} \left(e^{\frac{(b+i c)^2}{4 d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b-i c)^{-h-k+2n} \left(b-i c+2 d \sqrt{z}\right)^{h+k} \left(-\frac{\left(b-i c+2 d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b-i c)\left(b-i c+2 d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b-i c+2 d \sqrt{z}\right)^2}{4 d}\right) + 2 \sqrt{-\frac{\left(b-i c+2 d \sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b-i c+2 d \sqrt{z}\right)^2}{4 d}\right)\right) - e^{\frac{(i c-b)^2}{4 d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+i c)^{-h-k+2n} \left(b+i c+2 d \sqrt{z}\right)^{h+k} \left(-\frac{\left(b+i c+2 d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b+i c)\left(b+i c+2 d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+i c+2 d \sqrt{z}\right)^2}{4 d}\right) + 2 \sqrt{-\frac{\left(b+i c+2 d \sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+i c+2 d \sqrt{z}\right)^2}{4 d}\right)\right)\right) /; n \in \mathbb{N}$$

Involving $z^n e^{d z} \sin\left(c z^r + g\right)$

01.06.21.0433.01

$$\int z^n e^{d z} \sin(c z^2 + g) \, dz = \frac{1}{4\sqrt{i c}} \left(i e^{\frac{i d^2}{4 c} + i g} \sum_{q=0}^{n} 2^{q-n} (i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d + 2 i c z)^{q+1} \left(\frac{i (d + 2 i c z)^2}{c} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{i (d + 2 i c z)^2}{4 c} \right) \right) - \frac{1}{4\sqrt{-i c}} \left(i e^{-\frac{i d^2}{4 c} - i g} \sum_{q=0}^{n} 2^{q-n} (-i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d - 2 i c z)^{q+1} \left(-\frac{i (d - 2 i c z)^2}{c} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{i (d - 2 i c z)^2}{4 c} \right) \right) /; n \in \mathbb{N}$$

01.06.21.0434.01

$$\int z^n e^{d z} \sin(\sqrt{z}\, c + g) \, dz = i\, 2^{-2(n+1)} e^{-i g} \left(d^{-2(n+1)} e^{\frac{c^2}{4 d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (-i c)^{-h-k+2n} \left(2 d \sqrt{z} - i c\right)^{h+k} \left(-\frac{\left(2 d \sqrt{z} - i c\right)^2}{d} \right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(2 d \sqrt{-\frac{\left(2 d \sqrt{z} - i c\right)^2}{d}}\; \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2 d \sqrt{z} - i c\right)^2}{4 d} \right) - i c \left(2 d \sqrt{z} - i c\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2 d \sqrt{z} - i c\right)^2}{4 d} \right) \right) - d^{-2(n+1)} e^{\frac{c^2}{4 d} + 2 i g} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i c)^{-h-k+2n} \left(2 \sqrt{z}\, d + i c\right)^{h+k} \left(-\frac{\left(2 \sqrt{z}\, d + i c\right)^2}{d} \right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(c\, i \left(2 \sqrt{z}\, d + i c\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2 \sqrt{z}\, d + i c\right)^2}{4 d} \right) + 2 \sqrt{-\frac{\left(2 \sqrt{z}\, d + i c\right)^2}{d}}\; d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2 \sqrt{z}\, d + i c\right)^2}{4 d} \right) \right) \right) /; n \in \mathbb{N}$$

Involving $z^n e^{d z + e} \sin(c z^r + g)$

01.06.21.0435.01

$$\int z^n e^{d z+e} \sin\left(c z^2+g\right) dz = \frac{1}{4\sqrt{i c}} \left(i e^{\frac{i d^2}{4c}+e+i g} \sum_{q=0}^{n} 2^{q-n} (i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d+2 i c z)^{q+1} \left(\frac{i (d+2 i c z)^2}{c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{i (d+2 i c z)^2}{4c}\right)\right) - \frac{1}{4\sqrt{-i c}} \left(i e^{-\frac{i d^2}{4c}+e-i g} \sum_{q=0}^{n} 2^{q-n} (-i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d-2 i c z)^{q+1} \left(-\frac{i (d-2 i c z)^2}{c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{i (d-2 i c z)^2}{4c}\right)\right) /; n \in \mathbb{N}$$

01.06.21.0436.01

$$\int z^n e^{d z+e} \sin\left(\sqrt{z}\, c+g\right) dz = i\, 2^{-2(n+1)} e^{e-i g} \left(d^{-2(n+1)} e^{\frac{c^2}{4d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (-i c)^{-h-k+2n} \left(2 d \sqrt{z} - i c\right)^{h+k} \left(-\frac{\left(2 d \sqrt{z} - i c\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(2 d \sqrt{-\frac{\left(2 d \sqrt{z} - i c\right)^2}{d}}\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2 d \sqrt{z} - i c\right)^2}{4d}\right) - i c \left(2 d \sqrt{z} - i c\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2 d \sqrt{z} - i c\right)^2}{4d}\right)\right) - d^{-2(n+1)} e^{\frac{c^2}{4d}+2 i g} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i c)^{-h-k+2n} \left(2 \sqrt{z}\, d + i c\right)^{h+k} \left(-\frac{\left(2 \sqrt{z}\, d + i c\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(c\, i \left(2 \sqrt{z}\, d + i c\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2 \sqrt{z}\, d + i c\right)^2}{4d}\right) + 2 \sqrt{-\frac{\left(2 \sqrt{z}\, d + i c\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2 \sqrt{z}\, d + i c\right)^2}{4d}\right)\right)\right) /; n \in \mathbb{N}$$

Involving $z^{\alpha-1} e^{b z^r} \sin\left(c z^r + g\right)$

01.06.21.0437.01

$$\int z^{\alpha-1} e^{b z^r} \sin(c z^r + g)\, dz = -\frac{i z^\alpha}{2 r} \left(e^{-i g} \left((i c - b) z^r\right)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (i c - b) z^r\right) - e^{i g} \left(-(b + i c) z^r\right)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, -(b + i c) z^r\right)\right)$$

01.06.21.0438.01

$$\int \frac{e^{b z^r} \sin(c z^r + g)}{z}\, dz = \frac{\mathrm{Ei}((b + i c) z^r) (\sin(g) - i \cos(g)) + \mathrm{Ei}((b - i c) z^r) (i \cos(g) + \sin(g))}{2 r}$$

01.06.21.0439.01

$$\int z^{2n} e^{b z^2} \sin\left(c z^2 + g\right) dz = \frac{1}{4} i z \left(e^{i g} \left((-b - i c) z^2\right)^{-\frac{1}{2}} (-b - i c)^{-n} \left(\mathrm{erfc}\left(\sqrt{(-b - i c) z^2}\right) \Gamma\left(n + \frac{1}{2}\right) + e^{-(-b-i c) z^2} \sum_{k=0}^{n-1} \frac{\left((-b - i c) z^2\right)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}} - e^{-(-b-i c) z^2} \sum_{k=n}^{-1} \frac{\left((-b - i c) z^2\right)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}} \right) - e^{-i g} \left((i c - b) z^2\right)^{-\frac{1}{2}} (i c - b)^{-n} \left(\mathrm{erfc}\left(\sqrt{(i c - b) z^2}\right) \Gamma\left(n + \frac{1}{2}\right) + e^{-(i c-b) z^2} \sum_{k=0}^{n-1} \frac{\left((i c - b) z^2\right)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}} - e^{-(i c-b) z^2} \sum_{k=n}^{-1} \frac{\left((i c - b) z^2\right)^{k+\frac{1}{2}}}{\left(n + \frac{1}{2}\right)_{k-n+1}} \right)\right) /;\ n \in \mathbb{Z}$$

01.06.21.0440.01

$$\int z^{2n-1} e^{b z^2} \sin\left(c z^2 + g\right) dz = \frac{1}{4} i \left(e^{i g} (-b - i c)^{-n} \left(\frac{(-1)^{n-1} \mathrm{Ei}\left(-(-b - i c) z^2\right)}{(-n)!} + e^{-(-b-i c) z^2} \sum_{k=0}^{n-1} \frac{\left((-b - i c) z^2\right)^k}{(n)_{k-n+1}} - e^{-(-b-i c) z^2} \sum_{k=n}^{-1} \frac{\left((-b - i c) z^2\right)^k}{(n)_{k-n+1}} \right) - e^{-i g} (i c - b)^{-n} \left(\frac{(-1)^{n-1} \mathrm{Ei}\left(-(i c - b) z^2\right)}{(-n)!} + e^{-(i c-b) z^2} \sum_{k=0}^{n-1} \frac{\left((i c - b) z^2\right)^k}{(n)_{k-n+1}} - e^{-(i c-b) z^2} \sum_{k=n}^{-1} \frac{\left((i c - b) z^2\right)^k}{(n)_{k-n+1}} \right)\right) /;\ n \in \mathbb{Z}$$

01.06.21.0441.01

$$\int z e^{b z^2} \sin\left(c z^2 + g\right) dz = \frac{e^{b z^2} \left(b \sin\left(c z^2 + g\right) - c \cos\left(c z^2 + g\right)\right)}{2 \left(b^2 + c^2\right)}$$

01.06.21.0442.01

$$\int z^2 e^{b z^2} \sin(c z^2 + g)\, dz = \frac{1}{4} z^3 \left(\left(\frac{\frac{1}{2}\sqrt{\pi}\left(\operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right)-1\right) - e^{(b+i c) z^2}\sqrt{-(b+i c) z^2}}{\left(-(b+i c) z^2\right)^{3/2}} + \frac{\frac{1}{2}\sqrt{\pi}\left(\operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right)-1\right) - e^{(b-i c) z^2}\sqrt{-(b-i c) z^2}}{\left(-(b-i c) z^2\right)^{3/2}} \right) \sin(g) - i\cos(g) \left(\frac{\frac{1}{2}\sqrt{\pi}\left(\operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right)-1\right) - e^{(b+i c) z^2}\sqrt{-(b+i c) z^2}}{\left(-(b+i c) z^2\right)^{3/2}} + \frac{e^{(b-i c) z^2}\sqrt{-(b-i c) z^2} - \frac{1}{2}\sqrt{\pi}\left(\operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right)-1\right)}{\left(-(b-i c) z^2\right)^{3/2}} \right) \right)$$

01.06.21.0443.01

$$\int z^3 e^{b z^2} \sin(c z^2 + g)\, dz = \frac{e^{b z^2}\left(\left(z^2 b^3 - b^2 + c^2 z^2 b + c^2\right)\sin(c z^2 + g) - c\left(b^2 z^2 + c^2 z^2 - 2 b\right)\cos(c z^2 + g)\right)}{2\left(b^2 + c^2\right)^2}$$

01.06.21.0444.01

$$\int z^4 e^{b z^2} \sin(c z^2 + g)\, dz = \frac{1}{16} z^5 \left(\left(\frac{1}{\left(-(b+i c) z^2\right)^{5/2}} \left(2 e^{(b+i c) z^2}\sqrt{-(b+i c) z^2}\left(2 b z^2 + 2 c i z^2 - 3\right) + 3\sqrt{\pi}\operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right) - 3\sqrt{\pi}\right) + \frac{1}{\left(-(b-i c) z^2\right)^{5/2}} \left(2 e^{(b-i c) z^2}\sqrt{-(b-i c) z^2}\left(2 b z^2 - 2 i c z^2 - 3\right) + 3\sqrt{\pi}\operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right) - 3\sqrt{\pi}\right) \right) \sin(g) - i\cos(g) \left(\frac{1}{\left(-(b+i c) z^2\right)^{5/2}} \left(2 e^{(b+i c) z^2}\sqrt{-(b+i c) z^2}\left(2 b z^2 + 2 c i z^2 - 3\right) + 3\sqrt{\pi}\operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right) - 3\sqrt{\pi}\right) + \frac{1}{\left(-(b-i c) z^2\right)^{5/2}} \left(-2 e^{(b-i c) z^2}\sqrt{-(b-i c) z^2}\left(2 b z^2 - 2 i c z^2 - 3\right) - 3\sqrt{\pi}\operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right) + 3\sqrt{\pi}\right) \right) \right)$$

01.06.21.0445.01

$$\int z^5 e^{b z^2} \sin(c z^2 + g)\, dz = \frac{1}{2\left(b^2 + c^2\right)^3} \left(e^{b z^2} \left(\left(z^4 b^5 - 2 z^2 b^4 + 2\left(c^2 z^4 + 1\right) b^3 + c^2\left(c^2 z^4 - 6\right) b + 2 c^4 z^2\right) \sin(c z^2 + g) - c\left(b^4 z^4 - 4 b^3 z^2 - 4 b c^2 z^2 + c^2\left(c^2 z^4 - 2\right) + 2 b^2\left(c^2 z^4 + 3\right)\right)\cos(c z^2 + g) \right) \right)$$

01.06.21.0446.01

$$\int \frac{e^{b z^2}\sin(c z^2 + g)}{z}\, dz = \frac{1}{4} i e^{-i g}\left(\operatorname{Ei}\left((b - i c) z^2\right) - e^{2 i g}\operatorname{Ei}\left((b + i c) z^2\right)\right)$$

01.06.21.0447.01

$$\int \frac{e^{b z^2} \sin(c z^2 + g)}{z^2} \, dz = \frac{1}{2 z} \left(i \sqrt{\pi} \, e^{-i g} \left(\sqrt{-(b - i c) z^2} \operatorname{erfc}\left(\sqrt{-(b - i c) z^2} \right) - e^{2 i g} \sqrt{-(b + i c) z^2} \operatorname{erfc}\left(\sqrt{-(b + i c) z^2} \right) \right) - 2 e^{b z^2} \sin(c z^2 + g) \right)$$

01.06.21.0448.01

$$\int \frac{e^{b z^2} \sin(c z^2 + g)}{z^3} \, dz = \frac{1}{4} \left((c - i b) e^{i g} \operatorname{Ei}\left((b + i c) z^2\right) + (c + i b) e^{-i g} \operatorname{Ei}\left((b - i c) z^2\right) - \frac{2 e^{b z^2} \sin(c z^2 + g)}{z^2} \right)$$

01.06.21.0449.01

$$\int \frac{e^{b z^2} \sin(c z^2 + g)}{z^4} \, dz = -\frac{1}{6 z^3} \Big(-2 i \sqrt{\pi} \cos(g) \left((b - i c)^{3/2} \operatorname{erfi}\left(\sqrt{b - i c} \; z \right) - (b + i c)^{3/2} \operatorname{erfi}\left(\sqrt{b + i c} \; z \right) \right) z^3 - 2 \sqrt{\pi} \left(\operatorname{erfi}\left(\sqrt{b + i c} \; z \right) (b + i c)^{3/2} + (b - i c)^{3/2} \operatorname{erfi}\left(\sqrt{b - i c} \; z \right) \right) \sin(g) z^3 + \left(-2 i \sqrt{\pi} \left(-(b + i c) z^2 \right)^{3/2} + 2 i \sqrt{\pi} \left(-(b - i c) z^2 \right)^{3/2} + e^{(b + i c) z^2} \left(2 (c - i b) z^2 - i \right) + e^{(b - i c) z^2} \left(2 (c + i b) z^2 + i \right) \right) \cos(g) + \left(2 \sqrt{\pi} \left(-(b + i c) z^2 \right)^{3/2} + 2 \sqrt{\pi} \left(-(b - i c) z^2 \right)^{3/2} + e^{(b + i c) z^2} \left(2 (b + i c) z^2 + 1 \right) + e^{(b - i c) z^2} \left(2 (b - i c) z^2 + 1 \right) \right) \sin(g) \Big)$$

01.06.21.0450.01

$$\int \frac{e^{b z^2} \sin(c z^2 + g)}{z^5} \, dz = \frac{1}{8 z^4} \Big((b + i c)^2 \operatorname{Ei}\left((b + i c) z^2\right) (\sin(g) - i \cos(g)) z^4 + (b - i c)^2 \operatorname{Ei}\left((b - i c) z^2\right) (i \cos(g) + \sin(g)) z^4 + e^{(b - i c) z^2} i \left(\left(-b z^2 + c i z^2 + e^{2 i c z^2} \left(b z^2 + c i z^2 + 1 \right) - 1 \right) \cos(g) - \left(e^{2 i c z^2} \left(-i b z^2 + c z^2 - i \right) - i \left(b z^2 - i c z^2 + 1 \right) \right) \sin(g) \right) \Big)$$

01.06.21.0451.01

$$\int z^n e^{b \sqrt{z}} \sin\left(\sqrt{z} \, c + g\right) dz = i e^{i g} (-b - i c)^{-2 (n+1)} \left(-\frac{\operatorname{Ei}\left(-(-b - i c) \sqrt{z}\right)}{(-2 (n + 1))!} + e^{-(-b - i c) \sqrt{z}} \sum_{k=0}^{2 n+1} \frac{\left((-b - i c) \sqrt{z}\right)^k}{(2 (n + 1))_{k-2 n-1}} - e^{-(-b - i c) \sqrt{z}} \sum_{k=2 (n+1)}^{-1} \frac{\left((-b - i c) \sqrt{z}\right)^k}{(2 (n + 1))_{k-2 n-1}} \right) - i e^{-i g} (i c - b)^{-2 (n+1)} \left(-\frac{\operatorname{Ei}\left(-(i c - b) \sqrt{z}\right)}{(-2 (n + 1))!} + e^{-(i c - b) \sqrt{z}} \sum_{k=0}^{2 n+1} \frac{\left((i c - b) \sqrt{z}\right)^k}{(2 (n + 1))_{k-2 n-1}} - e^{-(i c - b) \sqrt{z}} \sum_{k=2 (n+1)}^{-1} \frac{\left((i c - b) \sqrt{z}\right)^k}{(2 (n + 1))_{k-2 n-1}} \right) /; n \in \mathbb{Z}$$

01.06.21.0452.01

$$\int z \, e^{b \sqrt{z}} \sin\left(\sqrt{z} \, c + g\right) dz = \frac{1}{\left(b^2 + c^2\right)^4} 2 e^{b \sqrt{z}} \Big(\left(b \left(b^2 + c^2\right)^3 z^{3/2} - 3 (b - c) (b + c) \left(b^2 + c^2\right)^2 z + 6 b \left(b^2 + c^2\right) \left(b^2 - 3 c^2\right) \sqrt{z} - 6 \left(b^4 - 6 c^2 b^2 + c^4\right) \right) \sin\left(\sqrt{z} \, c + g\right) - c \left(\left(b^2 + c^2\right)^3 z^{3/2} - 6 b \left(b^2 + c^2\right)^2 z + 6 \left(3 b^2 - c^2\right) \left(b^2 + c^2\right) \sqrt{z} - 24 b (b - c) (b + c) \right) \cos\left(\sqrt{z} \, c + g\right) \Big)$$

01.06.21.0453.01

$$\int z^2 e^{b\sqrt{z}} \sin\left(\sqrt{z}\, c+g\right) dz = \frac{1}{\left(b^2+c^2\right)^6} 2 e^{b\sqrt{z}} \left(\left(20\, b \left(b^2+c^2\right)^3 \left(b^2-3 c^2\right) z^{3/2} + b \left(b^2+c^2\right)^5 z^{5/2} - 5 (b-c)(b+c) \left(b^2+c^2\right)^4 z^2 - 60 \left(b^2+c^2\right)^2 \left(b^4-6 c^2 b^2+c^4\right) z + 120\, b \left(b^2+c^2\right) \left(b^4-10 c^2 b^2+5 c^4\right) \sqrt{z} - 120 \left(b^6-15 c^2 b^4+15 c^4 b^2-c^6\right)\right) \sin\left(\sqrt{z}\, c+g\right) - c \left(20 \left(3 b^2-c^2\right) \left(b^2+c^2\right)^3 z^{3/2} + \left(b^2+c^2\right)^5 z^{5/2} - 10\, b \left(b^2+c^2\right)^4 z^2 - 240\, b (b-c)(b+c) \left(b^2+c^2\right)^2 z + 120 \left(b^2+c^2\right) \left(5 b^4-10 c^2 b^2+c^4\right) \sqrt{z} - 240\, b \left(3 b^4-10 c^2 b^2+3 c^4\right)\right) \cos\left(\sqrt{z}\, c+g\right)\right)$$

01.06.21.0454.01

$$\int z^3 e^{b\sqrt{z}} \sin\left(\sqrt{z}\, c+g\right) dz = \frac{1}{\left(b^2+c^2\right)^8} 2 e^{b\sqrt{z}} \left(\left(840\, b \left(b^2+c^2\right)^3 \left(b^4-10 c^2 b^2+5 c^4\right) z^{3/2} + 42\, b \left(b^2+c^2\right)^5 \left(b^2-3 c^2\right) z^{5/2} + b \left(b^2+c^2\right)^7 z^{7/2} - 7 (b-c)(b+c) \left(b^2+c^2\right)^6 z^3 - 210 \left(b^2+c^2\right)^4 \left(b^4-6 c^2 b^2+c^4\right) z^2 - 2520 \left(b^2+c^2\right)^2 \left(b^6-15 c^2 b^4+15 c^4 b^2-c^6\right) z + 5040\, b \left(b^2+c^2\right) \left(b^6-21 c^2 b^4+35 c^4 b^2-7 c^6\right) \sqrt{z} - 5040 \left(b^8-28 c^2 b^6+70 c^4 b^4-28 c^6 b^2+c^8\right)\right) \sin\left(\sqrt{z}\, c+g\right) - c \left(840 \left(b^2+c^2\right)^3 \left(5 b^4-10 c^2 b^2+c^4\right) z^{3/2} + 42 \left(3 b^2-c^2\right) \left(b^2+c^2\right)^5 z^{5/2} + \left(b^2+c^2\right)^7 z^{7/2} - 14\, b \left(b^2+c^2\right)^6 z^3 - 840\, b (b-c)(b+c) \left(b^2+c^2\right)^4 z^2 - 5040\, b \left(b^2+c^2\right)^2 \left(3 b^4-10 c^2 b^2+3 c^4\right) z + 5040 \left(b^2+c^2\right) \left(7 b^6-35 c^2 b^4+21 c^4 b^2-c^6\right) \sqrt{z} - 40\,320\, b \left(b^6-7 c^2 b^4+7 c^4 b^2-c^6\right)\right) \cos\left(\sqrt{z}\, c+g\right)\right)$$

01.06.21.0455.01

$$\int z^4 e^{b\sqrt{z}} \sin\left(\sqrt{z}\, c+g\right) dz = \frac{1}{\left(b^2+c^2\right)^{10}} 2 e^{b\sqrt{z}} \left(\left(60\,480\, b \left(b^2+c^2\right)^3 \left(b^6-21 c^2 b^4+35 c^4 b^2-7 c^6\right) z^{3/2} + 3024\, b \left(b^2+c^2\right)^5 \left(b^4-10 c^2 b^2+5 c^4\right) z^{5/2} + 72\, b \left(b^2+c^2\right)^7 \left(b^2-3 c^2\right) z^{7/2} + b \left(b^2+c^2\right)^9 z^{9/2} - 9 (b-c)(b+c) \left(b^2+c^2\right)^8 z^4 - 504 \left(b^2+c^2\right)^6 \left(b^4-6 c^2 b^2+c^4\right) z^3 - 15\,120 \left(b^2+c^2\right)^4 \left(b^6-15 c^2 b^4+15 c^4 b^2-c^6\right) z^2 - 181\,440 \left(b^2+c^2\right)^2 \left(b^8-28 c^2 b^6+70 c^4 b^4-28 c^6 b^2+c^8\right) z + 362\,880\, b \left(b^2+c^2\right) \left(b^2-3 c^2\right) \left(b^6-33 c^2 b^4+27 c^4 b^2-3 c^6\right) \sqrt{z} - 362\,880 \left(b^{10}-45 c^2 b^8+210 c^4 b^6-210 c^6 b^4+45 c^8 b^2-c^{10}\right)\right) \sin\left(\sqrt{z}\, c+g\right) - c \left(60\,480 \left(b^2+c^2\right)^3 \left(7 b^6-35 c^2 b^4+21 c^4 b^2-c^6\right) z^{3/2} + 3024 \left(b^2+c^2\right)^5 \left(5 b^4-10 c^2 b^2+c^4\right) z^{5/2} + 72 \left(3 b^2-c^2\right) \left(b^2+c^2\right)^7 z^{7/2} + \left(b^2+c^2\right)^9 z^{9/2} - 18\, b \left(b^2+c^2\right)^8 z^4 - 2016\, b (b-c)(b+c) \left(b^2+c^2\right)^6 z^3 - 30\,240\, b \left(b^2+c^2\right)^4 \left(3 b^4-10 c^2 b^2+3 c^4\right) z^2 - 1\,451\,520\, b \left(b^2+c^2\right)^2 \left(b^6-7 c^2 b^4+7 c^4 b^2-c^6\right) z + 362\,880 \left(9 b^{10}-75 c^2 b^8+42 c^4 b^6+90 c^6 b^4-35 c^8 b^2+c^{10}\right) \sqrt{z} - 725\,760\, b \left(5 b^4-10 c^2 b^2+c^4\right) \left(b^4-10 c^2 b^2+5 c^4\right)\right) \cos\left(\sqrt{z}\, c+g\right)\right)$$

01.06.21.0456.01

$$\int z^5 e^{b\sqrt{z}} \sin\left(\sqrt{z}\, c+g\right) dz = \frac{1}{\left(b^2+c^2\right)^{12}}$$
$$\Big(2 e^{b\sqrt{z}} \Big(\big(330 b^{15} \left(z^4 c^8-8 z^3 c^6-1056 z^2 c^4-16128 z c^2+20160\right) z^{3/2}+165 b^{17} \left(z^3 c^6+6 z^2 c^4-144 z c^2+2016\right) z^{5/2}+$$
$$55 b^{19} \left(z^2 c^4+12 z c^2+144\right) z^{7/2}+11 b^{21} \left(z c^2+10\right) z^{9/2}+b^{23} z^{11/2}-11 b^{22} z^5-99 b^{20} \left(z c^2+10\right) z^4-$$
$$55 b^{18} \left(7 z^2 c^4+36 z c^2+1008\right) z^3-165 b^{16} \left(5 z^3 c^6-114 z^2 c^4-3024 z c^2+10080\right) z^2-$$
$$990 b^{14} \left(z^4 c^8-104 z^3 c^6-3360 z^2 c^4-40320 z c^2+20160\right) z+$$
$$462 b^{13} \left(z^5 c^{10}-30 z^4 c^8-2400 z^3 c^6-43200 z^2 c^4-475200 z c^2+86400\right) \sqrt{z}+$$
$$462 b^{11} c^2 \left(z^5 c^{10}-60 z^4 c^8-3600 z^3 c^6-23040 z^2 c^4+302400 z c^2-4665600\right) \sqrt{z}+$$
$$330 b^9 c^4 \left(z^5 c^{10}-98 z^4 c^8-3696 z^3 c^6+110880 z^2 c^4+3769920 z c^2+33264000\right) \sqrt{z}+$$
$$165 b^7 c^6 \left(z^5 c^{10}-144 z^4 c^8-1344 z^3 c^6+354816 z^2 c^4+3991680 z c^2-31933440\right) \sqrt{z}+$$
$$55 b^5 c^8 \left(z^5 c^{10}-198 z^4 c^8+5184 z^3 c^6+508032 z^2 c^4-11975040 z c^2-215550720\right) \sqrt{z}+$$
$$11 b^3 c^{10} \left(z^5 c^{10}-260 z^4 c^8+18000 z^3 c^6-34473600 z c^2+558835200\right) \sqrt{z}+$$
$$b c^{12} \left(z^5 c^{10}-330 z^4 c^8+39600 z^3 c^6-2328480 z^2 c^4+59875200 z c^2-439084800\right) \sqrt{z}+$$
$$990 b^8 c^4 \left(z^5 c^{10}+238 z^4 c^8-3696 z^3 c^6-332640 z^2 c^4-3326400 z c^2-19958400\right)+$$
$$462 b^{10} c^2 \left(z^5 c^{10}+660 z^4 c^8+7920 z^3 c^6-316800 z^2 c^4-5227200 z c^2+5702400\right)+$$
$$99 b^2 c^{10} \left(z^5 c^{10}-20 z^4 c^8-5040 z^3 c^6+403200 z^2 c^4-8668800 z c^2+26611200\right)+$$
$$11 c^{12} \left(z^5 c^{10}-90 z^4 c^8+5040 z^3 c^6-151200 z^2 c^4+1814400 z c^2-3628800\right)-$$
$$462 b^{12} \left(z^5 c^{10}-510 z^4 c^8-13920 z^3 c^6-129600 z^2 c^4-1857600 z c^2+86400\right)+$$
$$165 b^6 c^6 \left(5 z^5 c^{10}+624 z^4 c^8-38976 z^3 c^6-887040 z^2 c^4+19958400 z c^2+223534080\right)+$$
$$55 b^4 c^8 \left(7 z^5 c^{10}+342 z^4 c^8-60480 z^3 c^6+1088640 z^2 c^4+43908480 z c^2-359251200\right)\big) \sin\left(\sqrt{z}\, c+g\right)-$$
$$c \big(330 b^{14} \left(z^4 c^8+72 z^3 c^6+864 z^2 c^4+181440\right) z^{3/2}+165 b^{16} \left(z^3 c^6+66 z^2 c^4+1200 z c^2+14112\right) z^{5/2}+$$
$$55 b^{18} \left(z^2 c^4+52 z c^2+720\right) z^{7/2}+11 b^{20} \left(z c^2+30\right) z^{9/2}+b^{22} z^{11/2}-22 b^{21} z^5-220 b^{19} \left(z c^2+18\right) z^4-$$
$$990 b^{17} \left(z^2 c^4+28 z c^2+336\right) z^3-2640 b^{15} \left(z^3 c^6+30 z^2 c^4+336 z c^2+5040\right) z^2-$$
$$4620 b^{13} \left(z^4 c^8+24 z^3 c^6-288 z^2 c^4-8640 z c^2+43200\right) z+$$
$$165 b^6 c^6 \left(z^5 c^{10}+16 z^4 c^8-6720 z^3 c^6+64512 z^2 c^4+7539840 z c^2+31933440\right) \sqrt{z}+$$
$$330 b^8 c^4 \left(z^5 c^{10}+42 z^4 c^8-5040 z^3 c^6-110880 z^2 c^4+1995840 z c^2+35925120\right) \sqrt{z}+$$
$$462 b^{10} c^2 \left(z^5 c^{10}+60 z^4 c^8-2640 z^3 c^6-126720 z^2 c^4-1425600 z c^2-13305600\right) \sqrt{z}+$$
$$462 b^{12} \left(z^5 c^{10}+70 z^4 c^8-480 z^3 c^6-60480 z^2 c^4-820800 z c^2+950400\right) \sqrt{z}+$$
$$55 b^4 c^8 \left(z^5 c^{10}-18 z^4 c^8-6336 z^3 c^6+362880 z^2 c^4+2540160 z c^2-199584000\right) \sqrt{z}+$$
$$11 b^2 c^{10} \left(z^5 c^{10}-60 z^4 c^8-2160 z^3 c^6+483840 z^2 c^4-19958400 z c^2+195955200\right) \sqrt{z}+$$
$$c^{12} \left(z^5 c^{10}-110 z^4 c^8+7920 z^3 c^6-332640 z^2 c^4+6652800 z c^2-39916800\right) \sqrt{z}-$$
$$5544 b^{11} \left(z^5 c^{10}+10 z^4 c^8-1440 z^3 c^6-36000 z^2 c^4-360000 z c^2+86400\right)-$$
$$4620 b^9 c^2 \left(z^5 c^{10}-12 z^4 c^8-2640 z^3 c^6-31680 z^2 c^4+95040 z c^2-1900800\right)-$$
$$2640 b^7 c^4 \left(z^5 c^{10}-42 z^4 c^8-3024 z^3 c^6+55440 z^2 c^4+1995840 z c^2+11975040\right)-$$
$$990 b^5 c^6 \left(z^5 c^{10}-80 z^4 c^8-1344 z^3 c^6+201600 z^2 c^4+443520 z c^2-31933440\right)-$$
$$220 b^3 c^8 \left(z^5 c^{10}-126 z^4 c^8+4032 z^3 c^6+181440 z^2 c^4-9072000 z c^2+39916800\right)-$$
$$22 b c^{10} \left(z^5 c^{10}-180 z^4 c^8+15120 z^3 c^6-604800 z^2 c^4+9072000 z c^2-21772800\right)\big) \cos\left(\sqrt{z}\, c+g\right)\Big)\Big)$$

01.06.21.0457.01

$$\int \frac{e^{b\sqrt{z}}\sin\left(\sqrt{z}\,c+g\right)}{z}\,dz = i\,e^{-i g}\left(\text{Ei}\left((b-i c)\sqrt{z}\right)-e^{2 i g}\,\text{Ei}\left((b+i c)\sqrt{z}\right)\right)$$

01.06.21.0458.01

$$\int \frac{e^{b\sqrt{z}}\sin\left(\sqrt{z}\,c+g\right)}{z^2}\,dz = \frac{1}{2z}\,i\,e^{-i g}\left(-e^{2 i g}\,z\,\text{Ei}\left((b+i c)\sqrt{z}\right)(b+i c)^2+\right.$$
$$\left.e^{(b-i c)\sqrt{z}}\left(-\sqrt{z}\,b+e^{2 i\left(\sqrt{z}\,c+g\right)}\left(\sqrt{z}\,b+i c\sqrt{z}+1\right)+i c\sqrt{z}-1\right)+(b-i c)^2\,z\,\text{Ei}\left((b-i c)\sqrt{z}\right)\right)$$

01.06.21.0459.01

$$\int \frac{e^{b\sqrt{z}}\sin\left(\sqrt{z}\,c+g\right)}{z^3}\,dz = \frac{1}{24}\,i\,e^{-i g}\left(-e^{2 i g}\,\text{Ei}\left((b+i c)\sqrt{z}\right)(b+i c)^4+\right.$$
$$\frac{1}{z^2}\left(e^{(b-i c)\sqrt{z}}\left(-b^3 z^{3/2}-i c^3 z^{3/2}+c^2 z+2 i c\sqrt{z}+b\left(3 z c^2+2 i\sqrt{z}\,c-2\right)\sqrt{z}+b^2\left(3 i c z^{3/2}-z\right)-6\right)\right)+$$
$$\frac{1}{z^2}\left(e^{\sqrt{z}\,(b+i c)+2 i g}\left(b^3 z^{3/2}-i c^3 z^{3/2}-c^2 z+2 i c\sqrt{z}+b^2\left(3 c i z^{3/2}+z\right)+b\left(-3 c^2 z^{3/2}+2 i c z+2\sqrt{z}\right)+6\right)\right)+$$
$$\left.(b-i c)^4\,\text{Ei}\left((b-i c)\sqrt{z}\right)\right)$$

01.06.21.0460.01

$$\int \frac{e^{b\sqrt{z}}\sin\left(\sqrt{z}\,c+g\right)}{z^4}\,dz = \frac{1}{720}\,i\,e^{-i g}\left(-e^{2 i g}\,\text{Ei}\left((b+i c)\sqrt{z}\right)(b+i c)^6-\right.$$
$$\frac{1}{z^3}\left(e^{\sqrt{z}\,(b+i c)+2 i g}\left(-2(b+i c)^3 z^{3/2}-(b+i c)^5 z^{5/2}-(b+i c)^4 z^2-6(b+i c)^2 z-24(b+i c)\sqrt{z}-120\right)\right)+$$
$$\frac{1}{z^3}\left(e^{(b-i c)\sqrt{z}}\left(-2(b-i c)^3 z^{3/2}-(b-i c)^5 z^{5/2}-(b-i c)^4 z^2-6(b-i c)^2 z-24(b-i c)\sqrt{z}-120\right)\right)+$$
$$\left.(b-i c)^6\,\text{Ei}\left((b-i c)\sqrt{z}\right)\right)$$

01.06.21.0461.01

$$\int \frac{e^{b\sqrt{z}}\sin\left(\sqrt{z}\,c+g\right)}{z^5}\,dz =$$
$$\frac{1}{40\,320}\left(i\,e^{-i g}\left(-e^{2 i g}\,\text{Ei}\left((b+i c)\sqrt{z}\right)(b+i c)^8-\frac{1}{z^4}\left(e^{\sqrt{z}\,(b+i c)+2 i g}\left(-24(b+i c)^3 z^{3/2}-2(b+i c)^5 z^{5/2}-\right.\right.\right.\right.$$
$$\left.\left.(b+i c)^7 z^{7/2}-(b+i c)^6 z^3-6(b+i c)^4 z^2-120(b+i c)^2 z-720(b+i c)\sqrt{z}-5040\right)\right)+$$
$$\frac{1}{z^4}\left(e^{(b-i c)\sqrt{z}}\left(-24(b-i c)^3 z^{3/2}-2(b-i c)^5 z^{5/2}-(b-i c)^7 z^{7/2}-(b-i c)^6 z^3-6(b-i c)^4 z^2-\right.\right.$$
$$\left.\left.\left.\left.120(b-i c)^2 z-720(b-i c)\sqrt{z}-5040\right)\right)+(b-i c)^8\,\text{Ei}\left((b-i c)\sqrt{z}\right)\right)\right)$$

Involving $z^{\alpha-1}\,e^{b z^r+e}\sin\left(c z^r+g\right)$

01.06.21.0462.01

$$\int z^{\alpha-1} e^{b z^r+e} \sin(c z^r+g)\, dz = -\frac{i z^\alpha}{2 r}\left(e^{e-i g}\left((i c-b) z^r\right)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (i c-b) z^r\right)-e^{e+i g}\left(-(b+i c) z^r\right)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r},-(b+i c) z^r\right)\right)$$

01.06.21.0463.01

$$\int \frac{e^{b z^r+e} \sin(c z^r+g)}{z}\, dz = e^e\, \frac{\operatorname{Ei}((b+i c) z^r)(\sin(g)-i \cos(g))+\operatorname{Ei}((b-i c) z^r)(i \cos(g)+\sin(g))}{2 r}$$

01.06.21.0464.01

$$\int z^{2 n} e^{b z^2+e} \sin(c z^2+g)\, dz = \frac{1}{4} i z e^e\left(e^{i g}\left((-b-i c) z^2\right)^{-\frac{1}{2}}(-b-i c)^{-n}\left(\operatorname{erfc}\left(\sqrt{(-b-i c) z^2}\right) \Gamma\left(n+\frac{1}{2}\right)+e^{-(-b-i c) z^2} \sum_{k=0}^{n-1} \frac{\left((-b-i c) z^2\right)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}-e^{-(-b-i c) z^2} \sum_{k=n}^{-1} \frac{\left((-b-i c) z^2\right)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}\right)-e^{-i g}\left((i c-b) z^2\right)^{-\frac{1}{2}}(i c-b)^{-n}\left(\operatorname{erfc}\left(\sqrt{(i c-b) z^2}\right) \Gamma\left(n+\frac{1}{2}\right)+e^{-(i c-b) z^2} \sum_{k=0}^{n-1} \frac{\left((i c-b) z^2\right)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}-e^{-(i c-b) z^2} \sum_{k=n}^{-1} \frac{\left((i c-b) z^2\right)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0465.01

$$\int z^{2 n-1} e^{b z^2+e} \sin(c z^2+g)\, dz = \frac{1}{4} i e^e\left(e^{i g}(-b-i c)^{-n}\left(\frac{(-1)^{n-1} \operatorname{Ei}\left(-(-b-i c) z^2\right)}{(-n)!}+e^{-(-b-i c) z^2} \sum_{k=0}^{n-1} \frac{\left((-b-i c) z^2\right)^k}{(n)_{k-n+1}}-e^{-(-b-i c) z^2} \sum_{k=n}^{-1} \frac{\left((-b-i c) z^2\right)^k}{(n)_{k-n+1}}\right)-e^{-i g}(i c-b)^{-n}\left(\frac{(-1)^{n-1} \operatorname{Ei}\left(-(i c-b) z^2\right)}{(-n)!}+e^{-(i c-b) z^2} \sum_{k=0}^{n-1} \frac{\left((i c-b) z^2\right)^k}{(n)_{k-n+1}}-e^{-(i c-b) z^2} \sum_{k=n}^{-1} \frac{\left((i c-b) z^2\right)^k}{(n)_{k-n+1}}\right)\right) /; n \in \mathbb{Z}$$

01.06.21.0466.01

$$\int z e^{b z^2+e} \sin(c z^2+g)\, dz = \frac{e^{b z^2+e}\left(b \sin\left(c z^2+g\right)-c \cos\left(c z^2+g\right)\right)}{2\left(b^2+c^2\right)}$$

01.06.21.0467.01

$$\int z^2 e^{b z^2+e} \sin(c z^2+g)\, dz = \frac{1}{4} z^3 e^e \left(\left(\frac{\frac{1}{2}\sqrt{\pi}\left(\operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right)-1\right)-e^{(b+i c) z^2}\sqrt{-(b+i c) z^2}}{\left(-(b+i c) z^2\right)^{3/2}}+\frac{\frac{1}{2}\sqrt{\pi}\left(\operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right)-1\right)-e^{(b-i c) z^2}\sqrt{-(b-i c) z^2}}{\left(-(b-i c) z^2\right)^{3/2}}\right)\sin(g)-i\cos(g)\left(\frac{\frac{1}{2}\sqrt{\pi}\left(\operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right)-1\right)-e^{(b+i c) z^2}\sqrt{-(b+i c) z^2}}{\left(-(b+i c) z^2\right)^{3/2}}+\frac{e^{(b-i c) z^2}\sqrt{-(b-i c) z^2}-\frac{1}{2}\sqrt{\pi}\left(\operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right)-1\right)}{\left(-(b-i c) z^2\right)^{3/2}}\right)\right)$$

01.06.21.0468.01

$$\int z^3 e^{b z^2+e} \sin(c z^2+g)\, dz = \frac{1}{2\left(b^2+c^2\right)^2} e^{b z^2+e}\left(\left(z^2 b^3-b^2+c^2 z^2 b+c^2\right)\sin(c z^2+g)-c\left(b^2 z^2+c^2 z^2-2 b\right)\cos(c z^2+g)\right)$$

01.06.21.0469.01

$$\int z^4 e^{b z^2+e} \sin(c z^2+g)\, dz = \frac{1}{16} z^5 e^e \left(\left(\frac{1}{\left(-(b+i c) z^2\right)^{5/2}}\left(2 e^{(b+i c) z^2}\sqrt{-(b+i c) z^2}\left(2 b z^2+2 c i z^2-3\right)+3\sqrt{\pi}\operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right)-3\sqrt{\pi}\right)+\frac{1}{\left(-(b-i c) z^2\right)^{5/2}}\left(2 e^{(b-i c) z^2}\sqrt{-(b-i c) z^2}\left(2 b z^2-2 i c z^2-3\right)+3\sqrt{\pi}\operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right)-3\sqrt{\pi}\right)\right)\sin(g)-i\cos(g)\left(\frac{1}{\left(-(b+i c) z^2\right)^{5/2}}\left(2 e^{(b+i c) z^2}\sqrt{-(b+i c) z^2}\left(2 b z^2+2 c i z^2-3\right)+3\sqrt{\pi}\operatorname{erf}\left(\sqrt{-(b+i c) z^2}\right)-3\sqrt{\pi}\right)+\frac{1}{\left(-(b-i c) z^2\right)^{5/2}}\left(-2 e^{(b-i c) z^2}\sqrt{-(b-i c) z^2}\left(2 b z^2-2 i c z^2-3\right)-3\sqrt{\pi}\operatorname{erf}\left(\sqrt{-(b-i c) z^2}\right)+3\sqrt{\pi}\right)\right)\right)$$

01.06.21.0470.01

$$\int z^5 e^{b z^2+e} \sin(c z^2+g)\, dz = \frac{1}{2\left(b^2+c^2\right)^3} e^{b z^2+e}\left(\left(z^4 b^5-2 z^2 b^4+2\left(c^2 z^4+1\right) b^3+c^2\left(c^2 z^4-6\right) b+2 c^4 z^2\right)\sin(c z^2+g)-c\left(b^4 z^4-4 b^3 z^2-4 b c^2 z^2+c^2\left(c^2 z^4-2\right)+2 b^2\left(c^2 z^4+3\right)\right)\cos(c z^2+g)\right)$$

01.06.21.0471.01

$$\int \frac{e^{b z^2+e}\sin(c z^2+g)}{z}\, dz = \frac{1}{4} i e^{e-i g}\left(\operatorname{Ei}\left((b-i c) z^2\right)-e^{2 i g}\operatorname{Ei}\left((b+i c) z^2\right)\right)$$

01.06.21.0472.01

$$\int \frac{e^{b z^2+e} \sin\left(c z^2+g\right)}{z^2} \, dz = \frac{1}{2 z} e^e \left(i \sqrt{\pi}\, e^{-i g} \left(\sqrt{-(b-i c) z^2}\, \operatorname{erfc}\left(\sqrt{-(b-i c) z^2}\right) - e^{2 i g} \sqrt{-(b+i c) z^2}\, \operatorname{erfc}\left(\sqrt{-(b+i c) z^2}\right)\right) - 2 e^{b z^2} \sin\left(c z^2+g\right)\right)$$

01.06.21.0473.01

$$\int \frac{e^{b z^2+e} \sin\left(c z^2+g\right)}{z^3} \, dz = \frac{1}{4} e^e \left((c-i b) e^{i g} \operatorname{Ei}\left((b+i c) z^2\right) + (c+i b) e^{-i g} \operatorname{Ei}\left((b-i c) z^2\right) - \frac{2 e^{b z^2} \sin\left(c z^2+g\right)}{z^2}\right)$$

01.06.21.0474.01

$$\int \frac{e^{b z^2+e} \sin\left(c z^2+g\right)}{z^4} \, dz = -\frac{1}{6 z^3} e^e \Big(-2 i \sqrt{\pi} \cos(g) \left((b-i c)^{3/2} \operatorname{erfi}\left(\sqrt{b-i c}\, z\right) - (b+i c)^{3/2} \operatorname{erfi}\left(\sqrt{b+i c}\, z\right)\right) z^3 - 2 \sqrt{\pi} \left(\operatorname{erfi}\left(\sqrt{b+i c}\, z\right) (b+i c)^{3/2} + (b-i c)^{3/2} \operatorname{erfi}\left(\sqrt{b-i c}\, z\right)\right) \sin(g) z^3 + \left(-2 i \sqrt{\pi} \left(-(b+i c) z^2\right)^{3/2} + 2 i \sqrt{\pi} \left(-(b-i c) z^2\right)^{3/2} + e^{(b+i c) z^2} \left(2 (c-i b) z^2 - i\right) + e^{(b-i c) z^2} \left(2 (c+i b) z^2 + i\right)\right) \cos(g) + \left(2 \sqrt{\pi} \left(-(b+i c) z^2\right)^{3/2} + 2 \sqrt{\pi} \left(-(b-i c) z^2\right)^{3/2} + e^{(b+i c) z^2} \left(2 (b+i c) z^2 + 1\right) + e^{(b-i c) z^2} \left(2 (b-i c) z^2 + 1\right)\right) \sin(g)\Big)$$

01.06.21.0475.01

$$\int \frac{e^{b z^2+e} \sin\left(c z^2+g\right)}{z^5} \, dz = \frac{1}{8 z^4} e^e \Big((b+i c)^2 \operatorname{Ei}\left((b+i c) z^2\right) (\sin(g) - i \cos(g)) z^4 + (b-i c)^2 \operatorname{Ei}\left((b-i c) z^2\right) (i \cos(g) + \sin(g)) z^4 + e^{(b-i c) z^2} i \left(\left(-b z^2 + c i z^2 + e^{2 i c z^2} \left(b z^2 + c i z^2 + 1\right) - 1\right) \cos(g) - \left(e^{2 i c z^2} \left(-i b z^2 + c z^2 - i\right) - i \left(b z^2 - i c z^2 + 1\right)\right) \sin(g)\right)\Big)$$

01.06.21.0476.01

$$\int z^n e^{b \sqrt{z}+e} \sin\left(\sqrt{z}\, c+g\right) dz = i e^{e+i g} (-b-i c)^{-2 (n+1)} \left(-\frac{\operatorname{Ei}\left(-(-b-i c) \sqrt{z}\right)}{(-2 (n+1))!} + e^{-(-b-i c) \sqrt{z}} \sum_{k=0}^{2 n+1} \frac{\left((-b-i c) \sqrt{z}\right)^k}{(2 (n+1))_{k-2 n-1}} - e^{-(-b-i c) \sqrt{z}} \sum_{k=2 (n+1)}^{-1} \frac{\left((-b-i c) \sqrt{z}\right)^k}{(2 (n+1))_{k-2 n-1}}\right) - i e^{e-i g} (i c-b)^{-2 (n+1)} \left(-\frac{\operatorname{Ei}\left(-(i c-b) \sqrt{z}\right)}{(-2 (n+1))!} + e^{-(i c-b) \sqrt{z}} \sum_{k=0}^{2 n+1} \frac{\left((i c-b) \sqrt{z}\right)^k}{(2 (n+1))_{k-2 n-1}} - e^{-(i c-b) \sqrt{z}} \sum_{k=2 (n+1)}^{-1} \frac{\left((i c-b) \sqrt{z}\right)^k}{(2 (n+1))_{k-2 n-1}}\right) /; n \in \mathbb{Z}$$

01.06.21.0477.01

$$\int z\, e^{b \sqrt{z}+e} \sin\left(\sqrt{z}\, c+g\right) dz = \frac{1}{\left(b^2+c^2\right)^4} 2 e^{b \sqrt{z}+e} \Big(\left(b \left(b^2+c^2\right)^3 z^{3/2} - 3 (b-c) (b+c) \left(b^2+c^2\right)^2 z + 6 b \left(b^2+c^2\right) \left(b^2-3 c^2\right) \sqrt{z} - 6 \left(b^4 - 6 c^2 b^2 + c^4\right)\right) \sin\left(\sqrt{z}\, c+g\right) - c \left(\left(b^2+c^2\right)^3 z^{3/2} - 6 b \left(b^2+c^2\right)^2 z + 6 \left(3 b^2-c^2\right) \left(b^2+c^2\right) \sqrt{z} - 24 b (b-c) (b+c)\right) \cos\left(\sqrt{z}\, c+g\right)\Big)$$

01.06.21.0478.01

$$\int z^2 e^{b\sqrt{z}+e}\sin\left(\sqrt{z}\,c+g\right)dz = \frac{1}{\left(b^2+c^2\right)^6}\,2\,e^{b\sqrt{z}+e}\left(\left(20\,b\left(b^2+c^2\right)^3\left(b^2-3\,c^2\right)z^{3/2}+b\left(b^2+c^2\right)^5 z^{5/2}-5\,(b-c)\,(b+c)\left(b^2+c^2\right)^4 z^2-60\left(b^2+c^2\right)^2\left(b^4-6\,c^2\,b^2+c^4\right)z+120\,b\left(b^2+c^2\right)\left(b^4-10\,c^2\,b^2+5\,c^4\right)\sqrt{z}-120\left(b^6-15\,c^2\,b^4+15\,c^4\,b^2-c^6\right)\right)\sin\left(\sqrt{z}\,c+g\right)-c\left(20\left(3\,b^2-c^2\right)\left(b^2+c^2\right)^3 z^{3/2}+\left(b^2+c^2\right)^5 z^{5/2}-10\,b\left(b^2+c^2\right)^4 z^2-240\,b\,(b-c)\,(b+c)\left(b^2+c^2\right)^2 z+120\left(b^2+c^2\right)\left(5\,b^4-10\,c^2\,b^2+c^4\right)\sqrt{z}-240\,b\left(3\,b^4-10\,c^2\,b^2+3\,c^4\right)\right)\cos\left(\sqrt{z}\,c+g\right)\right)$$

01.06.21.0479.01

$$\int z^3 e^{b\sqrt{z}+e}\sin\left(\sqrt{z}\,c+g\right)dz = \frac{1}{\left(b^2+c^2\right)^8}\,2\,e^{b\sqrt{z}+e}\left(\left(840\,b\left(b^2+c^2\right)^3\left(b^4-10\,c^2\,b^2+5\,c^4\right)z^{3/2}+42\,b\left(b^2+c^2\right)^5\left(b^2-3\,c^2\right)z^{5/2}+b\left(b^2+c^2\right)^7 z^{7/2}-7\,(b-c)\,(b+c)\left(b^2+c^2\right)^6 z^3-210\left(b^2+c^2\right)^4\left(b^4-6\,c^2\,b^2+c^4\right)z^2-2520\left(b^2+c^2\right)^2\left(b^6-15\,c^2\,b^4+15\,c^4\,b^2-c^6\right)z+5040\,b\left(b^2+c^2\right)\left(b^6-21\,c^2\,b^4+35\,c^4\,b^2-7\,c^6\right)\sqrt{z}-5040\left(b^8-28\,c^2\,b^6+70\,c^4\,b^4-28\,c^6\,b^2+c^8\right)\right)\sin\left(\sqrt{z}\,c+g\right)-c\left(840\left(b^2+c^2\right)^3\left(5\,b^4-10\,c^2\,b^2+c^4\right)z^{3/2}+42\left(3\,b^2-c^2\right)\left(b^2+c^2\right)^5 z^{5/2}+\left(b^2+c^2\right)^7 z^{7/2}-14\,b\left(b^2+c^2\right)^6 z^3-840\,b\,(b-c)\,(b+c)\left(b^2+c^2\right)^4 z^2-5040\,b\left(b^2+c^2\right)^2\left(3\,b^4-10\,c^2\,b^2+3\,c^4\right)z+5040\left(b^2+c^2\right)\left(7\,b^6-35\,c^2\,b^4+21\,c^4\,b^2-c^6\right)\sqrt{z}-40\,320\,b\left(b^6-7\,c^2\,b^4+7\,c^4\,b^2-c^6\right)\right)\cos\left(\sqrt{z}\,c+g\right)\right)$$

01.06.21.0480.01

$$\int z^4 e^{b\sqrt{z}+e}\sin\left(\sqrt{z}\,c+g\right)dz = \frac{1}{\left(b^2+c^2\right)^{10}}\,2\,e^{b\sqrt{z}+e}\left(\left(60\,480\,b\left(b^2+c^2\right)^3\left(b^6-21\,c^2\,b^4+35\,c^4\,b^2-7\,c^6\right)z^{3/2}+3024\,b\left(b^2+c^2\right)^5\left(b^4-10\,c^2\,b^2+5\,c^4\right)z^{5/2}+72\,b\left(b^2+c^2\right)^7\left(b^2-3\,c^2\right)z^{7/2}+b\left(b^2+c^2\right)^9 z^{9/2}-9\,(b-c)\,(b+c)\left(b^2+c^2\right)^8 z^4-504\left(b^2+c^2\right)^6\left(b^4-6\,c^2\,b^2+c^4\right)z^3-15\,120\left(b^2+c^2\right)^4\left(b^6-15\,c^2\,b^4+15\,c^4\,b^2-c^6\right)z^2-181\,440\left(b^2+c^2\right)^2\left(b^8-28\,c^2\,b^6+70\,c^4\,b^4-28\,c^6\,b^2+c^8\right)z+362\,880\,b\left(b^2+c^2\right)\left(b^2-3\,c^2\right)\left(b^6-33\,c^2\,b^4+27\,c^4\,b^2-3\,c^6\right)\sqrt{z}-362\,880\left(b^{10}-45\,c^2\,b^8+210\,c^4\,b^6-210\,c^6\,b^4+45\,c^8\,b^2-c^{10}\right)\right)\sin\left(\sqrt{z}\,c+g\right)-c\left(60\,480\left(b^2+c^2\right)^3\left(7\,b^6-35\,c^2\,b^4+21\,c^4\,b^2-c^6\right)z^{3/2}+3024\left(b^2+c^2\right)^5\left(5\,b^4-10\,c^2\,b^2+c^4\right)z^{5/2}+72\left(3\,b^2-c^2\right)\left(b^2+c^2\right)^7 z^{7/2}+\left(b^2+c^2\right)^9 z^{9/2}-18\,b\left(b^2+c^2\right)^8 z^4-2016\,b\,(b-c)\,(b+c)\left(b^2+c^2\right)^6 z^3-30\,240\,b\left(b^2+c^2\right)^4\left(3\,b^4-10\,c^2\,b^2+3\,c^4\right)z^2-1\,451\,520\,b\left(b^2+c^2\right)^2\left(b^6-7\,c^2\,b^4+7\,c^4\,b^2-c^6\right)z+362\,880\left(9\,b^{10}-75\,c^2\,b^8+42\,c^4\,b^6+90\,c^6\,b^4-35\,c^8\,b^2+c^{10}\right)\sqrt{z}-725\,760\,b\left(5\,b^4-10\,c^2\,b^2+c^4\right)\left(b^4-10\,c^2\,b^2+5\,c^4\right)\right)\cos\left(\sqrt{z}\,c+g\right)\right)$$

01.06.21.0481.01

$$\int z^5 e^{b\sqrt{z}+e}\sin\left(\sqrt{z}\,c+g\right)dz = \frac{1}{\left(b^2+c^2\right)^{12}}$$
$$\Big(2e^{b\sqrt{z}+e}\Big(\Big(330b^{15}\left(z^4c^8-8z^3c^6-1056z^2c^4-16128zc^2+20160\right)z^{3/2}+165b^{17}\left(z^3c^6+6z^2c^4-144zc^2+2016\right)z^{5/2}+$$
$$55b^{19}\left(z^2c^4+12zc^2+144\right)z^{7/2}+11b^{21}\left(zc^2+10\right)z^{9/2}+b^{23}z^{11/2}-11b^{22}z^5-99b^{20}\left(zc^2+10\right)z^4-$$
$$55b^{18}\left(7z^2c^4+36zc^2+1008\right)z^3-165b^{16}\left(5z^3c^6-114z^2c^4-3024zc^2+10080\right)z^2-$$
$$990b^{14}\left(z^4c^8-104z^3c^6-3360z^2c^4-40320zc^2+20160\right)z+$$
$$462b^{13}\left(z^5c^{10}-30z^4c^8-2400z^3c^6-43200z^2c^4-475200zc^2+86400\right)\sqrt{z}+$$
$$462b^{11}c^2\left(z^5c^{10}-60z^4c^8-3600z^3c^6-23040z^2c^4+302400zc^2-4665600\right)\sqrt{z}+$$
$$330b^9c^4\left(z^5c^{10}-98z^4c^8-3696z^3c^6+110880z^2c^4+3769920zc^2+33264000\right)\sqrt{z}+$$
$$165b^7c^6\left(z^5c^{10}-144z^4c^8-1344z^3c^6+354816z^2c^4+3991680zc^2-31933440\right)\sqrt{z}+$$
$$55b^5c^8\left(z^5c^{10}-198z^4c^8+5184z^3c^6+508032z^2c^4-11975040zc^2-215550720\right)\sqrt{z}+$$
$$11b^3c^{10}\left(z^5c^{10}-260z^4c^8+18000z^3c^6-34473600zc^2+558835200\right)\sqrt{z}+$$
$$bc^{12}\left(z^5c^{10}-330z^4c^8+39600z^3c^6-2328480z^2c^4+59875200zc^2-439084800\right)\sqrt{z}+$$
$$990b^8c^4\left(z^5c^{10}+238z^4c^8-3696z^3c^6-332640z^2c^4-3326400zc^2-19958400\right)+$$
$$462b^{10}c^2\left(z^5c^{10}+660z^4c^8+7920z^3c^6-316800z^2c^4-5227200zc^2+5702400\right)+$$
$$99b^2c^{10}\left(z^5c^{10}-20z^4c^8-5040z^3c^6+403200z^2c^4-8668800zc^2+26611200\right)+$$
$$11c^{12}\left(z^5c^{10}-90z^4c^8+5040z^3c^6-151200z^2c^4+1814400zc^2-3628800\right)-$$
$$462b^{12}\left(z^5c^{10}-510z^4c^8-13920z^3c^6-129600z^2c^4-1857600zc^2+86400\right)+$$
$$165b^6c^6\left(5z^5c^{10}+624z^4c^8-38976z^3c^6-887040z^2c^4+19958400zc^2+223534080\right)+$$
$$55b^4c^8\left(7z^5c^{10}+342z^4c^8-60480z^3c^6+1088640z^2c^4+43908480zc^2-359251200\right)\Big)\sin\left(\sqrt{z}\,c+g\right)-$$
$$c\Big(330b^{14}\left(z^4c^8+72z^3c^6+864z^2c^4+181440\right)z^{3/2}+165b^{16}\left(z^3c^6+66z^2c^4+1200zc^2+14112\right)z^{5/2}+$$
$$55b^{18}\left(z^2c^4+52zc^2+720\right)z^{7/2}+11b^{20}\left(zc^2+30\right)z^{9/2}+b^{22}z^{11/2}-22b^{21}z^5-220b^{19}\left(zc^2+18\right)z^4-$$
$$990b^{17}\left(z^2c^4+28zc^2+336\right)z^3-2640b^{15}\left(z^3c^6+30z^2c^4+336zc^2+5040\right)z^2-$$
$$4620b^{13}\left(z^4c^8+24z^3c^6-288z^2c^4-8640zc^2+43200\right)z+$$
$$165b^6c^6\left(z^5c^{10}+16z^4c^8-6720z^3c^6+64512z^2c^4+7539840zc^2+31933440\right)\sqrt{z}+$$
$$330b^8c^4\left(z^5c^{10}+42z^4c^8-5040z^3c^6-110880z^2c^4+1995840zc^2+35925120\right)\sqrt{z}+$$
$$462b^{10}c^2\left(z^5c^{10}+60z^4c^8-2640z^3c^6-126720z^2c^4-1425600zc^2-13305600\right)\sqrt{z}+$$
$$462b^{12}\left(z^5c^{10}+70z^4c^8-480z^3c^6-60480z^2c^4-820800zc^2+950400\right)\sqrt{z}+$$
$$55b^4c^8\left(z^5c^{10}-18z^4c^8-6336z^3c^6+362880z^2c^4+2540160zc^2-199584000\right)\sqrt{z}+$$
$$11b^2c^{10}\left(z^5c^{10}-60z^4c^8-2160z^3c^6+483840z^2c^4-19958400zc^2+195955200\right)\sqrt{z}+$$
$$c^{12}\left(z^5c^{10}-110z^4c^8+7920z^3c^6-332640z^2c^4+6652800zc^2-39916800\right)\sqrt{z}-$$
$$5544b^{11}\left(z^5c^{10}+10z^4c^8-1440z^3c^6-36000z^2c^4-360000zc^2+86400\right)-$$
$$4620b^9c^2\left(z^5c^{10}-12z^4c^8-2640z^3c^6-31680z^2c^4+95040zc^2-1900800\right)-$$
$$2640b^7c^4\left(z^5c^{10}-42z^4c^8-3024z^3c^6+55440z^2c^4+1995840zc^2+11975040\right)-$$
$$990b^5c^6\left(z^5c^{10}-80z^4c^8-1344z^3c^6+201600z^2c^4+443520zc^2-31933440\right)-$$
$$220b^3c^8\left(z^5c^{10}-126z^4c^8+4032z^3c^6+181440z^2c^4-9072000zc^2+39916800\right)-$$
$$22bc^{10}\left(z^5c^{10}-180z^4c^8+15120z^3c^6-604800z^2c^4+9072000zc^2-21772800\right)\Big)\cos\left(\sqrt{z}\,c+g\right)\Big)\Big)$$

01.06.21.0482.01

$$\int \frac{e^{b\sqrt{z}+e}\sin\left(\sqrt{z}\,c+g\right)}{z}\,dz = i\,e^{e-i g}\left(\text{Ei}\left((b-i c)\sqrt{z}\right)-e^{2 i g}\,\text{Ei}\left((b+i c)\sqrt{z}\right)\right)$$

01.06.21.0483.01

$$\int \frac{e^{b\sqrt{z}+e}\sin\left(\sqrt{z}\,c+g\right)}{z^2}\,dz = \frac{1}{2 z}\,i\,e^{e-i g}\left(-e^{2 i g}\,z\,\text{Ei}\left((b+i c)\sqrt{z}\right)(b+i c)^2+\right.$$
$$\left.e^{(b-i c)\sqrt{z}}\left(-\sqrt{z}\,b+e^{2 i\left(\sqrt{z}\,c+g\right)}\left(\sqrt{z}\,b+i c\sqrt{z}+1\right)+i c\sqrt{z}-1\right)+(b-i c)^2\,z\,\text{Ei}\left((b-i c)\sqrt{z}\right)\right)$$

01.06.21.0484.01

$$\int \frac{e^{b\sqrt{z}+e}\sin\left(\sqrt{z}\,c+g\right)}{z^3}\,dz = \frac{1}{24}\,i\,e^{e-i g}\left(-e^{2 i g}\,\text{Ei}\left((b+i c)\sqrt{z}\right)(b+i c)^4+\right.$$
$$\frac{1}{z^2}\left(e^{(b-i c)\sqrt{z}}\left(-b^3 z^{3/2}-i c^3 z^{3/2}+c^2 z+2 i c\sqrt{z}+b\left(3 z c^2+2 i\sqrt{z}\,c-2\right)\sqrt{z}+b^2\left(3 i c z^{3/2}-z\right)-6\right)\right)+$$
$$\frac{1}{z^2}\left(e^{\sqrt{z}\,(b+i c)+2 i g}\left(b^3 z^{3/2}-i c^3 z^{3/2}-c^2 z+2 i c\sqrt{z}+b^2\left(3 c i z^{3/2}+z\right)+b\left(-3 c^2 z^{3/2}+2 i c z+2\sqrt{z}\right)+6\right)\right)+$$
$$\left.(b-i c)^4\,\text{Ei}\left((b-i c)\sqrt{z}\right)\right)$$

01.06.21.0485.01

$$\int \frac{e^{b\sqrt{z}+e}\sin\left(\sqrt{z}\,c+g\right)}{z^4}\,dz = \frac{1}{720}\,i\,e^{e-i g}\left(-e^{2 i g}\,\text{Ei}\left((b+i c)\sqrt{z}\right)(b+i c)^6-\right.$$
$$\frac{1}{z^3}\left(e^{\sqrt{z}\,(b+i c)+2 i g}\left(-2 (b+i c)^3 z^{3/2}-(b+i c)^5 z^{5/2}-(b+i c)^4 z^2-6 (b+i c)^2 z-24 (b+i c)\sqrt{z}-120\right)\right)+$$
$$\frac{1}{z^3}\left(e^{(b-i c)\sqrt{z}}\left(-2 (b-i c)^3 z^{3/2}-(b-i c)^5 z^{5/2}-(b-i c)^4 z^2-6 (b-i c)^2 z-24 (b-i c)\sqrt{z}-120\right)\right)+$$
$$\left.(b-i c)^6\,\text{Ei}\left((b-i c)\sqrt{z}\right)\right)$$

01.06.21.0486.01

$$\int \frac{e^{b\sqrt{z}+e}\sin\left(\sqrt{z}\,c+g\right)}{z^5}\,dz =$$
$$\frac{1}{40\,320}\left(i\,e^{e-i g}\left(-e^{2 i g}\,\text{Ei}\left((b+i c)\sqrt{z}\right)(b+i c)^8-\frac{1}{z^4}\left(e^{\sqrt{z}\,(b+i c)+2 i g}\left(-24 (b+i c)^3 z^{3/2}-2 (b+i c)^5 z^{5/2}-\right.\right.\right.\right.$$
$$\left.\left.(b+i c)^7 z^{7/2}-(b+i c)^6 z^3-6 (b+i c)^4 z^2-120 (b+i c)^2 z-720 (b+i c)\sqrt{z}-5040\right)\right)+$$
$$\frac{1}{z^4}\left(e^{(b-i c)\sqrt{z}}\left(-24 (b-i c)^3 z^{3/2}-2 (b-i c)^5 z^{5/2}-(b-i c)^7 z^{7/2}-(b-i c)^6 z^3-6 (b-i c)^4 z^2-\right.\right.$$
$$\left.\left.\left.\left.120 (b-i c)^2 z-720 (b-i c)\sqrt{z}-5040\right)\right)+(b-i c)^8\,\text{Ei}\left((b-i c)\sqrt{z}\right)\right)\right)$$

Involving $z^n e^{b z^r+d z}\sin\left(c z^r+g\right)$

01.06.21.0487.01

$$\int z^n e^{b z^2+d z} \sin\left(c z^2+g\right) dz = \frac{1}{4\sqrt{b+i c}} \left(i e^{-\frac{d^2}{4(b+i c)}+i g} \sum_{q=0}^{n} 2^{q-n} (b+i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d+2(b+i c)z)^{q+1} \left(-\frac{(d+2(b+i c)z)^2}{b+i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2(b+i c)z)^2}{4(b+i c)}\right)\right) - \frac{1}{4\sqrt{b-i c}} \left(i e^{-\frac{d^2}{4(b-i c)}-i g} \sum_{q=0}^{n} 2^{q-n} (b-i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d+2 b z-2 i c z)^{q+1} \left(-\frac{(d+2 b z-2 i c z)^2}{b-i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2 b z-2 i c z)^2}{4(b-i c)}\right)\right) /; n \in \mathbb{N}$$

01.06.21.0488.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin\left(\sqrt{z}\, c+g\right) dz = i\, 2^{-2(n+1)} e^{-i g} \left(d^{-2(n+1)} e^{-\frac{(b-i c)^2}{4d}} \sum_{k=0}^{n}\sum_{h=0}^{k} (-1)^{k-h} 4^k (b-i c)^{-h-k+2n} \left(b-i c+2 d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b-i c+2 d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b-i c)\left(b-i c+2 d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b-i c+2 d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b-i c+2 d\sqrt{z}\right)^2}{d}}\; d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b-i c+2 d\sqrt{z}\right)^2}{4d}\right)\right) - d^{-2(n+1)} e^{2 i g-\frac{(b+i c)^2}{4d}} \sum_{k=0}^{n}\sum_{h=0}^{k} (-1)^{k-h} 4^k (b+i c)^{-h-k+2n} \left(b+i c+2 d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+i c+2 d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b+i c)\left(b+i c+2 d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+i c+2 d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+i c+2 d\sqrt{z}\right)^2}{d}}\; d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+i c+2 d\sqrt{z}\right)^2}{4d}\right)\right)\right) /; n \in \mathbb{N}$$

Involving $z^n e^{b z^r + d z + e} \sin(c z^r + g)$

01.06.21.0489.01

$$\int z^n e^{b z^2 + d z + e} \sin(c z^2 + g) \, dz = \frac{1}{4\sqrt{b + i c}} \left(i e^{-\frac{d^2}{4(b+i c)} + e + i g} \sum_{q=0}^{n} 2^{q-n} (b + i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d + 2(b + i c) z)^{q+1} \left(-\frac{(d + 2(b + i c) z)^2}{b + i c} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d + 2(b + i c) z)^2}{4(b + i c)} \right) \right) - \frac{1}{4\sqrt{b - i c}} \left(i e^{-\frac{d^2}{4(b-i c)} + e - i g} \sum_{q=0}^{n} 2^{q-n} (b - i c)^{-n-\frac{1}{2}} (-d)^{n-q} (d + 2 b z - 2 i c z)^{q+1} \left(-\frac{(d + 2 b z - 2 i c z)^2}{b - i c} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d + 2 b z - 2 i c z)^2}{4(b - i c)} \right) \right) /; n \in \mathbb{N}$$

01.06.21.0490.01

$$\int z^n e^{\sqrt{z}\, b+d\,z+e} \sin\left(\sqrt{z}\, c+g\right) dz = i\, 2^{-2(n+1)} e^{e-i\,g} \left(d^{-2(n+1)} e^{-\frac{(b-i\,c)^2}{4d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b-i\,c)^{-h-k+2n} \left(b-i\,c+2\,d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b-i\,c+2\,d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b-i\,c)\left(b-i\,c+2\,d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b-i\,c+2\,d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b-i\,c+2\,d\sqrt{z}\right)^2}{d}}\, d\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b-i\,c+2\,d\sqrt{z}\right)^2}{4d}\right)\right) - d^{-2(n+1)} e^{2\,i\,g-\frac{(b+i\,c)^2}{4d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+i\,c)^{-h-k+2n} \left(b+i\,c+2\,d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+i\,c+2\,d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b+i\,c)\left(b+i\,c+2\,d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+i\,c+2\,d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+i\,c+2\,d\sqrt{z}\right)^2}{d}}\, d\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+i\,c+2\,d\sqrt{z}\right)^2}{4d}\right)\right)\right) /;\, n \in \mathbb{N}$$

Involving exponential and algebraic functions

Involving exp and algebraic functions

Involving $(a\,z+b)^\beta\, d^z$

01.06.21.0491.01

$$\int (a\,z+b)^\beta d^z \sin(c\,z+e)\, dz = \frac{1}{2a} i\, d^{-\frac{b}{a}} e^{-\frac{i(b\,c+a\,e)}{a}} (b+a\,z)^{\beta+1} \left(e^{2\,i\,e} E_{-\beta}\left(-\frac{i(b+a\,z)(c-i\log(d))}{a}\right) - e^{\frac{2\,i\,b\,c}{a}} E_{-\beta}\left(\frac{i(b+a\,z)(c+i\log(d))}{a}\right)\right)$$

01.06.21.0492.01

$$\int (a\,z+b)^\beta e^{p\,z} \sin(c\,z+e)\, dz = \frac{i\, e^{-\frac{i(b\,c+a\,e)+b\,p}{a}} (b+a\,z)^{\beta+1}}{2a} \left(e^{2\,i\,e} E_{-\beta}\left(-\frac{i(c-i\,p)(b+a\,z)}{a}\right) - e^{\frac{2\,i\,b\,c}{a}} E_{-\beta}\left(\frac{i(c+i\,p)(b+a\,z)}{a}\right)\right)$$

01.06.21.0493.01

$$\int (a\,z+b)^{\beta}\, d^z \sin(c\,z)\, dz = \frac{i\, d^{-\frac{b}{a}}}{2\,a}\, e^{-\frac{i\,b\,c}{a}}\, (b+a\,z)^{\beta+1} \left(E_{-\beta}\!\left(-\frac{i\,(b+a\,z)\,(c-i\log(d))}{a}\right) - e^{\frac{2\,i\,b\,c}{a}}\, E_{-\beta}\!\left(\frac{i\,(b+a\,z)\,(c+i\log(d))}{a}\right)\right)$$

01.06.21.0494.01

$$\int (a\,z+b)^{\beta}\, e^{p\,z} \sin(c\,z)\, dz = \frac{i}{2\,a}\, e^{-\frac{b\,(i\,c+p)}{a}}\, (b+a\,z)^{\beta+1} \left(E_{-\beta}\!\left(-\frac{i\,(c-i\,p)\,(b+a\,z)}{a}\right) - e^{\frac{2\,i\,b\,c}{a}}\, E_{-\beta}\!\left(\frac{i\,(c+i\,p)\,(b+a\,z)}{a}\right)\right)$$

01.06.21.0495.01

$$\int \frac{e^{p\,z}\sin(c\,z)}{\sqrt{a\,z+b}}\, dz = \frac{1}{2\left(c^2+p^2\right)\sqrt{b+a\,z}}\, e^{-\frac{b\,(i\,c+p)}{a}}\, \sqrt{\pi} \left(-e^{\frac{2\,i\,b\,c}{a}}\,(c-i\,p)\sqrt{\frac{i\,(c+i\,p)\,(b+a\,z)}{a}}\; \operatorname{erfc}\!\left(\sqrt{\frac{i\,(c+i\,p)\,(b+a\,z)}{a}}\right) + \sqrt{-\frac{i\,(c-i\,p)\,(b+a\,z)}{a}}\; (-(c+i\,p))\, \operatorname{erfc}\!\left(\sqrt{-\frac{i\,(c-i\,p)\,(b+a\,z)}{a}}\right)\right)$$

Arguments involving polynomials

Involving $a\,z^2+b\,z+c$

01.06.21.0496.01

$$\int \sin\!\left(a\,z^2+b\,z+c\right) dz = \frac{1}{\sqrt{a}}\sqrt{\frac{\pi}{2}} \left(\cos\!\left(\frac{b^2}{4\,a}-c\right) S\!\left(\frac{b+2\,a\,z}{\sqrt{a}\,\sqrt{2\,\pi}}\right) - C\!\left(\frac{b+2\,a\,z}{\sqrt{a}\,\sqrt{2\,\pi}}\right) \sin\!\left(\frac{b^2}{4\,a}-c\right)\right)$$

Involving $a\,z^2+b\,z$

01.06.21.0497.01

$$\int \sin\!\left(a\,z^2+b\,z\right) dz = \frac{1}{\sqrt{a}}\sqrt{\frac{\pi}{2}} \left(\cos\!\left(\frac{b^2}{4\,a}\right) S\!\left(\frac{b+2\,a\,z}{\sqrt{a}\,\sqrt{2\,\pi}}\right) - C\!\left(\frac{b+2\,a\,z}{\sqrt{a}\,\sqrt{2\,\pi}}\right) \sin\!\left(\frac{b^2}{4\,a}\right)\right)$$

Involving $a\,z^2+c$

01.06.21.0498.01

$$\int \sin\!\left(a\,z^2+c\right) dz = \frac{1}{\sqrt{a}}\sqrt{\frac{\pi}{2}} \left(\cos(c)\, S\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\, z\right) + C\!\left(\sqrt{a}\,\sqrt{\frac{2}{\pi}}\, z\right) \sin(c)\right)$$

Arguments involving rational functions

Involving $a\,z^2+\frac{b}{z^2}$

01.06.21.0499.01

$$\int \sin\left(a z^2 + \frac{b}{z^2}\right) dz = -\frac{1}{8} i \sqrt{\pi} \left(\frac{1}{\sqrt{-i a}} \left(e^{-2 \sqrt{-i a} \sqrt{-i b}} \left(e^{4 \sqrt{-i a} \sqrt{-i b}} \left(\operatorname{erf}\left(\sqrt{-i a}\, z + \frac{\sqrt{-i b}}{z} \right) - 1 \right) - \operatorname{erf}\left(\frac{\sqrt{-i b}}{z} - \sqrt{-i a}\, z \right) + 1 \right) \right) + \frac{e^{-2 \sqrt{i a} \sqrt{i b}} \left(-e^{4 \sqrt{i a} \sqrt{i b}} \left(\operatorname{erf}\left(\sqrt{i a}\, z + \frac{\sqrt{i b}}{z} \right) - 1 \right) + \operatorname{erf}\left(\frac{\sqrt{i b}}{z} - \sqrt{i a}\, z \right) - 1 \right)}{\sqrt{i a}} \right)$$

Involving $a z^2 + \frac{b}{z^2} + c$

01.06.21.0500.01

$$\int \sin\left(a z^2 + \frac{b}{z^2} + c\right) dz = -\frac{1}{8} i e^{-i c} \sqrt{\pi} \left(\frac{1}{\sqrt{-i a}} \left(e^{-2 \sqrt{-i a} \sqrt{-i b} + 2 i c} \left(e^{4 \sqrt{-i a} \sqrt{-i b}} \left(\operatorname{erf}\left(\sqrt{-i a}\, z + \frac{\sqrt{-i b}}{z} \right) - 1 \right) - \operatorname{erf}\left(\frac{\sqrt{-i b}}{z} - \sqrt{-i a}\, z \right) + 1 \right) \right) + \frac{e^{-2 \sqrt{i a} \sqrt{i b}} \left(-e^{4 \sqrt{i a} \sqrt{i b}} \left(\operatorname{erf}\left(\sqrt{i a}\, z + \frac{\sqrt{i b}}{z} \right) - 1 \right) + \operatorname{erf}\left(\frac{\sqrt{i b}}{z} - \sqrt{i a}\, z \right) - 1 \right)}{\sqrt{i a}} \right)$$

Arguments involving algebraic functions

Involving $a z + b \sqrt{z} + c$

01.06.21.0501.01

$$\int \sin\left(a z + \sqrt{z}\, b + c\right) dz = -\frac{1}{2 a^{3/2}} \left(2 \sqrt{a} \cos\left(\sqrt{z}\, b + c + a z\right) + b \sqrt{2 \pi} \cos\left(\frac{b^2}{4 a} - c\right) S\left(\frac{2 \sqrt{z}\, a + b}{\sqrt{a} \sqrt{2 \pi}}\right) - b \sqrt{2 \pi}\, C\left(\frac{2 \sqrt{z}\, a + b}{\sqrt{a} \sqrt{2 \pi}}\right) \sin\left(\frac{b^2}{4 a} - c\right) \right)$$

Involving $a z + b \sqrt{z}$

01.06.21.0502.01

$$\int \sin\left(\sqrt{z}\, b + a z\right) dz = -\frac{\cos\left(\sqrt{z}\, b + a z\right)}{a} - \frac{b}{a^{3/2}} \sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{b^2}{4 a}\right) S\left(\frac{2 \sqrt{z}\, a + b}{\sqrt{a} \sqrt{2 \pi}}\right) - C\left(\frac{2 \sqrt{z}\, a + b}{\sqrt{a} \sqrt{2 \pi}}\right) \sin\left(\frac{b^2}{4 a}\right) \right)$$

Involving $a z^r + c$

01.06.21.0503.01

$$\int \sin(a z^r + c)\, dz = \frac{i}{2r}\left(e^{i c} z\,(-i a z^r)^{-1/r}\,\Gamma\left(\frac{1}{r}, -i a z^r\right) - e^{-i c} z\,(i a z^r)^{-1/r}\,\Gamma\left(\frac{1}{r}, i a z^r\right)\right)$$

01.06.21.0504.01

$$\int \sin\left(a z^2 + c\right) dz = \frac{1}{\sqrt{a}}\sqrt{\frac{\pi}{2}}\left(\cos(c)\, S\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\, z\right) + C\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\, z\right)\sin(c)\right)$$

01.06.21.0505.01

$$\int \sin\left(\sqrt{z}\, a + c\right) dz = \frac{2\sin\left(\sqrt{z}\, a + c\right) - 2 a \sqrt{z}\, \cos\left(\sqrt{z}\, a + c\right)}{a^2}$$

Arguments involving exponential functions

01.06.21.0506.01

$$\int \sin(a^z)\, dz = \frac{\mathrm{Si}(a^z)}{\log(a)}$$

01.06.21.0507.01

$$\int \sin(e^z)\, dz = \mathrm{Si}(e^z)$$

Arguments involving trigonometric functions

Involving tan

01.06.21.0508.01

$$\int \sin(\tan(z))\, dz = \frac{1}{4e}\left(\left(-1 + e^2\right)\mathrm{Ci}(i - \tan(z)) + \left(-1 + e^2\right)\mathrm{Ci}(i + \tan(z)) + \left(1 + e^2\right) i\,(\mathrm{Si}(i - \tan(z)) + \mathrm{Si}(i + \tan(z)))\right)$$

01.06.21.0509.01

$$\int \sin(a \tan(z))\, dz = \frac{1}{2}\left(\mathrm{Ci}(-a\,(-i + \tan(z)))\sinh(a) + \mathrm{Ci}(a\,(i + \tan(z)))\sinh(a) + i\cosh(a)\,(\mathrm{Si}(a\,(i + \tan(z))) + \mathrm{Si}(i a - a \tan(z)))\right)$$

Involving cot

01.06.21.0510.01

$$\int \sin(\cot(z))\, dz = -\frac{1}{4e}\left(\left(-1 + e^2\right)\mathrm{Ci}(i - \cot(z)) + \left(-1 + e^2\right)\mathrm{Ci}(i + \cot(z)) + \left(1 + e^2\right) i\,(\mathrm{Si}(i - \cot(z)) + \mathrm{Si}(i + \cot(z)))\right)$$

01.06.21.0511.01

$$\int \sin(a \cot(z))\, dz = \frac{1}{2}\left(-\mathrm{Ci}(-a\,(-i + \cot(z)))\sinh(a) - \mathrm{Ci}(a\,(i + \cot(z)))\sinh(a) - i\cosh(a)\,(\mathrm{Si}(a\,(i + \cot(z))) + \mathrm{Si}(i a - a \cot(z)))\right)$$

Arguments involving hyperbolic functions

Involving tanh

01.06.21.0512.01

$$\int \sin(\tanh(z))\,dz = \frac{1}{2}(-\text{Ci}(1-\tanh(z))\sin(1)-\text{Ci}(\tanh(z)+1)\sin(1)+\cos(1)(\text{Si}(1-\tanh(z))+\text{Si}(\tanh(z)+1)))$$

01.06.21.0513.01

$$\int \sin(a\tanh(z))\,dz = \frac{1}{2}(-\text{Ci}(\tanh(z)\,a+a)\sin(a)-\text{Ci}(a-a\tanh(z))\sin(a)+\cos(a)(\text{Si}(\tanh(z)\,a+a)+\text{Si}(a-a\tanh(z))))$$

Involving coth

01.06.21.0514.01

$$\int \sin(\coth(z))\,dz = \frac{1}{2}(-\text{Ci}(1-\coth(z))\sin(1)-\text{Ci}(\coth(z)+1)\sin(1)+\cos(1)(\text{Si}(1-\coth(z))+\text{Si}(\coth(z)+1)))$$

01.06.21.0515.01

$$\int \sin(a\coth(z))\,dz = \frac{1}{2}(-\text{Ci}(\coth(z)\,a+a)\sin(a)-\text{Ci}(a-a\coth(z))\sin(a)+\cos(a)(\text{Si}(\coth(z)\,a+a)+\text{Si}(a-a\coth(z))))$$

Arguments involving inverse trigonometric functions

Involving $\sin^{-1}$

01.06.21.0516.01

$$\int \sin\left(\sin^{-1}(z)\right)dz = \frac{z^2}{2}$$

01.06.21.0517.01

$$\int \sin\left(a\sin^{-1}(z)\right)dz = \frac{\cos\left((a-1)\sin^{-1}(z)\right)}{2-2a} - \frac{\cos\left((a+1)\sin^{-1}(z)\right)}{2(a+1)}$$

Involving $\cos^{-1}$

01.06.21.0518.01

$$\int \sin\left(\cos^{-1}(z)\right)dz = \frac{1}{2}\left(\sqrt{1-z^2}\,z+\sin^{-1}(z)\right)$$

01.06.21.0519.01

$$\int \sin\left(a\cos^{-1}(z)\right)dz = \frac{1}{2}\left(\frac{\sin\left((a+1)\cos^{-1}(z)\right)}{a+1}+\frac{\sin\left(\cos^{-1}(z)-a\cos^{-1}(z)\right)}{a-1}\right)$$

Involving $\tan^{-1}$

01.06.21.0520.01

$$\int \sin\left(\tan^{-1}(z)\right)dz = \sqrt{z^2+1}$$

01.06.21.0521.01

$$\int \sin\left(a\tan^{-1}(z)\right) dz = \frac{1}{2\left(a^2-4\right)} e^{-i a \tan^{-1}(z)} \left((a-2)\left((a+2)\left(-i\left(-1+e^{2 i a \tan^{-1}(z)}\right) z - e^{2 i a \tan^{-1}(z)} {}_2F_1\left(\frac{a}{2}, 1; \frac{a}{2}+1; -e^{2 i \tan^{-1}(z)}\right) + {}_2F_1\left(-\frac{a}{2}, 1; 1-\frac{a}{2}; -e^{2 i \tan^{-1}(z)}\right)\right) + a e^{2 i (a+1) \tan^{-1}(z)} {}_2F_1\left(\frac{a}{2}+1, 1; \frac{a}{2}+2; -e^{2 i \tan^{-1}(z)}\right)\right) - a (a+2) e^{2 i \tan^{-1}(z)} {}_2F_1\left(1-\frac{a}{2}, 1; 2-\frac{a}{2}; -e^{2 i \tan^{-1}(z)}\right)\right)$$

Involving $\cot^{-1}$

01.06.21.0522.01

$$\int \sin\left(\cot^{-1}(z)\right) dz = \frac{\sqrt{1+\frac{1}{z^2}}\; z \sinh^{-1}(z)}{\sqrt{z^2+1}}$$

01.06.21.0523.01

$$\int \sin\left(a\cot^{-1}(z)\right) dz = \frac{1}{2\left(a^2-4\right)} e^{-i a \cot^{-1}(z)} \left((a-2)\left((a+2)\left(-i\left(-1+e^{2 i a \cot^{-1}(z)}\right) z + e^{2 i a \cot^{-1}(z)} {}_2F_1\left(\frac{a}{2}, 1; \frac{a}{2}+1; e^{2 i \cot^{-1}(z)}\right) - {}_2F_1\left(-\frac{a}{2}, 1; 1-\frac{a}{2}; e^{2 i \cot^{-1}(z)}\right)\right) + a e^{2 i (a+1) \cot^{-1}(z)} {}_2F_1\left(\frac{a}{2}+1, 1; \frac{a}{2}+2; e^{2 i \cot^{-1}(z)}\right)\right) - a (a+2) e^{2 i \cot^{-1}(z)} {}_2F_1\left(1-\frac{a}{2}, 1; 2-\frac{a}{2}; e^{2 i \cot^{-1}(z)}\right)\right)$$

Involving $\csc^{-1}$

01.06.21.0524.01

$$\int \sin\left(\csc^{-1}(z)\right) dz = \log(z)$$

01.06.21.0525.01

$$\int \sin\left(a\csc^{-1}(z)\right) dz = \frac{1}{a^2-1} \left(e^{-i a \csc^{-1}(z)} \left((a-1) e^{i a \csc^{-1}(z)} \left(a e^{i (a+1) \csc^{-1}(z)} {}_2F_1\left(\frac{a+1}{2}, 1; \frac{a+3}{2}; e^{2 i \csc^{-1}(z)}\right) + (a+1) z \sin\left(a\csc^{-1}(z)\right)\right) - a (a+1) e^{i \csc^{-1}(z)} {}_2F_1\left(\frac{1}{2}-\frac{a}{2}, 1; \frac{3}{2}-\frac{a}{2}; e^{2 i \csc^{-1}(z)}\right)\right)\right)$$

Involving $\sec^{-1}$

01.06.21.0526.01

$$\int \sin\left(\sec^{-1}(z)\right) dz = \frac{\sqrt{z^2}\left(\cot^{-1}\left(\sqrt{z^2-1}\right) + \sqrt{z^2-1}\right)}{z}$$

01.06.21.0527.01

$$\int \sin\left(a \sec^{-1}(z)\right) dz = -\frac{1}{2\left(a^2-1\right)} \left(i\, e^{-i a \sec^{-1}(z)} \left((a-1)\left((a+1)\left(-1+e^{2 i a \sec^{-1}(z)}\right) z - 2 a\, e^{i (2a+1) \sec^{-1}(z)}\, {}_2F_1\left(\frac{a+1}{2}, 1; \frac{a+3}{2}; -e^{2 i \sec^{-1}(z)}\right)\right) + 2 a (a+1)\, e^{i \sec^{-1}(z)}\, {}_2F_1\left(\frac{1}{2}-\frac{a}{2}, 1; \frac{3}{2}-\frac{a}{2}; -e^{2 i \sec^{-1}(z)}\right)\right)\right)$$

Arguments involving inverse hyperbolic functions

Involving $\sinh^{-1}$

01.06.21.0528.01

$$\int \sin\left(\sinh^{-1}(z)\right) dz = \frac{1}{2}\left(z \sin\left(\sinh^{-1}(z)\right) - \sqrt{z^2+1}\, \cos\left(\sinh^{-1}(z)\right)\right)$$

01.06.21.0529.01

$$\int \sin\left(a \sinh^{-1}(z)\right) dz = \frac{z \sin\left(a \sinh^{-1}(z)\right) - a \sqrt{z^2+1}\, \cos\left(a \sinh^{-1}(z)\right)}{a^2+1}$$

Involving $\cosh^{-1}$

01.06.21.0530.01

$$\int \sin\left(\cosh^{-1}(z)\right) dz = \frac{1}{2}\left(z \sin\left(\cosh^{-1}(z)\right) - \sqrt{\frac{z-1}{z+1}}\, (z+1) \cos\left(\cosh^{-1}(z)\right)\right)$$

01.06.21.0531.01

$$\int \sin\left(a \cosh^{-1}(z)\right) dz = \frac{z \sin\left(a \cosh^{-1}(z)\right) - a \sqrt{\frac{z-1}{z+1}}\, (z+1) \cos\left(a \cosh^{-1}(z)\right)}{a^2+1}$$

Involving $\tanh^{-1}$

01.06.21.0532.01

$$\int \sin\left(\tanh^{-1}(z)\right) dz = \frac{1}{10}\, i\, e^{-i \tanh^{-1}(z)} \left(-5 e^{2 i \tanh^{-1}(z)} z + 5 z - 5 e^{2 i \tanh^{-1}(z)}\, {}_2F_1\left(\frac{i}{2}, 1; 1+\frac{i}{2}; -e^{2 \tanh^{-1}(z)}\right) + 5\, {}_2F_1\left(-\frac{i}{2}, 1; 1-\frac{i}{2}; -e^{2 \tanh^{-1}(z)}\right) + e^{(2+2 i) \tanh^{-1}(z)} (1+2 i)\, {}_2F_1\left(1+\frac{i}{2}, 1; 2+\frac{i}{2}; -e^{2 \tanh^{-1}(z)}\right) - (1-2 i)\, e^{2 \tanh^{-1}(z)}\, {}_2F_1\left(1-\frac{i}{2}, 1; 2-\frac{i}{2}; -e^{2 \tanh^{-1}(z)}\right)\right)$$

01.06.21.0533.01

$$\int \sin\left(a \tanh^{-1}(z)\right) dz = -\frac{1}{2\left(a^2+4\right)} i\, e^{-i a \tanh^{-1}(z)} \left((a+2i)\left((a-2i)\left(\left(-1+e^{2 i a \tanh^{-1}(z)}\right) z + e^{2 i a \tanh^{-1}(z)}\, {}_2F_1\left(\frac{i a}{2}, 1; 1+\frac{i a}{2}; -e^{2 \tanh^{-1}(z)}\right) - {}_2F_1\left(-\frac{1}{2}(i a), 1; 1-\frac{i a}{2}; -e^{2 \tanh^{-1}(z)}\right)\right) - a\, e^{2(1+i a) \tanh^{-1}(z)}\, {}_2F_1\left(1+\frac{i a}{2}, 1; 2+\frac{i a}{2}; -e^{2 \tanh^{-1}(z)}\right)\right) + a (a-2i)\, e^{2 \tanh^{-1}(z)}\, {}_2F_1\left(1-\frac{i a}{2}, 1; 2-\frac{i a}{2}; -e^{2 \tanh^{-1}(z)}\right)\right)$$

Involving $\coth^{-1}$

01.06.21.0534.01

$$\int \sin\left(\coth^{-1}(z)\right) dz = -\frac{1}{10} i\, e^{-i \coth^{-1}(z)} \left(5 e^{2 i \coth^{-1}(z)} z - 5 z + 5 e^{2 i \coth^{-1}(z)}\, {}_2F_1\left(\frac{i}{2}, 1; 1+\frac{i}{2}; e^{2 \coth^{-1}(z)}\right) - 5\, {}_2F_1\left(-\frac{i}{2}, 1; 1-\frac{i}{2}; e^{2 \coth^{-1}(z)}\right) + e^{(2+2i) \coth^{-1}(z)} (1+2i)\, {}_2F_1\left(1+\frac{i}{2}, 1; 2+\frac{i}{2}; e^{2 \coth^{-1}(z)}\right) - (1-2i)\, e^{2 \coth^{-1}(z)}\, {}_2F_1\left(1-\frac{i}{2}, 1; 2-\frac{i}{2}; e^{2 \coth^{-1}(z)}\right)\right)$$

01.06.21.0535.01

$$\int \sin\left(a \coth^{-1}(z)\right) dz = -\frac{1}{2\left(a^2+4\right)} i\, e^{-i a \coth^{-1}(z)} \left((a+2i)\left((a-2i)\left(\left(-1+e^{2 i a \coth^{-1}(z)}\right) z + e^{2 i a \coth^{-1}(z)}\, {}_2F_1\left(\frac{i a}{2}, 1; 1+\frac{i a}{2}; e^{2 \coth^{-1}(z)}\right) - {}_2F_1\left(-\frac{1}{2}(i a), 1; 1-\frac{i a}{2}; e^{2 \coth^{-1}(z)}\right)\right) + a\, e^{2(1+i a) \coth^{-1}(z)}\, {}_2F_1\left(1+\frac{i a}{2}, 1; 2+\frac{i a}{2}; e^{2 \coth^{-1}(z)}\right)\right) - a (a-2i)\, e^{2 \coth^{-1}(z)}\, {}_2F_1\left(1-\frac{i a}{2}, 1; 2-\frac{i a}{2}; e^{2 \coth^{-1}(z)}\right)\right)$$

Involving csch^{-1}

01.06.21.0536.01

$$\int \sin\left(\operatorname{csch}^{-1}(z)\right) dz = \left(\frac{1}{2}-\frac{i}{2}\right) e^{(1+i) \operatorname{csch}^{-1}(z)}\, {}_2F_1\left(\frac{1}{2}+\frac{i}{2}, 1; \frac{3}{2}+\frac{i}{2}; e^{2 \operatorname{csch}^{-1}(z)}\right) + \left(\frac{1}{2}+\frac{i}{2}\right) e^{(1-i) \operatorname{csch}^{-1}(z)}\, {}_2F_1\left(\frac{1}{2}-\frac{i}{2}, 1; \frac{3}{2}-\frac{i}{2}; e^{2 \operatorname{csch}^{-1}(z)}\right) + z \sin\left(\operatorname{csch}^{-1}(z)\right)$$

01.06.21.0537.01

$$\int \sin\left(a \operatorname{csch}^{-1}(z)\right) dz = \frac{1}{2\left(a^2+1\right)} i\, e^{-i a \operatorname{csch}^{-1}(z)} \left(2 a (a-i)\, e^{\operatorname{csch}^{-1}(z)}\, {}_2F_1\left(\frac{1}{2}-\frac{i a}{2}, 1; \frac{3}{2}-\frac{i a}{2}; e^{2 \operatorname{csch}^{-1}(z)}\right) - (a+i)\left((a-i)\left(-1+e^{2 i a \operatorname{csch}^{-1}(z)}\right) z + 2 a\, e^{2 a i \operatorname{csch}^{-1}(z)+\operatorname{csch}^{-1}(z)}\, {}_2F_1\left(\frac{1}{2}+\frac{i a}{2}, 1; \frac{3}{2}+\frac{i a}{2}; e^{2 \operatorname{csch}^{-1}(z)}\right)\right)\right)$$

Involving sech^{-1}

01.06.21.0538.01

$$\int \sin\left(\operatorname{sech}^{-1}(z)\right) dz = -\left(\frac{1}{2} - \frac{i}{2}\right) e^{(1+i)\operatorname{sech}^{-1}(z)} {}_2F_1\left(\frac{1}{2} + \frac{i}{2}, 1; \frac{3}{2} + \frac{i}{2}; -e^{2\operatorname{sech}^{-1}(z)}\right) + \left(-\frac{1}{2} - \frac{i}{2}\right) e^{(1-i)\operatorname{sech}^{-1}(z)} {}_2F_1\left(\frac{1}{2} - \frac{i}{2}, 1; \frac{3}{2} - \frac{i}{2}; -e^{2\operatorname{sech}^{-1}(z)}\right) + z \sin\left(\operatorname{sech}^{-1}(z)\right)$$

01.06.21.0539.01

$$\int \sin\left(a \operatorname{sech}^{-1}(z)\right) dz = -\frac{1}{2\left(a^2+1\right)} i\, e^{-i a \operatorname{sech}^{-1}(z)} \left((a+i)\left((a-i)\left(-1+e^{2 i a \operatorname{sech}^{-1}(z)}\right) z - 2 a\, e^{2 a i \operatorname{sech}^{-1}(z)+\operatorname{sech}^{-1}(z)} {}_2F_1\left(\frac{1}{2} + \frac{i a}{2}, 1; \frac{3}{2} + \frac{i a}{2}; -e^{2\operatorname{sech}^{-1}(z)}\right)\right) + 2 a (a-i)\, e^{\operatorname{sech}^{-1}(z)} {}_2F_1\left(\frac{1}{2} - \frac{i a}{2}, 1; \frac{3}{2} - \frac{i a}{2}; -e^{2\operatorname{sech}^{-1}(z)}\right)\right)$$

Arguments involving polynomials or algebraic functions and power factors

Involving power

Involving $z^n \sin\left(c z^r + f z\right)$

01.06.21.0540.01

$$\int z^n \sin\left(a z^2 + b z\right) dz = \frac{1}{2^{n+2} a^{n+1}} \left((i(-b)^n (b + 2 a z))\, e^{-\frac{i b^2}{4 a}} \sum_{j=0}^{n} \left(-\frac{2 b + 4 a z}{b}\right)^j \left(-\frac{i (b + 2 a z)^2}{a}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (b + 2 a z)^2}{4 a}\right) - e^{\frac{i b^2}{2 a}} \sum_{j=0}^{n} \left(-\frac{2 b + 4 a z}{b}\right)^j \left(\frac{i (b + 2 a z)^2}{a}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (b + 2 a z)^2}{4 a}\right)\right) /; n \in \mathbb{N}$$

01.06.21.0541.01

$$\int z^n \sin\left(\sqrt{z}\, a + b\, z\right) dz = i\, 4^{-n-1} a^{2n} b^{-2n-2} e^{-\frac{i a^2}{4 b}} \left(e^{\frac{i a^2}{2 b}} \sum_{j=0}^{n} \sum_{h=0}^{j} 4^j \left(-\frac{a + 2 b \sqrt{z}}{a}\right)^{h+j} \left(\frac{i \left(a + 2 b \sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(a \left(a + 2 b \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i \left(a + 2 b \sqrt{z}\right)^2}{4 b}\right) + 2 \sqrt{\frac{i \left(a + 2 b \sqrt{z}\right)^2}{b}}\, b\, i\, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i \left(a + 2 b \sqrt{z}\right)^2}{4 b}\right)\right) - \sum_{j=0}^{n} \sum_{h=0}^{j} 4^j \left(-\frac{a + 2 b \sqrt{z}}{a}\right)^{h+j} \left(-\frac{i \left(a + 2 b \sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(a \left(a + 2 b \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(a + 2 b \sqrt{z}\right)^2}{4 b}\right) - 2\, i\, b \sqrt{-\frac{i \left(a + 2 b \sqrt{z}\right)^2}{b}}\, \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i \left(a + 2 b \sqrt{z}\right)^2}{4 b}\right)\right)\right) /;\, n \in \mathbb{N}$$

Involving $z^n \sin\left(a\, z^r + b\, z + c\right)$

01.06.21.0542.01

$$\int z^n \sin\left(a\, z^2 + b\, z + c\right) dz = \frac{1}{2^{n+2} a^{n+1}} \left((i\, (-b))^n (b + 2 a z))\, e^{-\frac{i \left(b^2 + 4 a c\right)}{4 a}} \left(e^{2 i c} \sum_{j=0}^{n} \left(-\frac{2 b + 4 a z}{b}\right)^j \left(-\frac{i (b + 2 a z)^2}{a}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (b + 2 a z)^2}{4 a}\right) - e^{\frac{i b^2}{2 a}} \sum_{j=0}^{n} \left(-\frac{2 b + 4 a z}{b}\right)^j \left(\frac{i (b + 2 a z)^2}{a}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (b + 2 a z)^2}{4 a}\right)\right)\right) /;\, n \in \mathbb{N}$$

01.06.21.0543.01

$$\int z^n \sin\left(\sqrt{z}\, a + c + b\, z\right) dz = i\, 4^{-n-1} a^{2n} b^{-2n-2} e^{-\frac{i a^2}{4b} - i c} \left(e^{\frac{i a^2}{2b}} \sum_{j=0}^{n} \sum_{h=0}^{j} 4^j \left(-\frac{a + 2 b \sqrt{z}}{a}\right)^{h+j} \left(\frac{i \left(a + 2 b \sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(a \left(a + 2 b \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h + j + 1), \frac{i \left(a + 2 b \sqrt{z}\right)^2}{4b}\right) + 2 \sqrt{\frac{i \left(a + 2 b \sqrt{z}\right)^2}{b}}\, b\, i\, \Gamma\left(\frac{1}{2}(h + j + 2), \frac{i \left(a + 2 b \sqrt{z}\right)^2}{4b}\right)\right) - e^{2 i c} \sum_{j=0}^{n} \sum_{h=0}^{j} 4^j \left(-\frac{a + 2 b \sqrt{z}}{a}\right)^{h+j} \left(-\frac{i \left(a + 2 b \sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(a \left(a + 2 b \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h + j + 1), -\frac{i \left(a + 2 b \sqrt{z}\right)^2}{4b}\right) - 2 i b \sqrt{-\frac{i \left(a + 2 b \sqrt{z}\right)^2}{b}}\, \Gamma\left(\frac{1}{2}(h + j + 2), -\frac{i \left(a + 2 b \sqrt{z}\right)^2}{4b}\right)\right)\right) /; n \in \mathbb{N}$$

Arguments involving polynomials or algebraic functions and factors involving exponential functions

Involving exp

Involving $a^{d z} \sin\left(c\, z^r + f\, z\right)$

01.06.21.0544.01

$$\int a^{d z} \sin\left(c\, z^2 + f\, z\right) dz = -\frac{1}{4c} \left(a^{-\frac{d f}{2c}} e^{-\frac{i \left(f^2 + d^2 \log^2(a)\right)}{4c}} \sqrt{\pi} \left(\sqrt{-i c}\, e^{\frac{i f^2}{2c}} \operatorname{erfi}\left(\frac{d \log(a) - i (f + 2 c z)}{2 \sqrt{-i c}}\right) + \sqrt{i c}\, e^{\frac{i d^2 \log^2(a)}{2c}} \operatorname{erfi}\left(\frac{i (f + 2 c z) + d \log(a)}{2 \sqrt{i c}}\right)\right)\right)$$

01.06.21.0545.01

$$\int e^{d z} \sin\left(c\, z^2 + f\, z\right) dz = -\frac{1}{4c} \left(e^{-\frac{i \left(d^2 - 2 i f d + f^2\right)}{4c}} \sqrt{\pi} \left(\sqrt{-i c}\, e^{\frac{i f^2}{2c}} \operatorname{erfi}\left(\frac{d - i (f + 2 c z)}{2 \sqrt{-i c}}\right) + \sqrt{i c}\, e^{\frac{i d^2}{2c}} \operatorname{erfi}\left(\frac{d + i (f + 2 c z)}{2 \sqrt{i c}}\right)\right)\right)$$

01.06.21.0546.01

$$\int a^{d z} \sin\left(\sqrt{z}\, c + f z\right) dz = \frac{1}{4} i \left(2 i e^{-i\left(\sqrt{z}\, c+f z\right)} \left(\frac{e^{2 i\left(\sqrt{z}\, c+f z\right)}}{f - i d \log(a)} + \frac{1}{f + d i \log(a)}\right) a^{d z} + \frac{i c\, e^{\frac{c^2}{-4 i f+4 d \log(a)}} \sqrt{\pi}\, \text{erfi}\left(\frac{2 d \sqrt{z}\, \log(a) - i\left(c+2 f \sqrt{z}\right)}{2\sqrt{-i f+d \log(a)}}\right)}{(-i f + d \log(a))^{3/2}} + \frac{i c\, e^{\frac{c^2}{4 i f+4 d \log(a)}} \sqrt{\pi}\, \text{erfi}\left(\frac{i c+2\sqrt{z}\, (i f+d \log(a))}{2\sqrt{i f+d \log(a)}}\right)}{(i f + d \log(a))^{3/2}}\right)$$

01.06.21.0547.01

$$\int e^{d z} \sin\left(\sqrt{z}\, c + f z\right) dz = e^{d z - i f z - i c \sqrt{z}} \left(\frac{e^{2 i\left(\sqrt{z}\, c+f z\right)}}{2 i d - 2 f} + \frac{1}{-2 f - 2 i d}\right) + \frac{c\, e^{\frac{c^2}{4 d-4 i f}}\, i \sqrt{\pi}\, \text{erf}\left(\frac{c+2 (f+i d) \sqrt{z}}{2\sqrt{d-i f}}\right)}{4 (d - i f)^{3/2}} - \frac{c\, e^{\frac{c^2}{4 d+4 i f}} \sqrt{\pi}\, \text{erfi}\left(\frac{2\sqrt{z}\, (d+i f)+i c}{2\sqrt{d+i f}}\right)}{4 (d + i f)^{3/2}}$$

Involving $a^{d z+e} \sin\left(c z^r + f z\right)$

01.06.21.0548.01

$$\int a^{d z+e} \sin\left(c z^2 + f z\right) dz = -\frac{1}{4 c} \left(a^{e-\frac{d f}{2 c}}\, e^{-\frac{i\left(f^2+d^2 \log^2(a)\right)}{4 c}} \sqrt{\pi} \left(\sqrt{-i c}\; e^{\frac{i f^2}{2 c}}\, \text{erfi}\left(\frac{d \log(a) - i (f + 2 c z)}{2\sqrt{-i c}}\right) + \sqrt{i c}\; e^{\frac{i d^2 \log^2(a)}{2 c}}\, \text{erfi}\left(\frac{i (f + 2 c z) + d \log(a)}{2\sqrt{i c}}\right)\right)\right)$$

01.06.21.0549.01

$$\int e^{d z+e} \sin\left(c z^2 + f z\right) dz = -\frac{1}{4 c} \left(e^{-\frac{i\left(d^2-2 i f d+f^2+4 i c e\right)}{4 c}} \sqrt{\pi} \left(\sqrt{-i c}\; e^{\frac{i f^2}{2 c}}\, \text{erfi}\left(\frac{d - i (f + 2 c z)}{2\sqrt{-i c}}\right) + \sqrt{i c}\; e^{\frac{i d^2}{2 c}}\, \text{erfi}\left(\frac{d + i (f + 2 c z)}{2\sqrt{i c}}\right)\right)\right)$$

01.06.21.0550.01

$$\int a^{e+d z} \sin\left(\sqrt{z}\, c + f z\right) dz = \frac{1}{4} i a^e \left(2 e^{-i\left(\sqrt{z}\, c+f z\right)} i \left(\frac{e^{2 i\left(\sqrt{z}\, c+f z\right)}}{f - i d \log(a)} + \frac{1}{f + d i \log(a)}\right) a^{d z} + \frac{c\, e^{\frac{c^2}{-4 i f+4 d \log(a)}}\, i \sqrt{\pi}\, \text{erfi}\left(\frac{2 d \sqrt{z}\, \log(a) - i\left(c+2 f \sqrt{z}\right)}{2\sqrt{-i f+d \log(a)}}\right)}{(-i f + d \log(a))^{3/2}} + \frac{c\, e^{\frac{c^2}{4 i f+4 d \log(a)}}\, i \sqrt{\pi}\, \text{erfi}\left(\frac{i c+2\sqrt{z}\, (i f+d \log(a))}{2\sqrt{i f+d \log(a)}}\right)}{(i f + d \log(a))^{3/2}}\right)$$

01.06.21.0551.01

$$\int e^{d z+e} \sin\left(\sqrt{z}\, c + f z\right) dz = e^{e+d z-i f z-i c \sqrt{z}} \left(\frac{e^{2 i\left(\sqrt{z}\, c+f z\right)}}{2 i d - 2 f} + \frac{1}{-2 f - 2 i d}\right) + \frac{c\, e^{\frac{c^2+4 d e-4 i e f}{4 d-4 i f}}\, i \sqrt{\pi}\, \mathrm{erf}\left(\frac{c+2 (f+i d) \sqrt{z}}{2 \sqrt{d-i f}}\right)}{4 (d - i f)^{3/2}} - \frac{c\, e^{\frac{c^2+4 d e+4 i e f}{4 d+4 i f}} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{2 \sqrt{z}\, (d+i f)+i c}{2 \sqrt{d+i f}}\right)}{4 (d + i f)^{3/2}}$$

Involving $a^{b z^r} \sin\left(c z^r + f z\right)$

01.06.21.0552.01

$$\int a^{b z^2} \sin\left(c z^2 + f z\right) dz = \frac{1}{4\left(c^2 + b^2 \log^2(a)\right)} \left(i\, a^{\frac{b f^2}{2\left(c^2+b^2 \log^2(a)\right)}} \sqrt{\pi} \left(e^{-\frac{f^2}{4 i c+4 b \log(a)}}\, \mathrm{erfi}\left(\frac{2 b z \log(a) - i (f + 2 c z)}{2 \sqrt{-i c + b \log(a)}}\right) \sqrt{-i c + b \log(a)}\, (i c + b \log(a)) + e^{-\frac{f^2}{-4 i c+4 b \log(a)}}\, \mathrm{erfi}\left(\frac{i (f + 2 c z) + 2 b z \log(a)}{2 \sqrt{i c + b \log(a)}}\right) (i c - b \log(a)) \sqrt{i c + b \log(a)}\right)\right)$$

01.06.21.0553.01

$$\int e^{b z^2} \sin\left(c z^2 + f z\right) dz = \frac{1}{4\left(b^2 + c^2\right)} \left(i\, e^{\frac{b f^2}{2\left(b^2+c^2\right)}} \sqrt{\pi} \left((i c - b) \sqrt{b + i c}\; e^{-\frac{f^2}{4 b-4 i c}}\, \mathrm{erfi}\left(\frac{2 b z + i (f + 2 c z)}{2 \sqrt{b + i c}}\right) + (b + i c) \sqrt{b - i c}\; e^{-\frac{f^2}{4 b+4 i c}}\, \mathrm{erfi}\left(\frac{2 b z - i (f + 2 c z)}{2 \sqrt{b - i c}}\right)\right)\right)$$

01.06.21.0554.01

$$\int a^{b \sqrt{z}} \sin\left(\sqrt{z}\, c + f z\right) dz = -\frac{a^{b \sqrt{z}} \cos\left(\sqrt{z}\, c + f z\right)}{f} - \frac{e^{\frac{i c^2-2 b \log(a) c-i b^2 \log^2(a)}{4 f}} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b \log(a)-i\left(c+2 f \sqrt{z}\right)}{2 \sqrt{-i f}}\right) (c + b i \log(a))}{4 (-i f)^{3/2}} - \frac{e^{\frac{i\left(-c^2+2 b i \log(a) c+b^2 \log^2(a)\right)}{4 f}} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{i c+2 i f \sqrt{z}+b \log(a)}{2 \sqrt{i f}}\right) (c - i b \log(a))}{4 (i f)^{3/2}}$$

01.06.21.0555.01

$$\int e^{b \sqrt{z}} \sin\left(\sqrt{z}\, c + f z\right) dz = -\frac{(c + i b)\, e^{\frac{-i b^2-2 c b+c^2 i}{4 f}} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b-i\left(c+2 f \sqrt{z}\right)}{2 \sqrt{-i f}}\right)}{4 (-i f)^{3/2}} - \frac{(c - i b)\, e^{\frac{i\left(b^2+2 i c b-c^2\right)}{4 f}} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b+i c+2 i f \sqrt{z}}{2 \sqrt{i f}}\right)}{4 (i f)^{3/2}} - \frac{e^{b \sqrt{z}} \cos\left(\sqrt{z}\, c + f z\right)}{f}$$

Involving $a^{b z^r+e} \sin\left(c z^r + f z\right)$

01.06.21.0556.01

$$\int a^{b z^2+e} \sin\left(c z^2+f z\right) dz = \frac{1}{4\left(c^2+b^2 \log^2(a)\right)} \left(i\, a^{\frac{b f^2}{2\left(c^2+b^2 \log^2(a)\right)}+e} \sqrt{\pi} \left(e^{-\frac{f^2}{4 i c+4 b \log(a)}} \operatorname{erfi}\left(\frac{2 b z \log(a)-i(f+2 c z)}{2\sqrt{-i c+b \log(a)}}\right) \sqrt{-i c+b \log(a)}\, (i c+b \log(a)) + e^{-\frac{f^2}{-4 i c+4 b \log(a)}} \operatorname{erfi}\left(\frac{i(f+2 c z)+2 b z \log(a)}{2\sqrt{i c+b \log(a)}}\right) (i c-b \log(a)) \sqrt{i c+b \log(a)}\right)\right)$$

01.06.21.0557.01

$$\int e^{b z^2+e} \sin\left(c z^2+f z\right) dz = \frac{1}{4\left(b^2+c^2\right)} \left(i\, e^{\frac{b f^2}{2\left(b^2+c^2\right)}+e} \sqrt{\pi} \left((i c-b)\sqrt{b+i c}\; e^{-\frac{f^2}{4 b-4 i c}} \operatorname{erfi}\left(\frac{2 b z+i(f+2 c z)}{2\sqrt{b+i c}}\right) + (b+i c)\sqrt{b-i c}\; e^{-\frac{f^2}{4 b+4 i c}} \operatorname{erfi}\left(\frac{2 b z-i(f+2 c z)}{2\sqrt{b-i c}}\right)\right)\right)$$

01.06.21.0558.01

$$\int a^{\sqrt{z}\, b+e} \sin\left(\sqrt{z}\, c+f z\right) dz = -\frac{a^{\sqrt{z}\, b+e} \cos\left(\sqrt{z}\, c+f z\right)}{f} - \frac{e^{\frac{i c^2-i b^2 \log^2(a)+(4 e f-2 b c)\log(a)}{4 f}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b \log(a)-i\left(c+2 f \sqrt{z}\right)}{2\sqrt{-i f}}\right)(c+b\, i \log(a))}{4(-i f)^{3/2}} - \frac{e^{\frac{i\left(-c^2+b^2 \log^2(a)+2(b c-2 e f) i \log(a)\right)}{4 f}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{i c+2 i f \sqrt{z}+b \log(a)}{2\sqrt{i f}}\right)(c-i b \log(a))}{4(i f)^{3/2}}$$

01.06.21.0559.01

$$\int e^{\sqrt{z}\, b+e} \sin\left(\sqrt{z}\, c+f z\right) dz = -\frac{(c+i b)\, e^{\frac{-i b^2-2 c b+4 e f+c^2 i}{4 f}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b-i\left(c+2 f \sqrt{z}\right)}{2\sqrt{-i f}}\right)}{4(-i f)^{3/2}} - \frac{(c-i b)\, e^{\frac{i\left(b^2-c^2+2(b c-2 e f) i\right)}{4 f}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+i c+2 i f \sqrt{z}}{2\sqrt{i f}}\right)}{4(i f)^{3/2}} - \frac{e^{\sqrt{z}\, b+e} \cos\left(\sqrt{z}\, c+f z\right)}{f}$$

Involving $a^{b z^r+d z} \sin\left(c z^r+f z\right)$

01.06.21.0560.01

$$\int a^{b z^2+d z} \sin\left(c z^2 + f z\right) dz = \frac{1}{4\left(c^2 + b^2 \log^2(a)\right)} \left(i\, a^{\frac{b\left(f^2-d^2 \log^2(a)\right)}{2\left(c^2+b^2 \log^2(a)\right)} + \frac{d f}{2 i b \log(a) - 2c}} \sqrt{\pi} \left(e^{\frac{d^2 \log^2(a) - f^2}{4 i c + 4 b \log(a)}} \operatorname{erfi}\left(\frac{(d + 2 b z)\log(a) - i (f + 2 c z)}{2\sqrt{-i c + b \log(a)}}\right) \sqrt{-i c + b \log(a)}\, (i c + b \log(a))\, a^{\frac{i b d f \log(a)}{c^2+b^2 \log^2(a)}} + e^{\frac{d^2 \log^2(a) - f^2}{-4 i c + 4 b \log(a)}} \operatorname{erfi}\left(\frac{i (f + 2 c z) + (d + 2 b z)\log(a)}{2\sqrt{i c + b \log(a)}}\right) \sqrt{i c + b \log(a)}\, (i c - b \log(a)) \right) \right)$$

01.06.21.0561.01

$$\int e^{b z^2+d z} \sin\left(c z^2 + f z\right) dz = \frac{1}{4 (b + i c)(c + i b)} \left(e^{-\frac{c i (d - i f)^2 + 2 b d (d + i f)}{4\left(b^2+c^2\right)}} \sqrt{\pi} \left((b - i c)\sqrt{b + i c}\; e^{\frac{b\left(d^2+f^2\right) + 2 c\left(d^2 - f^2\right) i}{4\left(b^2+c^2\right)}} \operatorname{erfi}\left(\frac{d + i f + 2 (b + i c) z}{2\sqrt{b + i c}}\right) - \sqrt{b - i c}\, (b + i c)\, e^{\frac{b\left(d^2 + 4 i f d + f^2\right)}{4\left(b^2+c^2\right)}} \operatorname{erfi}\left(\frac{d - i (f + 2 (c + i b) z)}{2\sqrt{b - i c}}\right) \right) \right)$$

01.06.21.0562.01

$$\int a^{\sqrt{z}\, b + d z} \sin\left(\sqrt{z}\, c + f z\right) dz = -\left(\frac{e^{-i\left(\sqrt{z}\, c + f z\right)} a^{\sqrt{z}\, b + d z}}{2 (f + d i \log(a))} + \frac{e^{i\left(\sqrt{z}\, c + f z\right)} a^{\sqrt{z}\, b + d z}}{2 (f - i d \log(a))} + \frac{1}{4 (i f + d \log(a))^{3/2}} \left(e^{-\frac{-c^2 + 2 b i \log(a) c + b^2 \log^2(a)}{4 (i f + d \log(a))}} \sqrt{\pi} \operatorname{erfi}\left(\frac{i c + b \log(a) + 2\sqrt{z}\, (i f + d \log(a))}{2\sqrt{i f + d \log(a)}}\right) (c - i b \log(a)) \right) + \frac{e^{\frac{i c^2 - 2 b \log(a) c - i b^2 \log^2(a)}{4 (f + d i \log(a))}} \sqrt{\pi} \operatorname{erfi}\left(\frac{\left(b + 2 d \sqrt{z}\right)\log(a) - i\left(c + 2 f \sqrt{z}\right)}{2\sqrt{-i f + d \log(a)}}\right) (c + b i \log(a))}{4 (-i f + d \log(a))^{3/2}} \right)$$

01.06.21.0563.01

$$\int e^{\sqrt{z}\, b + d z} \sin\left(\sqrt{z}\, c + f z\right) dz = -\frac{(c - i b)\, e^{-\frac{b^2 + 2 i c b - c^2}{4 (d + i f)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b + i c + 2 (d + i f)\sqrt{z}}{2\sqrt{d + i f}}\right)}{4 (d + i f)^{3/2}} - \frac{e^{\sqrt{z}\, b + d z + i\left(\sqrt{z}\, c + f z\right)}}{2 (f - i d)} - \frac{e^{\sqrt{z}\, b + d z - i\left(\sqrt{z}\, c + f z\right)}}{2 (f + i d)} - \frac{(c + i b)\, e^{\frac{-i b^2 - 2 c b + c^2 i}{4 (f + i d)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b - i\left(c + 2 f \sqrt{z}\right) + 2 d \sqrt{z}}{2\sqrt{d - i f}}\right)}{4 (d - i f)^{3/2}}$$

Involving $a^{b z^r + d z + e} \sin\left(c z^r + f z\right)$

01.06.21.0564.01

$$\int a^{b z^2+d z+e} \sin\left(c z^2+f z\right) dz = \frac{1}{4\left(c^2+b^2 \log^2(a)\right)} \left(i\, a^{e+\frac{b\left(f^2-d^2 \log^2(a)\right)}{2\left(c^2+b^2 \log^2(a)\right)}+\frac{d f}{2 i b \log(a)-2 c}} \sqrt{\pi} \left(e^{\frac{d^2 \log^2(a)-f^2}{4 i c+4 b \log(a)}} \operatorname{erfi}\left(\frac{(d+2 b z) \log(a)-i (f+2 c z)}{2 \sqrt{-i c+b \log(a)}}\right) \sqrt{-i c+b \log(a)}\, (i c+b \log(a))\, a^{\frac{i b d f \log(a)}{c^2+b^2 \log^2(a)}} + e^{\frac{d^2 \log^2(a)-f^2}{-4 i c+4 b \log(a)}} \operatorname{erfi}\left(\frac{i (f+2 c z)+(d+2 b z) \log(a)}{2 \sqrt{i c+b \log(a)}}\right) \sqrt{i c+b \log(a)}\, (i c-b \log(a))\right)\right)$$

01.06.21.0565.01

$$\int e^{b z^2+d z+e} \sin\left(c z^2+f z\right) dz = \frac{1}{4\left(b^2+c^2\right)} \left(i\, e^{\frac{4 e b^2-2 d (d+i f) b+c\left(-i d^2-2 f d+4 c e+f^2 i\right)}{4\left(b^2+c^2\right)}} \sqrt{\pi} \left(\sqrt{b+i c}\, (b-i c)\, e^{\frac{b\left(d^2+f^2\right)+2 c\left(d^2-f^2\right) i}{4\left(b^2+c^2\right)}} \operatorname{erfi}\left(\frac{-d-i f-2 b z-2 i c z}{2 \sqrt{b+i c}}\right) + (b+i c) \sqrt{b-i c}\, e^{\frac{b\left(d^2+4 i f d+f^2\right)}{4\left(b^2+c^2\right)}} \operatorname{erfi}\left(\frac{d-i (f+2 (c+i b) z)}{2 \sqrt{b-i c}}\right)\right)\right)$$

01.06.21.0566.01

$$\int a^{\sqrt{z}\, b+e+d z} \sin\left(\sqrt{z}\, c+f z\right) dz = -i \frac{1}{4} a^e \left(-i\, 2\, e^{-i\left(\sqrt{z}\, c+f z\right)} \left(\frac{e^{2 i\left(\sqrt{z}\, c+f z\right)}}{f-i d \log(a)}+\frac{1}{f+d\, i \log(a)}\right) a^{\sqrt{z}\, b+d z} + \frac{e^{\frac{(c+b i \log(a))^2}{-4 i f+4 d \log(a)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{\left(b+2 d \sqrt{z}\right) \log(a)-i\left(c+2 f \sqrt{z}\right)}{2 \sqrt{-i f+d \log(a)}}\right) (-i c+b \log(a))}{(-i f+d \log(a))^{3/2}} - \frac{e^{\frac{(c-i b \log(a))^2}{4 i f+4 d \log(a)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{i c+b \log(a)+2 \sqrt{z}\, (i f+d \log(a))}{2 \sqrt{i f+d \log(a)}}\right) (i c+b \log(a))}{(i f+d \log(a))^{3/2}}\right)$$

01.06.21.0567.01

$$\int e^{\sqrt{z}\, b+d z+e} \sin\left(\sqrt{z}\, c+f z\right) dz = -\frac{(c-i b)\, e^{-\frac{b^2-c^2-4 d e+2 (b c-2 e f) i}{4 (d+i f)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b+i c+2 (d+i f) \sqrt{z}}{2 \sqrt{d+i f}}\right)}{4 (d+i f)^{3/2}} - \frac{e^{\sqrt{z}\, b+e+d z+i\left(\sqrt{z}\, c+f z\right)}}{2 (f-i d)} - \frac{e^{\sqrt{z}\, b+e+d z-i\left(\sqrt{z}\, c+f z\right)}}{2 (f+i d)} - \frac{(c+i b)\, e^{\frac{i c^2-2 b c-i\left(b^2-4 d e\right)+4 e f}{4 (f+i d)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b-i\left(c+2 f \sqrt{z}\right)+2 d \sqrt{z}}{2 \sqrt{d-i f}}\right)}{4 (d-i f)^{3/2}}$$

Involving $a^{d z} \sin\left(c z^r+f z+g\right)$

01.06.21.0568.01

$$\int a^{d z} \sin\left(c z^2 + f z + g\right) dz = -\frac{1}{4 c} \left(a^{-\frac{d f}{2 c}} e^{-\frac{i \left(f^2 + d^2 \log^2(a) + 4 c g\right)}{4 c}} \sqrt{\pi} \left(\sqrt{-i c}\, e^{\frac{i f^2}{2 c}} \operatorname{erfi}\left(\frac{d \log(a) - i (f + 2 c z)}{2 \sqrt{-i c}}\right) + \sqrt{i c}\, e^{\frac{1}{2} i \left(\frac{d^2 \log^2(a)}{c} + 4 g\right)} \operatorname{erfi}\left(\frac{i (f + 2 c z) + d \log(a)}{2 \sqrt{i c}}\right)\right)\right)$$

01.06.21.0569.01

$$\int e^{d z} \sin\left(c z^2 + f z + g\right) dz = -\frac{1}{4 c} \left(e^{-\frac{i \left(d^2 - 2 i f d + f^2 + 4 c g\right)}{4 c}} \sqrt{\pi} \left(\sqrt{-i c}\, e^{\frac{i f^2}{2 c}} \operatorname{erfi}\left(\frac{d - i (f + 2 c z)}{2 \sqrt{-i c}}\right) + \sqrt{i c}\, e^{\frac{i \left(d^2 + 4 c g\right)}{2 c}} \operatorname{erfi}\left(\frac{d + i (f + 2 c z)}{2 \sqrt{i c}}\right)\right)\right)$$

01.06.21.0570.01

$$\int a^{d z} \sin\left(\sqrt{z}\, c + f z + g\right) dz = -\frac{1}{4} i\, e^{-i g} \left(-2 i\, e^{-i \left(\sqrt{z}\, c + f z\right)} \left(\frac{e^{2 i \left(\sqrt{z}\, c + g + f z\right)}}{f - i d \log(a)} + \frac{1}{f + d i \log(a)}\right) a^{d z} - \frac{i c\, e^{\frac{c^2}{-4 i f + 4 d \log(a)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{2 d \sqrt{z} \log(a) - i \left(c + 2 f \sqrt{z}\right)}{2 \sqrt{-i f + d \log(a)}}\right)}{(-i f + d \log(a))^{3/2}} - \frac{i c\, e^{\frac{c^2}{4 i f + 4 d \log(a)} + 2 i g} \sqrt{\pi} \operatorname{erfi}\left(\frac{i c + 2 \sqrt{z}\, (i f + d \log(a))}{2 \sqrt{i f + d \log(a)}}\right)}{(i f + d \log(a))^{3/2}}\right)$$

01.06.21.0571.01

$$\int e^{d z} \sin\left(\sqrt{z}\, c + f z + g\right) dz = -\frac{c\, e^{-\frac{-c^2 - 4 i d g + 4 f g}{4 (d + i f)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{2 \sqrt{z}\, (d + i f) + i c}{2 \sqrt{d + i f}}\right)}{4 (d + i f)^{3/2}} - \frac{e^{d z + i \left(\sqrt{z}\, c + g + f z\right)}}{2 (f - i d)} - \frac{e^{d z - i \left(\sqrt{z}\, c + g + f z\right)}}{2 (f + i d)} - \frac{c\, e^{\frac{4 d g + \left(c^2 - 4 f g\right) i}{4 (f + i d)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{2 d \sqrt{z} - i \left(c + 2 f \sqrt{z}\right)}{2 \sqrt{d - i f}}\right)}{4 (d - i f)^{3/2}}$$

Involving $a^{d z + e} \sin\left(c z^r + f z + g\right)$

01.06.21.0572.01

$$\int a^{d z + e} \sin\left(c z^2 + f z + g\right) dz = -\frac{1}{4 c} \left(a^{e - \frac{d f}{2 c}} e^{-\frac{i \left(f^2 + d^2 \log^2(a) + 4 c g\right)}{4 c}} \sqrt{\pi} \left(\sqrt{-i c}\, e^{\frac{i f^2}{2 c}} \operatorname{erfi}\left(\frac{d \log(a) - i (f + 2 c z)}{2 \sqrt{-i c}}\right) + \sqrt{i c}\, e^{\frac{1}{2} i \left(\frac{d^2 \log^2(a)}{c} + 4 g\right)} \operatorname{erfi}\left(\frac{i (f + 2 c z) + d \log(a)}{2 \sqrt{i c}}\right)\right)\right)$$

01.06.21.0573.01

$$\int e^{d z + e} \sin\left(c z^2 + f z + g\right) dz = -\frac{1}{4 c} \left(e^{-\frac{i \left(d^2 - 2 i f d + f^2 + 4 c (g + i e)\right)}{4 c}} \sqrt{\pi} \left(\sqrt{-i c}\, e^{\frac{i f^2}{2 c}} \operatorname{erfi}\left(\frac{d - i (f + 2 c z)}{2 \sqrt{-i c}}\right) + \sqrt{i c}\, e^{\frac{i \left(d^2 + 4 c g\right)}{2 c}} \operatorname{erfi}\left(\frac{d + i (f + 2 c z)}{2 \sqrt{i c}}\right)\right)\right)$$

01.06.21.0574.01

$$\int a^{d z+e} \sin\left(\sqrt{z}\, c+f z+g\right) dz = -\frac{e^{-i\left(\sqrt{z}\, c+g+f z\right)} a^{e+d z}}{2 (f+d i \log(a))}-\frac{e^{i\left(\sqrt{z}\, c+g+f z\right)} a^{e+d z}}{2 (f-i d \log(a))}-\frac{c\, e^{\frac{4 d e i \log^2(a)+(4 e f+4 d g) \log(a)+\left(c^2-4 f g\right) i}{4(f+d i \log(a))}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{2 d \sqrt{z} \log(a)-i\left(c+2 f \sqrt{z}\right)}{2 \sqrt{-i f+d \log(a)}}\right)}{4(-i f+d \log(a))^{3/2}}-\frac{c\, e^{-\frac{-c^2-4 d e \log^2(a)+4 f g-4 i (e f+d g) \log(a)}{4(i f+d \log(a))}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{i c+2 \sqrt{z}\, (i f+d \log(a))}{2 \sqrt{i f+d \log(a)}}\right)}{4(i f+d \log(a))^{3/2}}$$

01.06.21.0575.01

$$\int a^{d z+e} \sin\left(\sqrt{z}\, c+f z+g\right) dz = -\frac{1}{4} i a^e e^{-i g}\left(-2 i e^{-i\left(\sqrt{z}\, c+f z\right)}\left(\frac{e^{2 i\left(\sqrt{z}\, c+g+f z\right)}}{f-i d \log(a)}+\frac{1}{f+d i \log(a)}\right) a^{d z}-\frac{i c\, e^{\frac{c^2}{-4 i f+4 d \log(a)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{2 d \sqrt{z} \log(a)-i\left(c+2 f \sqrt{z}\right)}{2 \sqrt{-i f+d \log(a)}}\right)}{(-i f+d \log(a))^{3/2}}-\frac{i c\, e^{\frac{c^2}{4 i f+4 d \log(a)}+2 i g} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{i c+2 \sqrt{z}\, (i f+d \log(a))}{2 \sqrt{i f+d \log(a)}}\right)}{(i f+d \log(a))^{3/2}}\right)$$

01.06.21.0576.01

$$\int e^{e+d z} \sin\left(\sqrt{z}\, c+g+f z\right) dz = -\frac{c\, e^{-\frac{-c^2-4 d e+4 f g-4 i (e f+d g)}{4(d+i f)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{2 \sqrt{z}\, (d+i f)+i c}{2 \sqrt{d+i f}}\right)}{4(d+i f)^{3/2}}-\frac{e^{e+d z+i\left(\sqrt{z}\, c+g+f z\right)}}{2(f-i d)}-\frac{e^{e+d z-i\left(\sqrt{z}\, c+g+f z\right)}}{2(f+i d)}-\frac{c\, e^{\frac{4 e f+4 d g+4 i d e+\left(c^2-4 f g\right) i}{4(f+i d)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{2 d \sqrt{z}-i\left(c+2 f \sqrt{z}\right)}{2 \sqrt{d-i f}}\right)}{4(d-i f)^{3/2}}$$

Involving $a^{b z^r} \sin\left(c z^r+f z+g\right)$

01.06.21.0577.01

$$\int a^{b z^2} \sin\left(c z^2+f z+g\right) dz = \frac{1}{4\left(c^2+b^2 \log^2(a)\right)}\left(i a^{\frac{b f^2}{2\left(c^2+b^2 \log^2(a)\right)}} \sqrt{\pi}\left(e^{-\frac{f^2}{4 i c+4 b \log(a)}-i g} \operatorname{erfi}\left(\frac{2 b z \log(a)-i(f+2 c z)}{2 \sqrt{-i c+b \log(a)}}\right) \sqrt{-i c+b \log(a)}\, (i c+b \log(a))+e^{i g-\frac{f^2}{-4 i c+4 b \log(a)}} \operatorname{erfi}\left(\frac{i(f+2 c z)+2 b z \log(a)}{2 \sqrt{i c+b \log(a)}}\right)(i c-b \log(a)) \sqrt{i c+b \log(a)}\right)\right)$$

01.06.21.0578.01

$$\int e^{b z^2}\sin\left(c z^2+f z+g\right)dz = \frac{1}{4\left(b^2+c^2\right)}\left(i\, e^{\frac{b f^2}{2\left(b^2+c^2\right)}}\sqrt{\pi}\left((i c-b)\sqrt{b+i c}\; e^{i g-\frac{f^2}{4 b-4 i c}}\operatorname{erfi}\left(\frac{2 b z+i(f+2 c z)}{2\sqrt{b+i c}}\right)+(b+i c)\sqrt{b-i c}\; e^{-\frac{f^2}{4 b+4 i c}-i g}\operatorname{erfi}\left(\frac{2 b z-i(f+2 c z)}{2\sqrt{b-i c}}\right)\right)\right)$$

01.06.21.0579.01

$$\int a^{\sqrt{z}\, b}\sin\left(\sqrt{z}\, c+f z+g\right)dz = -\frac{\cos\left(\sqrt{z}\, c+g+f z\right)a^{b\sqrt{z}}}{f}-\frac{e^{\frac{-i b^2\log^2(a)-2 b c\log(a)+\left(c^2-4 f g\right)i}{4 f}}\sqrt{\pi}\operatorname{erfi}\left(\frac{b\log(a)-i\left(c+2 f\sqrt{z}\right)}{2\sqrt{-i f}}\right)(c+b\, i\log(a))}{4(-i f)^{3/2}}-\frac{e^{\frac{i\left(-c^2+2 b i\log(a)c+b^2\log^2(a)+4 f g\right)}{4 f}}\sqrt{\pi}\operatorname{erfi}\left(\frac{i\left(c+2 f\sqrt{z}\right)+b\log(a)}{2\sqrt{i f}}\right)(c-i b\log(a))}{4(i f)^{3/2}}$$

01.06.21.0580.01

$$\int e^{b\sqrt{z}}\sin\left(\sqrt{z}\, c+f z+g\right)dz = -\frac{(c+i b)\, e^{\frac{-i b^2-2 c b+\left(c^2-4 f g\right)i}{4 f}}\sqrt{\pi}\operatorname{erfi}\left(\frac{b-i\left(c+2 f\sqrt{z}\right)}{2\sqrt{-i f}}\right)}{4(-i f)^{3/2}}-\frac{(c-i b)\, e^{\frac{i\left(b^2+2 i c b-c^2+4 f g\right)}{4 f}}\sqrt{\pi}\operatorname{erfi}\left(\frac{b+i c+2 i f\sqrt{z}}{2\sqrt{i f}}\right)}{4(i f)^{3/2}}-\frac{e^{b\sqrt{z}}\cos\left(\sqrt{z}\, c+g+f z\right)}{f}$$

Involving $a^{b z^r+e}\sin\left(c z^r+f z+g\right)$

01.06.21.0581.01

$$\int a^{b z^2+e}\sin\left(c z^2+f z+g\right)dz = \frac{1}{4\left(c^2+b^2\log^2(a)\right)}\left(i\, a^{\frac{b f^2}{2\left(c^2+b^2\log^2(a)\right)}+e}\sqrt{\pi}\left(e^{-\frac{f^2}{4 i c+4 b\log(a)}-i g}\operatorname{erfi}\left(\frac{2 b z\log(a)-i(f+2 c z)}{2\sqrt{-i c+b\log(a)}}\right)\sqrt{-i c+b\log(a)}\,(i c+b\log(a))+e^{i g-\frac{f^2}{-4 i c+4 b\log(a)}}\operatorname{erfi}\left(\frac{i(f+2 c z)+2 b z\log(a)}{2\sqrt{i c+b\log(a)}}\right)(i c-b\log(a))\sqrt{i c+b\log(a)}\right)\right)$$

01.06.21.0582.01

$$\int e^{b z^2+e}\sin\left(c z^2+f z+g\right)dz = \frac{1}{4\left(b^2+c^2\right)}\left(i\, e^{\frac{b f^2}{2\left(b^2+c^2\right)}+e}\sqrt{\pi}\left((i c-b)\sqrt{b+i c}\; e^{i g-\frac{f^2}{4 b-4 i c}}\operatorname{erfi}\left(\frac{2 b z+i(f+2 c z)}{2\sqrt{b+i c}}\right)+(b+i c)\sqrt{b-i c}\; e^{-\frac{f^2}{4 b+4 i c}-i g}\operatorname{erfi}\left(\frac{2 b z-i(f+2 c z)}{2\sqrt{b-i c}}\right)\right)\right)$$

01.06.21.0583.01

$$\int a^{\sqrt{z}\, b+e} \sin\left(\sqrt{z}\, c + f\, z + g\right) dz = -\frac{\cos\left(\sqrt{z}\, c + g + f\, z\right) a^{\sqrt{z}\, b+e}}{f} - \frac{e^{\frac{-i\, b^2 \log^2(a) + (4\, e\, f - 2\, b\, c) \log(a) + \left(c^2 - 4\, f\, g\right) i}{4\, f}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b \log(a) - i\left(c + 2\, f\, \sqrt{z}\right)}{2\sqrt{-i\, f}}\right)(c + b\, i \log(a))}{4\, (-i\, f)^{3/2}} - \frac{e^{\frac{i\left(-c^2 + b^2 \log^2(a) + 4\, f\, g + 2\, (b\, c - 2\, e\, f)\, i \log(a)\right)}{4\, f}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{i\left(c + 2\, f\, \sqrt{z}\right) + b \log(a)}{2\sqrt{i\, f}}\right)(c - i\, b \log(a))}{4\, (i\, f)^{3/2}}$$

01.06.21.0584.01

$$\int e^{\sqrt{z}\, b+e} \sin\left(\sqrt{z}\, c + f\, z + g\right) dz = -\frac{(c + i\, b)\, e^{\frac{-i\, b^2 - 2\, c\, b + 4\, e\, f + \left(c^2 - 4\, f\, g\right) i}{4\, f}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b - i\left(c + 2\, f\, \sqrt{z}\right)}{2\sqrt{-i\, f}}\right)}{4\, (-i\, f)^{3/2}} - \frac{(c - i\, b)\, e^{\frac{i\left(b^2 - c^2 + 4\, f\, g + 2\, (b\, c - 2\, e\, f)\, i\right)}{4\, f}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b + i\, c + 2\, i\, f\, \sqrt{z}}{2\sqrt{i\, f}}\right)}{4\, (i\, f)^{3/2}} - \frac{e^{\sqrt{z}\, b+e} \cos\left(\sqrt{z}\, c + g + f\, z\right)}{f}$$

Involving $a^{b\, z^r + d\, z} \sin\left(c\, z^r + f\, z + g\right)$

01.06.21.0585.01

$$\int a^{b\, z^2 + d\, z} \sin\left(c\, z^2 + f\, z + g\right) dz = \frac{1}{4\left(c^2 + b^2 \log^2(a)\right)} \left(i\, a^{\frac{b\left(f^2 - d^2 \log^2(a)\right)}{2\left(c^2 + b^2 \log^2(a)\right)} + \frac{d\, f}{2\, i\, b \log(a) - 2\, c}} \sqrt{\pi} \left(e^{\frac{d^2 \log^2(a) - f^2}{4\, i\, c + 4\, b \log(a)} - i\, g} \operatorname{erfi}\left(\frac{(d + 2\, b\, z) \log(a) - i\, (f + 2\, c\, z)}{2\sqrt{-i\, c + b \log(a)}}\right) \sqrt{-i\, c + b \log(a)}\, (i\, c + b \log(a))\, a^{\frac{i\, b\, d\, f \log(a)}{c^2 + b^2 \log^2(a)}} + e^{\frac{d^2 \log^2(a) - f^2}{-4\, i\, c + 4\, b \log(a)} + i\, g} \operatorname{erfi}\left(\frac{i\, (f + 2\, c\, z) + (d + 2\, b\, z) \log(a)}{2\sqrt{i\, c + b \log(a)}}\right) \sqrt{i\, c + b \log(a)}\, (i\, c - b \log(a))\right)\right)$$

01.06.21.0586.01

$$\int e^{b\, z^2 + d\, z} \sin\left(c\, z^2 + f\, z + g\right) dz = \frac{1}{4\, (b + i\, c)\, (c + i\, b)} \left(e^{-\frac{c\, i\, (d - i\, f)^2 + 2\, b\, d\, (d + i\, f)}{4\left(b^2 + c^2\right)}} \sqrt{\pi} \left((b - i\, c) \sqrt{b + i\, c}\; e^{\frac{b\left(d^2 + f^2\right) + 2\, c\left(d^2 - f^2\right) i}{4\left(b^2 + c^2\right)}} \operatorname{erfi}\left(\frac{d + i\, f + 2\, (b + i\, c)\, z}{2\sqrt{b + i\, c}}\right)(\cos(g) + i \sin(g)) - \sqrt{b - i\, c}\, (b + i\, c)\, e^{\frac{b\left(d^2 + 4\, i\, f\, d + f^2\right)}{4\left(b^2 + c^2\right)}} \operatorname{erfi}\left(\frac{d - i\, (f + 2\, (c + i\, b)\, z)}{2\sqrt{b - i\, c}}\right)(\cos(g) - i \sin(g))\right)\right)$$

01.06.21.0587.01

$$\int a^{\sqrt{z}\, b+d\, z} \sin\left(\sqrt{z}\, c+f\, z+g\right) dz = -i \frac{1}{4} e^{-i g} \left(-i\, 2\, e^{-i\left(\sqrt{z}\, c+f\, z\right)} \left(\frac{e^{2 i\left(\sqrt{z}\, c+g+f\, z\right)}}{f-i\, d \log(a)} + \frac{1}{f+d\, i \log(a)} \right) a^{\sqrt{z}\, b+d\, z} + \frac{e^{\frac{(c+b\, i \log(a))^2}{-4 i f+4 d \log(a)}} \sqrt{\pi}\, \text{erfi}\left(\frac{\left(b+2 d \sqrt{z}\right)\log(a)-i\left(c+2 f \sqrt{z}\right)}{2\sqrt{-i f+d \log(a)}} \right) (-i\, c+b \log(a))}{(-i\, f+d \log(a))^{3/2}} - \frac{e^{\frac{(c-i\, b \log(a))^2}{4 i f+4 d \log(a)}+2 i g} \sqrt{\pi}\, \text{erfi}\left(\frac{i\, c+b \log(a)+2\sqrt{z}\, (i\, f+d \log(a))}{2\sqrt{i\, f+d \log(a)}} \right) (i\, c+b \log(a))}{(i\, f+d \log(a))^{3/2}} \right)$$

01.06.21.0588.01

$$\int e^{\sqrt{z}\, b+d\, z} \sin\left(\sqrt{z}\, c+f\, z+g\right) dz = -\frac{(c-i\, b)\, e^{-\frac{b^2-c^2+4 f g+2 (b c-2 d g) i}{4 (d+i f)}} \sqrt{\pi}\, \text{erfi}\left(\frac{b+i\, c+2 (d+i\, f)\sqrt{z}}{2\sqrt{d+i\, f}} \right)}{4 (d+i\, f)^{3/2}} - \frac{(c+i\, b)\, e^{\frac{-i b^2-2 c b+4 d g+\left(c^2-4 f g\right) i}{4 (f+i d)}} \sqrt{\pi}\, \text{erfi}\left(\frac{b-i\left(c+2 f \sqrt{z}\right)+2 d \sqrt{z}}{2\sqrt{d-i\, f}} \right)}{4 (d-i\, f)^{3/2}} - \frac{e^{\sqrt{z}\, b+d\, z+i\left(\sqrt{z}\, c+g+f\, z\right)}}{2 (f-i\, d)} - \frac{e^{\sqrt{z}\, b+d\, z-i\left(\sqrt{z}\, c+g+f\, z\right)}}{2 (f+i\, d)}$$

Involving $a^{b z^r+d z+e} \sin\left(c\, z^r+f\, z+g\right)$

01.06.21.0589.01

$$\int a^{b z^2+d z+e} \sin\left(c\, z^2+f\, z+g\right) dz = \frac{1}{4\left(c^2+b^2 \log^2(a)\right)} \left(i\, a^{e+\frac{b\left(f^2-d^2 \log^2(a)\right)}{2\left(c^2+b^2 \log^2(a)\right)}+\frac{d f}{2 i b \log(a)-2 c}} \sqrt{\pi} \left(e^{\frac{d^2 \log^2(a)-f^2}{4 i c+4 b \log(a)}-i g}\, \text{erfi}\left(\frac{(d+2 b z)\log(a)-i\, (f+2 c z)}{2\sqrt{-i\, c+b \log(a)}} \right) \sqrt{-i\, c+b \log(a)}\, (i\, c+b \log(a))\, a^{\frac{i b d f \log(a)}{c^2+b^2 \log^2(a)}} + e^{\frac{d^2 \log^2(a)-f^2}{-4 i c+4 b \log(a)}+i g}\, \text{erfi}\left(\frac{i\, (f+2 c z)+(d+2 b z)\log(a)}{2\sqrt{i\, c+b \log(a)}} \right) \sqrt{i\, c+b \log(a)}\, (i\, c-b \log(a)) \right) \right)$$

01.06.21.0590.01

$$\int e^{b z^2+d z+e} \sin\left(c z^2 + f z + g\right) dz = \frac{1}{4 (b - i c) (c - i b)} \left(e^{\frac{4 e b^2-2 d (d+i f) b+c\left(-i d^2-2 f d+4 c e+f^2 i\right)}{4\left(b^2+c^2\right)}} \sqrt{\pi} \left(\sqrt{b + i c}\, (b - i c)\, e^{\frac{b\left(d^2+f^2\right)+2 c\left(d^2-f^2\right) i}{4\left(b^2+c^2\right)}} \operatorname{erfi}\left(\frac{-d - i f - 2 b z - 2 i c z}{2 \sqrt{b + i c}}\right) (\cos(g) + i \sin(g)) + (b + i c) \sqrt{b - i c}\, e^{\frac{b\left(d^2+4 i f d+f^2\right)}{4\left(b^2+c^2\right)}} \operatorname{erfi}\left(\frac{d - i (f + 2 (c + i b) z)}{2 \sqrt{b - i c}}\right) (\cos(g) - i \sin(g))\right)\right)$$

01.06.21.0591.01

$$\int a^{\sqrt{z}\, b+d z+e} \sin\left(\sqrt{z}\, c + f z + g\right) dz = -i \frac{1}{4} a^e e^{-i g} \left(-i\, 2\, e^{-i\left(\sqrt{z}\, c+f z\right)} \left(\frac{e^{2 i\left(\sqrt{z}\, c+g+f z\right)}}{f - i d \log(a)} + \frac{1}{f + d i \log(a)}\right) a^{\sqrt{z}\, b+d z} + \frac{e^{\frac{(c+b i \log(a))^2}{-4 i f+4 d \log(a)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{\left(b+2 d \sqrt{z}\right) \log(a)-i\left(c+2 f \sqrt{z}\right)}{2 \sqrt{-i f+d \log(a)}}\right) (-i c + b \log(a))}{(-i f + d \log(a))^{3/2}} - \frac{e^{\frac{(c-i b \log(a))^2}{4 i f+4 d \log(a)}+2 i g} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{i c+b \log(a)+2 \sqrt{z}\, (i f+d \log(a))}{2 \sqrt{i f+d \log(a)}}\right) (i c + b \log(a))}{(i f + d \log(a))^{3/2}}\right)$$

01.06.21.0592.01

$$\int e^{\sqrt{z}\, b+d z+e} \sin\left(\sqrt{z}\, c + f z + g\right) dz = -\frac{(c - i b)\, e^{-\frac{b^2-c^2-4 d e+4 f g+2 (b c-2 (e f+d g)) i}{4 (d+i f)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+i c+2 (d+i f) \sqrt{z}}{2 \sqrt{d+i f}}\right)}{4 (d + i f)^{3/2}} - \frac{(c + i b)\, e^{\frac{-2 b c-i\left(b^2-4 d e\right)+4 e f+4 d g+\left(c^2-4 f g\right) i}{4 (f+i d)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b-i\left(c+2 f \sqrt{z}\right)+2 d \sqrt{z}}{2 \sqrt{d-i f}}\right)}{4 (d - i f)^{3/2}} - \frac{e^{\sqrt{z}\, b+e+d z+i\left(\sqrt{z}\, c+g+f z\right)}}{2 (f - i d)} - \frac{e^{\sqrt{z}\, b+e+d z-i\left(\sqrt{z}\, c+g+f z\right)}}{2 (f + i d)}$$

Arguments involving polynomials or algebraic functions and factors involving exponential function and a power function

Involving exp and power

Involving $z^n e^{d z} \sin\left(c z^r + f z\right)$

01.06.21.0593.01

$$\int z^n e^{dz}\sin(cz^2+fz)\,dz = \frac{1}{4\sqrt{ic}}\left(i e^{\frac{i(d+if)^2}{4c}}\sum_{q=0}^{n}2^{q-n}(ic)^{-n-\frac{1}{2}}(-d-if)^{n-q}(d+if+2icz)^{q+1}\left(\frac{i(d+if+2icz)^2}{c}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},\frac{i(d+if+2icz)^2}{4c}\right)\right)-\frac{1}{4\sqrt{-ic}}\left(i e^{-\frac{i(d-if)^2}{4c}}\sum_{q=0}^{n}2^{q-n}(-ic)^{-n-\frac{1}{2}}(if-d)^{n-q}(d-if-2icz)^{q+1}\left(-\frac{i(d-if-2icz)^2}{c}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},-\frac{i(d-if-2icz)^2}{4c}\right)\right)\;/;\;n\in\mathbb{N}$$

01.06.21.0594.01

$$\int z^n e^{dz}\sin(\sqrt{z}\,c+fz)\,dz = i\,2^{-2(n+1)}\left(e^{\frac{c^2}{4(d-if)}}(d-if)^{-2(n+1)}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}4^k(-ic)^{-h-k+2n}\left(2(d-if)\sqrt{z}-ic\right)^{h+k}\left(-\frac{\left(2(d-if)\sqrt{z}-ic\right)^2}{d-if}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}\left(2(d-if)\sqrt{-\frac{\left(2(d-if)\sqrt{z}-ic\right)^2}{d-if}}\,\Gamma\left(\frac{1}{2}(h+k+2),-\frac{\left(2(d-if)\sqrt{z}-ic\right)^2}{4(d-if)}\right)-ic\left(2(d-if)\sqrt{z}-ic\right)\Gamma\left(\frac{1}{2}(h+k+1),-\frac{\left(2(d-if)\sqrt{z}-ic\right)^2}{4(d-if)}\right)\right)-e^{\frac{c^2}{4(d+if)}}(d+if)^{-2(n+1)}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}4^k(ic)^{-h-k+2n}\left(2\sqrt{z}(d+if)+ic\right)^{h+k}\left(-\frac{\left(2\sqrt{z}(d+if)+ic\right)^2}{d+if}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}\left(ci\left(2\sqrt{z}(d+if)+ic\right)\Gamma\left(\frac{1}{2}(h+k+1),-\frac{\left(2\sqrt{z}(d+if)+ic\right)^2}{4(d+if)}\right)+2\sqrt{-\frac{\left(2\sqrt{z}(d+if)+ic\right)^2}{d+if}}\,(d+if)\,\Gamma\left(\frac{1}{2}(h+k+2),-\frac{\left(2\sqrt{z}(d+if)+ic\right)^2}{4(d+if)}\right)\right)\right)\;/;\;n\in\mathbb{N}$$

Involving $z^n e^{dz+e}\sin(cz^r+fz)$

01.06.21.0595.01

$$\int z^n e^{d z+e} \sin(c z^2 + f z)\, dz = \frac{1}{4\sqrt{i c}} \left(i\, e^{\frac{i (d+i f)^2}{4 c}+e} \sum_{q=0}^{n} 2^{q-n} (i c)^{-n-\frac{1}{2}} (-d - i f)^{n-q} (d + i f + 2 i c z)^{q+1} \left(\frac{i (d + i f + 2 i c z)^2}{c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{i (d + i f + 2 i c z)^2}{4 c}\right)\right) - \frac{1}{4\sqrt{-i c}} \left(i\, e^{e-\frac{i (d-i f)^2}{4 c}} \sum_{q=0}^{n} 2^{q-n} (-i c)^{-n-\frac{1}{2}} (i f - d)^{n-q} (d - i f - 2 i c z)^{q+1} \left(-\frac{i (d - i f - 2 i c z)^2}{c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{i (d - i f - 2 i c z)^2}{4 c}\right)\right) /; n \in \mathbb{N}$$

01.06.21.0596.01

$$\int z^n e^{d z+e} \sin(\sqrt{z}\, c + f z)\, dz = i\, 2^{-2(n+1)} e^e \left(e^{\frac{c^2}{4 (d-i f)}} (d - i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (-i c)^{-h-k+2 n} \left(2 (d - i f) \sqrt{z} - i c\right)^{h+k} \left(-\frac{\left(2 (d - i f) \sqrt{z} - i c\right)^2}{d - i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(2 (d - i f) \sqrt{-\frac{\left(2 (d - i f) \sqrt{z} - i c\right)^2}{d - i f}}\, \Gamma\left(\frac{1}{2}(h + k + 2), -\frac{\left(2 (d - i f) \sqrt{z} - i c\right)^2}{4 (d - i f)}\right) - i c \left(2 (d - i f) \sqrt{z} - i c\right) \Gamma\left(\frac{1}{2}(h + k + 1), -\frac{\left(2 (d - i f) \sqrt{z} - i c\right)^2}{4 (d - i f)}\right)\right) - e^{\frac{c^2}{4 (d+i f)}} (d + i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i c)^{-h-k+2 n} \left(2 \sqrt{z}\, (d + i f) + i c\right)^{h+k} \left(-\frac{\left(2 \sqrt{z}\, (d + i f) + i c\right)^2}{d + i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(c\, i \left(2 \sqrt{z}\, (d + i f) + i c\right) \Gamma\left(\frac{1}{2}(h + k + 1), -\frac{\left(2 \sqrt{z}\, (d + i f) + i c\right)^2}{4 (d + i f)}\right) + 2 \sqrt{-\frac{\left(2 \sqrt{z}\, (d + i f) + i c\right)^2}{d + i f}}\, (d + i f)\, \Gamma\left(\frac{1}{2}(h + k + 2), -\frac{\left(2 \sqrt{z}\, (d + i f) + i c\right)^2}{4 (d + i f)}\right)\right)\right) /; n \in \mathbb{N}$$

Involving $z^n e^{b z^r} \sin(c z^r + f z)$

01.06.21.0597.01

$$\int z^n e^{b z^2} \sin(c z^2 + f z)\, dz = \frac{1}{4\sqrt{b + i c}} \left(i e^{\frac{f^2}{4(b+ic)}} \sum_{q=0}^{n} 2^{q-n} (b + i c)^{-n-\frac{1}{2}} (-i f)^{n-q} (i f + 2(b + i c) z)^{q+1} \left(-\frac{(i f + 2(b + i c) z)^2}{b + i c} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(i f + 2(b + i c) z)^2}{4(b + i c)} \right) \right) - \frac{1}{4\sqrt{b - i c}} \left(i e^{\frac{f^2}{4(b-ic)}} \sum_{q=0}^{n} 2^{q-n} (b - i c)^{-n-\frac{1}{2}} (i f)^{n-q} (-i f + 2 b z - 2 i c z)^{q+1} \left(-\frac{(-i f + 2 b z - 2 i c z)^2}{b - i c} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(-i f + 2 b z - 2 i c z)^2}{4(b - i c)} \right) \right) /; n \in \mathbb{N}$$

01.06.21.0598.01

$$\int z^n e^{\sqrt{z}\, b} \sin\left(\sqrt{z}\, c + f\, z\right) dz = i\, 2^{-2(n+1)} \left(e^{-\frac{i (b - i c)^2}{4 f}} (-i\, f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, (b - i\, c)^{-h-k+2n} \left(b - i\, c - 2\, i\, f \sqrt{z}\right)^{h+k} \left(-\frac{i \left(b - i\, c - 2\, i\, f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b - i\, c) \left(b - i\, c - 2\, i\, f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h + k + 1), -\frac{i \left(b - i\, c - 2\, i\, f \sqrt{z}\right)^2}{4 f}\right) - 2\, i\, f \sqrt{-\frac{i \left(b - i\, c - 2\, i\, f \sqrt{z}\right)^2}{f}}\; \Gamma\left(\frac{1}{2}(h + k + 2), -\frac{i \left(b - i\, c - 2\, i\, f \sqrt{z}\right)^2}{4 f}\right) \right) - e^{\frac{i (b + i c)^2}{4 f}} (i\, f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, (b + i\, c)^{-h-k+2n} \left(b + i\, c + 2\, i\, f \sqrt{z}\right)^{h+k} \left(\frac{i \left(b + i\, c + 2\, i\, f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b + i\, c) \left(b + i\, c + 2\, i\, f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h + k + 1), \frac{i \left(b + i\, c + 2\, i\, f \sqrt{z}\right)^2}{4 f}\right) + 2 \sqrt{\frac{i \left(b + i\, c + 2\, i\, f \sqrt{z}\right)^2}{f}}\; f\, i\, \Gamma\left(\frac{1}{2}(h + k + 2), \frac{i \left(b + i\, c + 2\, i\, f \sqrt{z}\right)^2}{4 f}\right) \right) \right) /;\, n \in \mathbb{N}$$

Involving $z^n e^{b z^r + e} \sin\left(c\, z^r + f\, z\right)$

01.06.21.0599.01

$$\int z^n e^{b z^2+e} \sin\left(c z^2 + f z\right) dz = \frac{1}{4\sqrt{b+i c}} \left(i e^{\frac{f^2}{4(b+i c)}+e} \sum_{q=0}^{n} 2^{q-n} (b+i c)^{-n-\frac{1}{2}} (-i f)^{n-q} (i f + 2(b+i c) z)^{q+1} \left(-\frac{(i f + 2(b+i c) z)^2}{b+i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(i f + 2(b+i c) z)^2}{4(b+i c)}\right)\right) - \frac{1}{4\sqrt{b-i c}} \left(i e^{\frac{f^2}{4(b-i c)}+e} \sum_{q=0}^{n} 2^{q-n} (b-i c)^{-n-\frac{1}{2}} (i f)^{n-q} (-i f + 2 b z - 2 i c z)^{q+1} \left(-\frac{(-i f + 2 b z - 2 i c z)^2}{b-i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(-i f + 2 b z - 2 i c z)^2}{4(b-i c)}\right)\right) /; n \in \mathbb{N}$$

01.06.21.0600.01

$$\int z^n e^{\sqrt{z}\, b+e} \sin\left(\sqrt{z}\, c + f z\right) dz = i\, 2^{-2(n+1)} e^e$$

$$\left(e^{-\frac{i(b-ic)^2}{4f}} (-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b-ic)^{-h-k+2n} \left(b - i c - 2 i f \sqrt{z}\right)^{h+k} \left(-\frac{i\left(b-ic-2if\sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)} \right.$$

$$\binom{k}{h}\binom{n}{k} \left((b-ic)\left(b-ic-2if\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{i\left(b-ic-2if\sqrt{z}\right)^2}{4f}\right) - \right.$$

$$\left. 2 i f \sqrt{-\frac{i\left(b-ic-2if\sqrt{z}\right)^2}{f}}\; \Gamma\left(\frac{1}{2}(h+k+2), -\frac{i\left(b-ic-2if\sqrt{z}\right)^2}{4f}\right)\right) -$$

$$e^{\frac{i(b+ic)^2}{4f}} (i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+ic)^{-h-k+2n} \left(b + i c + 2 i f \sqrt{z}\right)^{h+k} \left(\frac{i\left(b+ic+2if\sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k} \left((b+ic)\left(b+ic+2if\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i\left(b+ic+2if\sqrt{z}\right)^2}{4f}\right) + \right.$$

$$\left.\left. 2 \sqrt{\frac{i\left(b+ic+2if\sqrt{z}\right)^2}{f}}\; f\, i\, \Gamma\left(\frac{1}{2}(h+k+2), \frac{i\left(b+ic+2if\sqrt{z}\right)^2}{4f}\right)\right)\right) /; n \in \mathbb{N}$$

Involving $z^n e^{b z^r + d z} \sin(c z^r + f z)$

01.06.21.0601.01

$$\int z^n e^{b z^2 + d z} \sin\left(c z^2 + f z\right) dz =$$

$$\frac{i}{4\sqrt{b+ic}} e^{-\frac{(d+if)^2}{4(b+ic)}} \sum_{q=0}^{n} 2^{q-n} (b+ic)^{-n-\frac{1}{2}} (-d-if)^{n-q} (d+if+2(b+ic)z)^{q+1} \left(-\frac{(d+if+2(b+ic)z)^2}{b+ic}\right)^{\frac{1}{2}(-q-1)}$$

$$\binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+if+2(b+ic)z)^2}{4(b+ic)}\right) - \frac{i}{4\sqrt{b-ic}} e^{-\frac{(d-if)^2}{4(b-ic)}} \sum_{q=0}^{n} 2^{q-n} (b-ic)^{-n-\frac{1}{2}} (if-d)^{n-q}$$

$$(d-if+2bz-2icz)^{q+1} \left(-\frac{(d-if+2bz-2icz)^2}{b-ic}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d-if+2bz-2icz)^2}{4(b-ic)}\right) /; n \in \mathbb{N}$$

01.06.21.0602.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin\left(\sqrt{z}\, c+f z\right) dz = i\, 2^{-2(n+1)} \left(e^{-\frac{(b-i c)^2}{4(d-i f)}} (d-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b-i c)^{-h-k+2n} \left(b-i c+2(d-i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{d-i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b-i c)\left(b-i c+2(d-i f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right) + 2\sqrt{-\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{d-i f}}\, (d-i f)\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right)\right) - e^{-\frac{(b+i c)^2}{4(d+i f)}} (d+i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+i c)^{-h-k+2n} \left(b+i c+2(d+i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{d+i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b+i c)\left(b+i c+2(d+i f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right) + 2\sqrt{-\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{d+i f}}\, (d+i f)\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right)\right)\right) /; n \in \mathbb{N}$$

Involving $z^n e^{b z^r + d z + e} \sin\left(c z^r + f z\right)$

01.06.21.0603.01

$$\int z^n e^{b z^2+d z+e} \sin\left(c z^2 + f z\right) dz = \frac{i}{4\sqrt{b+i c}} e^{-\frac{(d+i f)^2}{4(b+i c)}+e} \sum_{q=0}^{n} 2^{q-n} (b+i c)^{-n-\frac{1}{2}} (-d-i f)^{n-q} (d+i f+2(b+i c) z)^{q+1} \left(-\frac{(d+i f+2(b+i c) z)^2}{b+i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+i f+2(b+i c) z)^2}{4(b+i c)}\right) - \frac{i}{4\sqrt{b-i c}} e^{-\frac{(d-i f)^2}{4(b-i c)}+e} \sum_{q=0}^{n} 2^{q-n} (b-i c)^{-n-\frac{1}{2}} (i f-d)^{n-q} (d-i f+2 b z-2 i c z)^{q+1} \left(-\frac{(d-i f+2 b z-2 i c z)^2}{b-i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d-i f+2 b z-2 i c z)^2}{4(b-i c)}\right) /; n \in \mathbb{N}$$

01.06.21.0604.01

$$\int z^n e^{\sqrt{z}\, b+d z+e} \sin\left(\sqrt{z}\, c+f z\right) dz = i\, 2^{-2(n+1)} e^e \Bigg(e^{-\frac{(b-i c)^2}{4(d-i f)}} (d-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b-i c)^{-h-k+2n} \left(b-i c+2(d-i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{d-i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b-i c)\left(b-i c+2(d-i f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right) + 2\sqrt{-\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{d-i f}}\,(d-i f)\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right)\right) - e^{-\frac{(b+i c)^2}{4(d+i f)}} (d+i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+i c)^{-h-k+2n} \left(b+i c+2(d+i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{d+i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b+i c)\left(b+i c+2(d+i f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right) + 2\sqrt{-\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{d+i f}}\,(d+i f)\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right)\right)\Bigg) /;\, n \in \mathbb{N}$$

Involving $z^n e^{d z} \sin\left(c z^2 + f z + g\right)$

01.06.21.0605.01

$$\int z^n e^{dz}\sin\left(c z^2+f z+g\right)dz=\frac{i}{4\sqrt{i c}}\,e^{\frac{i(d+i f)^2}{4c}+i g}\sum_{q=0}^{n}2^{q-n}(i c)^{-n-\frac{1}{2}}(-d-i f)^{n-q}(d+i f+2 i c z)^{q+1}\left(\frac{i(d+i f+2 i c z)^2}{c}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},\frac{i(d+i f+2 i c z)^2}{4c}\right)-\frac{i}{4\sqrt{-i c}}\,e^{-\frac{i(d-i f)^2}{4c}-i g}\sum_{q=0}^{n}2^{q-n}(-i c)^{-n-\frac{1}{2}}(i f-d)^{n-q}(d-i f-2 i c z)^{q+1}\left(-\frac{i(d-i f-2 i c z)^2}{c}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},-\frac{i(d-i f-2 i c z)^2}{4c}\right)/;\, n\in\mathbb{N}$$

01.06.21.0606.01

$$\int z\, e^{dz}\sin\left(c z^2+f z+g\right)dz=\frac{1}{8c^{3/2}}\left(e^{-\frac{i\left(3d^2-2 i f d+f^2+4c^2z^2\right)}{4c}}\left(-\sqrt[4]{-1}\,e^{\frac{i\left(d^2+f^2+2c^2z^2\right)}{2c}}(d-i f)\sqrt{\pi}\,\operatorname{erf}\left(\frac{\sqrt[4]{-1}\,(f+i d+2 c z)}{2\sqrt{c}}\right)(i\cos(g)+\sin(g))-2\sqrt{c}\,e^{\frac{(d-i f)(-f+3 i d+4 c z)}{4c}}\left(\left(1+e^{2 i z(f+c z)}\right)\cos(g)+\left(-1+e^{2 i z(f+c z)}\right) i\sin(g)\right)+\sqrt[4]{-1}\,e^{\frac{i\left(d^2+c^2z^2\right)}{c}}(f-i d)\sqrt{\pi}\,\operatorname{erfi}\left(\frac{\sqrt[4]{-1}\,(f-i d+2 c z)}{2\sqrt{c}}\right)(\cos(g)+i\sin(g))\right)\right)$$

Involving $z^n e^{d z+e}\sin\left(c z^r+f z+g\right)$

01.06.21.0607.01

$$\int z^n e^{dz+e}\sin\left(c z^2+f z+g\right)dz=\frac{1}{4\sqrt{i c}}\left(i\,e^{\frac{i(d+i f)^2}{4c}+e+i g}\sum_{q=0}^{n}2^{q-n}(i c)^{-n-\frac{1}{2}}(-d-i f)^{n-q}(d+i f+2 i c z)^{q+1}\left(\frac{i(d+i f+2 i c z)^2}{c}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},\frac{i(d+i f+2 i c z)^2}{4c}\right)\right)-\frac{1}{4\sqrt{-i c}}\left(i\,e^{-\frac{i(d-i f)^2}{4c}+e-i g}\sum_{q=0}^{n}2^{q-n}(-i c)^{-n-\frac{1}{2}}(i f-d)^{n-q}(d-i f-2 i c z)^{q+1}\left(-\frac{i(d-i f-2 i c z)^2}{c}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},-\frac{i(d-i f-2 i c z)^2}{4c}\right)\right)/;\, n\in\mathbb{N}$$

01.06.21.0608.01

$$\int z^n e^{d z+e} \sin\left(\sqrt{z}\, c + f z + g\right) dz = i\, 2^{-2(n+1)} e^{e-i g} \left(e^{\frac{c^2}{4(d-i f)}} (d-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (-i c)^{-h-k+2n} \left(2(d-i f)\sqrt{z} - i c\right)^{h+k} \left(-\frac{\left(2(d-i f)\sqrt{z} - i c\right)^2}{d-i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(2(d-i f) \sqrt{-\frac{\left(2(d-i f)\sqrt{z} - i c\right)^2}{d-i f}}\ \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2(d-i f)\sqrt{z} - i c\right)^2}{4(d-i f)}\right) - i c \left(2(d-i f)\sqrt{z} - i c\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2(d-i f)\sqrt{z} - i c\right)^2}{4(d-i f)}\right)\right) - e^{\frac{c^2}{4(d+i f)}+2 i g} (d+i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i c)^{-h-k+2n} \left(2\sqrt{z}\,(d+i f) + i c\right)^{h+k} \left(-\frac{\left(2\sqrt{z}\,(d+i f) + i c\right)^2}{d+i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(c\, i \left(2\sqrt{z}\,(d+i f) + i c\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2\sqrt{z}\,(d+i f) + i c\right)^2}{4(d+i f)}\right) + 2\sqrt{-\frac{\left(2\sqrt{z}\,(d+i f) + i c\right)^2}{d+i f}}\ (d+i f)\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2\sqrt{z}\,(d+i f) + i c\right)^2}{4(d+i f)}\right)\right)\right) /;\ n \in \mathbb{N}$$

Involving $z^n e^{b z^r} \sin\left(c z^r + f z + g\right)$

01.06.21.0609.01

$$\int z^n e^{b z^2} \sin\left(c z^2 + f z + g\right) dz = \frac{1}{4\sqrt{b+i c}} \left(i\, e^{\frac{f^2}{4(b+i c)}+i g} \sum_{q=0}^{n} 2^{q-n} (b+i c)^{-n-\frac{1}{2}} (-i f)^{n-q} (i f + 2(b+i c) z)^{q+1} \left(-\frac{(i f + 2(b+i c) z)^2}{b+i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(i f + 2(b+i c) z)^2}{4(b+i c)}\right)\right) - \frac{1}{4\sqrt{b-i c}} \left(i\, e^{\frac{f^2}{4(b-i c)}-i g} \sum_{q=0}^{n} 2^{q-n} (b-i c)^{-n-\frac{1}{2}} (i f)^{n-q} (-i f + 2 b z - 2 i c z)^{q+1} \left(-\frac{(-i f + 2 b z - 2 i c z)^2}{b-i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(-i f + 2 b z - 2 i c z)^2}{4(b-i c)}\right)\right) /;\ n \in \mathbb{N}$$

01.06.21.0610.01

$$\int z^n e^{\sqrt{z}\, b} \sin\left(\sqrt{z}\, c + f z + g\right) dz = i\, 2^{-2(n+1)} e^{-i g} \Bigg(e^{-\frac{i (b-i c)^2}{4 f}} (-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b - i c)^{-h-k+2n} \left(b - i c - 2 i f \sqrt{z}\right)^{h+k} \left(-\frac{i \left(b - i c - 2 i f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h} \binom{n}{k} \left((b - i c) \left(b - i c - 2 i f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{i \left(b - i c - 2 i f \sqrt{z}\right)^2}{4 f}\right) - \right.$$

$$\left. 2 i f \sqrt{-\frac{i \left(b - i c - 2 i f \sqrt{z}\right)^2}{f}}\; \Gamma\left(\frac{1}{2}(h+k+2), -\frac{i \left(b - i c - 2 i f \sqrt{z}\right)^2}{4 f}\right) \right) -$$

$$e^{\frac{i (b+i c)^2}{4 f} + 2 i g} (i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b + i c)^{-h-k+2n} \left(b + i c + 2 i f \sqrt{z}\right)^{h+k} \left(\frac{i \left(b + i c + 2 i f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h} \binom{n}{k} \left((b + i c) \left(b + i c + 2 i f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i \left(b + i c + 2 i f \sqrt{z}\right)^2}{4 f}\right) + \right.$$

$$\left. 2 \sqrt{\frac{i \left(b + i c + 2 i f \sqrt{z}\right)^2}{f}}\; f\, i\, \Gamma\left(\frac{1}{2}(h+k+2), \frac{i \left(b + i c + 2 i f \sqrt{z}\right)^2}{4 f}\right) \right) \Bigg) \;/;\; n \in \mathbb{N}$$

Involving $z^n e^{b z^r + e} \sin\left(c z^r + f z + g\right)$

01.06.21.0611.01

$$\int z^n e^{b z^2+e} \sin\left(c z^2 + f z + g\right) dz = \frac{1}{4\sqrt{b+i c}} \left(i e^{\frac{f^2}{4(b+i c)}+e+i g} \sum_{q=0}^{n} 2^{q-n} (b+i c)^{-n-\frac{1}{2}} (-i f)^{n-q} (i f + 2(b+i c) z)^{q+1} \left(-\frac{(i f + 2(b+i c) z)^2}{b+i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(i f + 2(b+i c) z)^2}{4(b+i c)}\right)\right) - \frac{1}{4\sqrt{b-i c}} \left(i e^{\frac{f^2}{4(b-i c)}+e-i g} \sum_{q=0}^{n} 2^{q-n} (b-i c)^{-n-\frac{1}{2}} (i f)^{n-q} (-i f + 2 b z - 2 i c z)^{q+1} \left(-\frac{(-i f + 2 b z - 2 i c z)^2}{b-i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(-i f + 2 b z - 2 i c z)^2}{4(b-i c)}\right)\right) /; n \in \mathbb{N}$$

01.06.21.0612.01

$$\int z^n e^{\sqrt{z}\, b+e} \sin\left(\sqrt{z}\, c+f z+g\right) dz = i\, 2^{-2(n+1)} e^{e-i g}$$

$$\left(e^{-\frac{i(b-i c)^2}{4 f}} (-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b-i c)^{-h-k+2n} \left(b-i c-2 i f \sqrt{z}\right)^{h+k} \left(-\frac{i\left(b-i c-2 i f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)}\right.$$

$$\binom{k}{h}\binom{n}{k}\left((b-i c)\left(b-i c-2 i f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{i\left(b-i c-2 i f \sqrt{z}\right)^2}{4 f}\right)-\right.$$

$$\left.\left. 2 i f \sqrt{-\frac{i\left(b-i c-2 i f \sqrt{z}\right)^2}{f}}\; \Gamma\left(\frac{1}{2}(h+k+2), -\frac{i\left(b-i c-2 i f \sqrt{z}\right)^2}{4 f}\right)\right)\right)-$$

$$e^{\frac{i(b+i c)^2}{4 f}+2 i g} (i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+i c)^{-h-k+2n} \left(b+i c+2 i f \sqrt{z}\right)^{h+k} \left(\frac{i\left(b+i c+2 i f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\left((b+i c)\left(b+i c+2 i f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i\left(b+i c+2 i f \sqrt{z}\right)^2}{4 f}\right)+\right.$$

$$\left.\left. 2 \sqrt{\frac{i\left(b+i c+2 i f \sqrt{z}\right)^2}{f}}\; f\, i\, \Gamma\left(\frac{1}{2}(h+k+2), \frac{i\left(b+i c+2 i f \sqrt{z}\right)^2}{4 f}\right)\right)\right) /; n \in \mathbb{N}$$

Involving $z^n e^{b z^r+d z} \sin\left(c z^r+f z+g\right)$

01.06.21.0613.01

$$\int z^n e^{b z^2+d z} \sin\left(c z^2+f z+g\right) dz =$$

$$\frac{i}{4\sqrt{b+i c}} e^{-\frac{(d+i f)^2}{4(b+i c)}+i g} \sum_{q=0}^{n} 2^{q-n} (b+i c)^{-n-\frac{1}{2}} (-d-i f)^{n-q} (d+i f+2(b+i c) z)^{q+1} \left(-\frac{(d+i f+2(b+i c) z)^2}{b+i c}\right)^{\frac{1}{2}(-q-1)}$$

$$\binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+i f+2(b+i c) z)^2}{4(b+i c)}\right) - \frac{i}{4\sqrt{b-i c}} e^{-\frac{(d-i f)^2}{4(b-i c)}-i g} \sum_{q=0}^{n} 2^{q-n} (b-i c)^{-n-\frac{1}{2}} (i f-d)^{n-q}$$

$$(d-i f+2 b z-2 i c z)^{q+1} \left(-\frac{(d-i f+2 b z-2 i c z)^2}{b-i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d-i f+2 b z-2 i c z)^2}{4(b-i c)}\right) /; n \in \mathbb{N}$$

01.06.21.0614.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin\left(\sqrt{z}\, c+f z+g\right) dz = i\, 2^{-2(n+1)} e^{-i g} \left(e^{-\frac{(b-i c)^2}{4(d-i f)}} (d-i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b-i c)^{-h-k+2n} \left(b-i c+2(d-i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{d-i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b-i c)\left(b-i c+2(d-i f)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right) + 2\sqrt{-\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{d-i f}}\, (d-i f)\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right) \right) - e^{2 i g-\frac{(b+i c)^2}{4(d+i f)}} (d+i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+i c)^{-h-k+2n} \left(b+i c+2(d+i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{d+i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b+i c)\left(b+i c+2(d+i f)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right) + 2\sqrt{-\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{d+i f}}\, (d+i f)\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right) \right) \right) /;\, n \in \mathbb{N}$$

Involving $z^n e^{b z^r+d z+e} \sin\left(c z^r+f z+g\right)$

01.06.21.0615.01

$$\int z^n e^{b z^2+d z+e} \sin\left(c z^2 + f z + g\right) dz = \frac{i}{4\sqrt{b+i c}} e^{-\frac{(d+i f)^2}{4(b+i c)}+e+i g} \sum_{q=0}^{n} 2^{q-n} (b+i c)^{-n-\frac{1}{2}} (-d-i f)^{n-q} (d+i f+2(b+i c) z)^{q+1} \left(-\frac{(d+i f+2(b+i c) z)^2}{b+i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+i f+2(b+i c) z)^2}{4(b+i c)}\right) - \frac{i}{4\sqrt{b-i c}} e^{-\frac{(d-i f)^2}{4(b-i c)}+e-i g} \sum_{q=0}^{n} 2^{q-n} (b-i c)^{-n-\frac{1}{2}} (i f-d)^{n-q} (d-i f+2 b z-2 i c z)^{q+1} \left(-\frac{(d-i f+2 b z-2 i c z)^2}{b-i c}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d-i f+2 b z-2 i c z)^2}{4(b-i c)}\right) /; n \in \mathbb{N}$$

01.06.21.0616.01

$$\int z^n e^{\sqrt{z}\, b+d z+e} \sin\left(\sqrt{z}\, c+f z+g\right) dz = i\, 2^{-2(n+1)} e^{e-i g} \left(e^{-\frac{(b-i c)^2}{4(d-i f)}} (d-i f)^{-2(n+1)} \right.$$

$$\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b-i c)^{-h-k+2n} \left(b-i c+2(d-i f)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{d-i f}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k} \left((b-i c)\left(b-i c+2(d-i f)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right) + \right.$$

$$\left.\left. 2\sqrt{-\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{d-i f}}\, (d-i f)\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b-i c+2(d-i f)\sqrt{z}\right)^2}{4(d-i f)}\right)\right) - \right.$$

$$e^{2 i g-\frac{(b+i c)^2}{4(d+i f)}} (d+i f)^{-2(n+1)} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+i c)^{-h-k+2n} \left(b+i c+2(d+i f)\sqrt{z}\right)^{h+k}$$

$$\left(-\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{d+i f}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k}$$

$$\left((b+i c)\left(b+i c+2(d+i f)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right) + \right.$$

$$\left.\left. 2\sqrt{-\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{d+i f}}\, (d+i f)\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+i c+2(d+i f)\sqrt{z}\right)^2}{4(d+i f)}\right)\right)\right) /;\ n \in \mathbb{N}$$

Involving functions of the direct function

Involving powers of the direct function

Involving powers of sin

Involving $\sin^{\nu}(a z)$

01.06.21.0617.01

$$\int \sin^{\nu}(a\,z)\,dz = -\frac{\cos(a\,z)\sin^{\nu+1}(a\,z)\sin^2(a\,z)^{\frac{1}{2}(-\nu-1)}}{a}\,{}_2F_1\!\left(\frac{1}{2},\frac{1-\nu}{2};\frac{3}{2};\cos^2(a\,z)\right)$$

01.06.21.0618.01

$$\int \sin^2(a\,z)\,dz = \frac{z}{2} - \frac{\sin(2\,a\,z)}{4\,a}$$

01.06.21.0619.01

$$\int \sin^3(a\,z)\,dz = \frac{\cos(3\,a\,z) - 9\cos(a\,z)}{12\,a}$$

01.06.21.0620.01

$$\int \sin^4(a\,z)\,dz = \frac{12\,a\,z - 8\sin(2\,a\,z) + \sin(4\,a\,z)}{32\,a}$$

01.06.21.0621.01

$$\int \sin^5(a\,z)\,dz = -\frac{150\cos(a\,z) - 25\cos(3\,a\,z) + 3\cos(5\,a\,z)}{240\,a}$$

01.06.21.0622.01

$$\int \sin^6(a\,z)\,dz = -\frac{-60\,a\,z + 45\sin(2\,a\,z) - 9\sin(4\,a\,z) + \sin(6\,a\,z)}{192\,a}$$

01.06.21.0623.01

$$\int \sin^7(a\,z)\,dz = \frac{-1225\cos(a\,z) + 245\cos(3\,a\,z) - 49\cos(5\,a\,z) + 5\cos(7\,a\,z)}{2240\,a}$$

01.06.21.0624.01

$$\int \sin^8(a\,z)\,dz = \frac{840\,a\,z - 672\sin(2\,a\,z) + 168\sin(4\,a\,z) - 32\sin(6\,a\,z) + 3\sin(8\,a\,z)}{3072\,a}$$

01.06.21.1614.01

$$\int \sin^{2n}(a\,z)\,dz = \frac{\left(\frac{1}{2}\right)_n}{2\,a\,n!}\left(2\,a\,z - \cot(a\,z)\sum_{k=1}^{n}\frac{(k-1)!\sin^{2k}(a\,z)}{\left(\frac{1}{2}\right)_k}\right)/;\,n\in\mathbb{N}$$

01.06.21.1615.01

$$\int \sin^{2n+1}(a\,z)\,dz = -\frac{n!\cos^{2n+1}(a\,z)}{a}\sum_{k=0}^{n}\frac{\tan^{2k}(a\,z)}{k!\left(\frac{3}{2}\right)_{n-k}}\;/;\,n\in\mathbb{N}$$

01.06.21.1616.01

$$\int \sin^{2n}(a\,z)\,dz = \frac{\cos(a\,z)\sin^{2n+1}(a\,z)}{a\,(2\,n+1)}\,{}_2F_1\!\left(1,n+1;n+\frac{3}{2};\sin^2(a\,z)\right) + \frac{a\,z\left(\frac{1}{2}\right)_n}{a\,n!} - \frac{\left(\frac{1}{2}\right)_n\sin^{-1}(\sin(a\,z))\cos(a\,z)}{a\,n!\sqrt{\cos^2(a\,z)}}\;/;\,n\in\mathbb{N}$$

01.06.21.1617.01

$$\int \sin^{2n+1}(a\,z)\,dz = \frac{\sec(a\,z)\sin^{2n+2}(a\,z)}{2\,a\,(n+1)}\,{}_2F_1\!\left(\frac{1}{2},1;n+2;-\tan^2(a\,z)\right) - \frac{\cos(a\,z)\,n!\sqrt{\sec^2(a\,z)}}{a\left(\frac{3}{2}\right)_n}\;/;\,n\in\mathbb{N}$$

01.06.21.0625.01

$$\int \sin^{\frac{3}{2}}(a z)\, dz = -\frac{2}{3a}\left(\sin^{\frac{1}{2}}(a z)\cos(a z) + F\left(\frac{1}{4}(\pi - 2 a z) \,\middle|\, 2\right)\right)$$

01.06.21.0626.01

$$\int \sin^{\frac{1}{2}}(a z)\, dz = -\frac{2}{a} E\left(\frac{1}{4}(\pi - 2 a z) \,\middle|\, 2\right)$$

01.06.21.0627.01

$$\int \frac{1}{\sin^{\frac{1}{2}}(a z)}\, dz = -\frac{2}{a} F\left(\frac{1}{4}(\pi - 2 a z) \,\middle|\, 2\right)$$

01.06.21.0628.01

$$\int \frac{1}{\sin^{\frac{3}{2}}(a z)}\, dz = \frac{2}{a}\left(E\left(\frac{1}{4}(\pi - 2 a z) \,\middle|\, 2\right) - \frac{\cos(a z)}{\sin^{\frac{1}{2}}(a z)}\right)$$

01.06.21.0629.01

$$\int \frac{1}{\sqrt{\sin^3(a z)}}\, dz = -\frac{1}{a\sqrt{\sin^3(a z)}}\left(\sin(2 a z) - 2 E\left(\frac{1}{4}(\pi - 2 a z) \,\middle|\, 2\right)\sin^{\frac{3}{2}}(a z)\right)$$

01.06.21.0630.01

$$\int \frac{1}{\sin^{\frac{5}{2}}(a z)}\, dz = -\frac{1}{3a}\left(\frac{2\cos(a z)}{\sin^{\frac{3}{2}}(a z)} + 2 F\left(\frac{1}{4}(\pi - 2 a z) \,\middle|\, 2\right)\right)$$

01.06.21.0631.01

$$\int \frac{1}{\sqrt{\sin^5(a z)}}\, dz = -\frac{1}{3a\sqrt{\sin^5(a z)}}\left(2 F\left(\frac{1}{4}(\pi - 2 a z) \,\middle|\, 2\right)\sin^{\frac{5}{2}}(a z) + \sin(2 a z)\right)$$

Involving $\sin^\nu(a z + b)$

01.06.21.0632.01

$$\int \sin^\nu(b + a z)\, dz = -\frac{\cos(b + a z)\sin^{\nu+1}(b + a z)\sin^2(b + a z)^{\frac{1}{2}(-\nu-1)}}{a}\, {}_2F_1\left(\frac{1}{2}, \frac{1-\nu}{2}; \frac{3}{2}; \cos^2(b + a z)\right)$$

Involving $\sin^\nu\left(a z^2 + \frac{b}{z^2}\right)$

01.06.21.0633.01

$$\int \sin^{\nu}\left(a z^2 + \frac{b}{z^2}\right) dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + 2^{-\nu-2} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{1}{\sqrt{-i a (2k-\nu)}} i^{\nu} e^{-2\sqrt{-i a (2k-\nu)} \sqrt{-i b (2k-\nu)}} \left(e^{4\sqrt{-i a (2k-\nu)} \sqrt{-i b (2k-\nu)}} \left(\operatorname{erf}\left(\sqrt{-i a (2k-\nu)}\, z + \frac{\sqrt{-i b (2k-\nu)}}{z} \right) - 1 \right) - \operatorname{erf}\left(\frac{\sqrt{-i b (2k-\nu)}}{z} - \sqrt{-i a (2k-\nu)}\, z \right) + 1 \right) + \frac{1}{\sqrt{i a (2k-\nu)}} i^{-\nu} e^{-2\sqrt{i a (2k-\nu)} \sqrt{i b (2k-\nu)}} \left(e^{4\sqrt{i a (2k-\nu)} \sqrt{i b (2k-\nu)}} \left(\operatorname{erf}\left(\sqrt{i a (2k-\nu)}\, z + \frac{\sqrt{i b (2k-\nu)}}{z} \right) - 1 \right) - \operatorname{erf}\left(\frac{\sqrt{i b (2k-\nu)}}{z} - \sqrt{i a (2k-\nu)}\, z \right) + 1 \right) \right) /; \nu \in \mathbb{N}^+$$

Involving $\sin^{\nu}\left(a z^2 + \frac{b}{z^2} + c\right)$

01.06.21.0634.01

$$\int \sin^{\nu}\left(a z^2 + \frac{b}{z^2} + c\right) dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + 2^{-\nu-2} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} e^{-i\left(\frac{\pi \nu}{2} - c(\nu-2k)\right)} \left(\frac{1}{\sqrt{-i a (2k-\nu)}} \left(e^{2i\left(\frac{\pi\nu}{2} - c(\nu-2k)\right) - 2\sqrt{-i a (2k-\nu)} \sqrt{-i b (2k-\nu)}} \left(e^{4\sqrt{-i a (2k-\nu)} \sqrt{-i b (2k-\nu)}} \left(\operatorname{erf}\left(\sqrt{-i a (2k-\nu)}\, z + \frac{\sqrt{-i b (2k-\nu)}}{z} \right) - 1 \right) - \operatorname{erf}\left(\frac{\sqrt{-i b (2k-\nu)}}{z} - \sqrt{-i a (2k-\nu)}\, z \right) + 1 \right) \right) + \frac{1}{\sqrt{i a (2k-\nu)}} \left(e^{-2\sqrt{i a (2k-\nu)} \sqrt{i b (2k-\nu)}} \left(e^{4\sqrt{i a (2k-\nu)} \sqrt{i b (2k-\nu)}} \left(\operatorname{erf}\left(\sqrt{i a (2k-\nu)}\, z + \frac{\sqrt{i b (2k-\nu)}}{z} \right) - 1 \right) - \operatorname{erf}\left(\frac{\sqrt{i b (2k-\nu)}}{z} - \sqrt{i a (2k-\nu)}\, z \right) + 1 \right) \right) \right) /; \nu \in \mathbb{N}^+$$

Involving $\sin^{\nu}(a z^r)$

01.06.21.0635.01

$$\int \sin^{\nu}(a z^r)\, dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) - \frac{2^{-\nu} z}{r} \sum_{i=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^i \binom{\nu}{i} \left(e^{-\frac{1}{2} i \pi \nu} \Gamma\left(\frac{1}{r}, -i a (\nu - 2i) z^r\right) (-i a (\nu - 2i) z^r)^{-1/r} + e^{\frac{i \pi \nu}{2}} (i a (\nu - 2i) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i a (\nu - 2i) z^r\right) \right) /; \nu \in \mathbb{N}^+$$

01.06.21.0636.01

$$\int \sin^{\nu}(a z^2)\, dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + 2^{\frac{1}{2}-\nu} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{(-1)^k \binom{\nu}{k} \left(\cos\left(\frac{\pi \nu}{2}\right) C\left(\sqrt{\frac{2}{\pi}} \sqrt{a(\nu-2k)}\, z\right) + S\left(\sqrt{\frac{2}{\pi}} \sqrt{a(\nu-2k)}\, z\right) \sin\left(\frac{\pi \nu}{2}\right)\right)}{\sqrt{a(\nu-2k)}} /;\ \nu \in \mathbb{N}^+$$

01.06.21.0637.01

$$\int \sin^{\nu}(a \sqrt{z})\, dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + \frac{2^{2-\nu}}{a^2} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{(-1)^k \binom{\nu}{k} \left(\cos\left(\frac{\pi \nu}{2} - a(\nu-2k)\sqrt{z}\right) - a(\nu-2k)\sqrt{z}\, \sin\left(\frac{\pi \nu}{2} - a(\nu-2k)\sqrt{z}\right)\right)}{(\nu-2k)^2} /;\ \nu \in \mathbb{N}^+$$

Involving $\sin^{\nu}(a (z^r)^p)$

01.06.21.0638.01

$$\int \sin^{\nu}(a (z^r)^p)\, dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) - \frac{2^{-\nu} z}{p r} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(i^{-\nu}\, \Gamma\left(\frac{1}{p r}, -i a(\nu-2k)(z^r)^p\right) (-i a(\nu-2k)(z^r)^p)^{-\frac{1}{p r}} + i^{\nu} (i a(\nu-2k)(z^r)^p)^{-\frac{1}{p r}}\, \Gamma\left(\frac{1}{p r}, i a(\nu-2k)(z^r)^p\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0639.01

$$\int \sin^{\nu}\left(a (z^r)^{1/r}\right) dz = 2^{-\nu} z \left(\binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + \frac{2 (z^r)^{-1/r}}{a} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{e^{i k \pi}}{2k-\nu} \binom{\nu}{k} \sin\left(a(2k-\nu)(z^r)^{1/r} + \frac{\pi \nu}{2}\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0640.01

$$\int \sin^{\nu}\left(a \sqrt{z^2}\right) dz = 2^{-\nu} z \left(\binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + \frac{2}{a \sqrt{z^2}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{e^{i k \pi}}{2k-\nu} \binom{\nu}{k} \sin\left(a \sqrt{z^2}\, (2k-\nu) + \frac{\pi \nu}{2}\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin^{\nu}(a z^r + b)$

01.06.21.0641.01

$$\int \sin^{\nu}(a z^r + b)\, dz = 2^{-\nu} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) z - \frac{2^{-\nu} z}{r} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{i b(\nu-2k) - \frac{i \pi \nu}{2}}\, \Gamma\left(\frac{1}{r}, -i a(\nu-2k) z^r\right) (-i a(\nu-2k) z^r)^{-\frac{1}{r}} + e^{\frac{i \pi \nu}{2} - i b(\nu-2k)} (i a(\nu-2k) z^r)^{-\frac{1}{r}}\, \Gamma\left(\frac{1}{r}, i a(\nu-2k) z^r\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0642.01

$$\int \sin^{\nu}(a z^2 + b)\, dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + \frac{2^{\frac{1}{2}-\nu}\sqrt{\pi}}{\sqrt{a}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{\sqrt{\nu - 2k}} (-1)^k \binom{\nu}{k} \left(\cos\left(2bk - b\nu + \frac{\pi\nu}{2}\right) C\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\sqrt{\nu - 2k}\, z\right) + S\left(\sqrt{a}\sqrt{\frac{2}{\pi}}\sqrt{\nu - 2k}\, z\right) \sin\left(2bk - b\nu + \frac{\pi\nu}{2}\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0643.01

$$\int \sin^{\nu}(\sqrt{z}\, a + b)\, dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + \frac{2^{2-\nu}}{a^2} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{(\nu - 2k)^2} (-1)^k \binom{\nu}{k} \left(\cos\left(2bk - b\nu + \frac{\pi\nu}{2} + a(2k - \nu)\sqrt{z}\right) + a(2k - \nu)\sqrt{z}\, \sin\left(2bk - b\nu + \frac{\pi\nu}{2} + a(2k - \nu)\sqrt{z}\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin^{\nu}(a z^r + b z)$

01.06.21.0644.01

$$\int \sin^{\nu}(a z^2 + b z)\, dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + \frac{2^{\frac{1}{2}-\nu}\sqrt{\pi}}{\sqrt{a}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{(-1)^k}{\sqrt{\nu - 2k}} \binom{\nu}{k} \left(\cos\left(\frac{1}{4}\left(\frac{(\nu - 2k)b^2}{a} + 2\pi\nu\right)\right) C\left(\frac{\sqrt{\nu - 2k}\,(b + 2az)}{\sqrt{a}\sqrt{2\pi}}\right) + S\left(\frac{\sqrt{\nu - 2k}\,(b + 2az)}{\sqrt{a}\sqrt{2\pi}}\right) \sin\left(\frac{1}{4}\left(\frac{(\nu - 2k)b^2}{a} + 2\pi\nu\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0645.01

$$\int \sin^{\nu}(\sqrt{z}\, a + b z)\, dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + \frac{2^{-\nu}}{b^{3/2}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{(\nu - 2k)^{3/2}} \left((-1)^k \binom{\nu}{k} \left(a\sqrt{2\pi}\,(2k - \nu) \cos\left(\frac{1}{4}\left(\frac{(\nu - 2k)a^2}{b} + 2\pi\nu\right)\right) C\left(\frac{\sqrt{\nu - 2k}\,(a + 2b\sqrt{z})}{\sqrt{b}\sqrt{2\pi}}\right) + a\sqrt{2\pi}\,(2k - \nu) S\left(\frac{\sqrt{\nu - 2k}\,(a + 2b\sqrt{z})}{\sqrt{b}\sqrt{2\pi}}\right) \sin\left(\frac{1}{4}\left(\frac{(\nu - 2k)a^2}{b} + 2\pi\nu\right)\right) - 2\sqrt{b}\sqrt{\nu - 2k}\, \sin\left((a + b\sqrt{z})\sqrt{z}\,(2k - \nu) + \frac{\pi\nu}{2}\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin^{\nu}(a z^r + b z + c)$

01.06.21.0646.01

$$\int \sin^{\nu}\left(a z^2 + b z + c\right) dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + \frac{1}{\sqrt{a}} \left(\left(2^{\frac{1}{2}-\nu} \sqrt{\pi}\right) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{\sqrt{\nu - 2k}} \left((-1)^k \binom{\nu}{k} \left(\cos\left(\frac{1}{4}\left(\frac{(\nu - 2k) b^2}{a} + 8 c k - 4 c \nu + 2 \pi \nu\right)\right) C\left(\frac{\sqrt{\nu - 2k}\, (b + 2 a z)}{\sqrt{a}\, \sqrt{2\pi}}\right) + S\left(\frac{\sqrt{\nu - 2k}\, (b + 2 a z)}{\sqrt{a}\, \sqrt{2\pi}}\right) \sin\left(\frac{1}{4}\left(\frac{(\nu - 2k) b^2}{a} + 8 c k - 4 c \nu + 2 \pi \nu\right)\right)\right)\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.0647.01

$$\int \sin^{\nu}\left(\sqrt{z}\, a + b z + c\right) dz = 2^{-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + \frac{2^{-\nu}}{b^{3/2}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{(\nu - 2k)^{3/2}} (-1)^k \binom{\nu}{k} \left(a \sqrt{2\pi}\, (2k - \nu) \cos\left(\frac{1}{4}\left(\frac{(\nu - 2k) a^2}{b} + 8 c k - 4 c \nu + 2 \pi \nu\right)\right) C\left(\frac{\sqrt{\nu - 2k}\, \left(a + 2 b \sqrt{z}\right)}{\sqrt{b}\, \sqrt{2\pi}}\right) + a \sqrt{2\pi}\, (2k - \nu) S\left(\frac{\sqrt{\nu - 2k}\, \left(a + 2 b \sqrt{z}\right)}{\sqrt{b}\, \sqrt{2\pi}}\right) \sin\left(\frac{1}{4}\left(\frac{(\nu - 2k) a^2}{b} + 8 c k - 4 c \nu + 2 \pi \nu\right)\right) - 2 \sqrt{b}\, \sqrt{\nu - 2k}\, \sin\left(c (2k - \nu) + \left(a + b \sqrt{z}\right) \sqrt{z}\, (2k - \nu) + \frac{\pi \nu}{2}\right)\right) /; \nu \in \mathbb{N}^+$$

Involving products of the direct function

Involving products of two direct functions

Involving $\sin(c z) \sin(a z)$

01.06.21.0648.01

$$\int \sin(c z) \sin(a z)\, dz = \frac{c \cos(c z) \sin(a z) - a \cos(a z) \sin(c z)}{a^2 - c^2}$$

Involving $\sin(c z) \sin(a z + b)$

01.06.21.0649.01

$$\int \sin(c z) \sin(a z + b)\, dz = \frac{(a + c) \sin(b + (a - c) z) + (c - a) \sin(b + (a + c) z)}{2 (a - c) (a + c)}$$

Involving $\sin(c z + d) \sin(a z + b)$

01.06.21.0650.01

$$\int \sin(c z + d) \sin(a z + b)\, dz = \frac{(c - a) \sin(b + d + (a + c) z) + (a + c) \sin(b - d + a z - c z)}{2 (a - c) (a + c)}$$

Involving $\sin(d\, z) \sin(c\, z^r)$

01.06.21.0651.01

$$\int \sin(d\, z) \sin(c\, z^2)\, dz = \frac{1}{2\sqrt{c}} \left(\sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{d^2}{4c}\right) C\left(\frac{2\, c\, z - d}{\sqrt{c}\, \sqrt{2\pi}}\right) - \cos\left(\frac{d^2}{4c}\right) C\left(\frac{d + 2\, c\, z}{\sqrt{c}\, \sqrt{2\pi}}\right) + S\left(\frac{2\, c\, z - d}{\sqrt{c}\, \sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4c}\right) - S\left(\frac{d + 2\, c\, z}{\sqrt{c}\, \sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4c}\right) \right) \right)$$

01.06.21.0652.01

$$\int \sin(d\, z) \sin(c \sqrt{z})\, dz = \frac{1}{4\, d^{3/2}} \left(c \sqrt{2\pi} \left(\cos\left(\frac{c^2}{4d}\right) \left(C\left(\frac{2\, d \sqrt{z} - c}{\sqrt{d}\, \sqrt{2\pi}}\right) + C\left(\frac{c + 2\, d \sqrt{z}}{\sqrt{d}\, \sqrt{2\pi}}\right) \right) + \left(S\left(\frac{2\, d \sqrt{z} - c}{\sqrt{d}\, \sqrt{2\pi}}\right) + S\left(\frac{c + 2\, d \sqrt{z}}{\sqrt{d}\, \sqrt{2\pi}}\right) \right) \sin\left(\frac{c^2}{4d}\right) \right) - 4\sqrt{d}\, \cos(d\, z) \sin(c \sqrt{z}) \right)$$

Involving $\sin(d\, z + e) \sin(c\, z^r)$

01.06.21.0653.01

$$\int \sin(e + d\, z) \sin(c\, z^2)\, dz = \frac{1}{2\sqrt{c}} \left(\sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{d^2}{4c} + e\right) C\left(\frac{2\, c\, z - d}{\sqrt{c}\, \sqrt{2\pi}}\right) - \cos\left(\frac{d^2}{4c} - e\right) C\left(\frac{d + 2\, c\, z}{\sqrt{c}\, \sqrt{2\pi}}\right) - S\left(\frac{d + 2\, c\, z}{\sqrt{c}\, \sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4c} - e\right) + S\left(\frac{2\, c\, z - d}{\sqrt{c}\, \sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4c} + e\right) \right) \right)$$

01.06.21.0654.01

$$\int \sin(e + d\, z) \sin(c \sqrt{z})\, dz = \frac{1}{4\, d^{3/2}} \left(c \sqrt{2\pi} \left(\cos\left(\frac{c^2}{4d} - e\right) \left(C\left(\frac{2\, d \sqrt{z} - c}{\sqrt{d}\, \sqrt{2\pi}}\right) + C\left(\frac{c + 2\, d \sqrt{z}}{\sqrt{d}\, \sqrt{2\pi}}\right) \right) + \left(S\left(\frac{2\, d \sqrt{z} - c}{\sqrt{d}\, \sqrt{2\pi}}\right) + S\left(\frac{c + 2\, d \sqrt{z}}{\sqrt{d}\, \sqrt{2\pi}}\right) \right) \sin\left(\frac{c^2}{4d} - e\right) \right) - 4\sqrt{d}\, \cos(e + d\, z) \sin(c \sqrt{z}) \right)$$

Involving $\sin(b\, z^r) \sin(c\, z^r)$

01.06.21.0655.01

$$\int \sin(b\, z^r) \sin(c\, z^r)\, dz = -\frac{z}{4\, r} \left(\Gamma\left(\frac{1}{r}, (-i\, b + i\, c)\, z^r\right) ((-i\, b + i\, c)\, z^r)^{-1/r} - ((i\, b + i\, c)\, z^r)^{-1/r}\, \Gamma\left(\frac{1}{r}, (i\, b + i\, c)\, z^r\right) - ((-i\, b - i\, c)\, z^r)^{-1/r}\, \Gamma\left(\frac{1}{r}, (-i\, b - i\, c)\, z^r\right) + ((i\, b - i\, c)\, z^r)^{-1/r}\, \Gamma\left(\frac{1}{r}, (i\, b - i\, c)\, z^r\right) \right)$$

01.06.21.0656.01

$$\int \sin(b\, z^2) \sin(c\, z^2)\, dz = \frac{1}{2} \sqrt{\frac{\pi}{2}} \left(\frac{1}{\sqrt{b - c}}\, C\left(\sqrt{b - c}\, \sqrt{\frac{2}{\pi}}\, z\right) - \frac{1}{\sqrt{b + c}}\, C\left(\sqrt{b + c}\, \sqrt{\frac{2}{\pi}}\, z\right) \right)$$

01.06.21.0657.01

$$\int \sin\left(b\sqrt{z}\right)\sin\left(c\sqrt{z}\right)dz = \sqrt{z}\left(\frac{\sin\left((b-c)\sqrt{z}\right)}{b-c}-\frac{\sin\left((b+c)\sqrt{z}\right)}{b+c}\right)+\frac{\cos\left((b-c)\sqrt{z}\right)}{(b-c)^2}-\frac{\cos\left((b+c)\sqrt{z}\right)}{(b+c)^2}$$

Involving $\sin(d\,z)\sin\left(c\,z^r+g\right)$

01.06.21.0658.01

$$\int \sin(d\,z)\sin\left(c\,z^2+g\right)dz = \frac{1}{2\sqrt{-c}\sqrt{c}}\left(\sqrt{\frac{\pi}{2}}\left(\sqrt{c}\cos\left(\frac{d^2}{4c}-g\right)C\left(\frac{d-2cz}{\sqrt{-c}\sqrt{2\pi}}\right)-\sqrt{-c}\cos\left(\frac{d^2}{4c}-g\right)C\left(\frac{d+2cz}{\sqrt{c}\sqrt{2\pi}}\right)-\sqrt{c}\,S\left(\frac{d-2cz}{\sqrt{-c}\sqrt{2\pi}}\right)\sin\left(\frac{d^2}{4c}-g\right)-\sqrt{-c}\,S\left(\frac{d+2cz}{\sqrt{c}\sqrt{2\pi}}\right)\sin\left(\frac{d^2}{4c}-g\right)\right)\right)$$

01.06.21.0659.01

$$\int \sin(d\,z)\sin\left(\sqrt{z}\,c+g\right)dz = \frac{1}{2}\left(\frac{1}{d^{3/2}}\left(c\sqrt{\frac{\pi}{2}}\left(\cos\left(\frac{c^2}{4d}+g\right)C\left(\frac{2d\sqrt{z}-c}{\sqrt{d}\sqrt{2\pi}}\right)+\cos\left(\frac{c^2-4dg}{4d}\right)C\left(\frac{c+2d\sqrt{z}}{\sqrt{d}\sqrt{2\pi}}\right)+S\left(\frac{c+2d\sqrt{z}}{\sqrt{d}\sqrt{2\pi}}\right)\sin\left(\frac{c^2-4dg}{4d}\right)+S\left(\frac{2d\sqrt{z}-c}{\sqrt{d}\sqrt{2\pi}}\right)\sin\left(\frac{c^2}{4d}+g\right)\right)\right)-\frac{2\cos(d\,z)\sin\left(\sqrt{z}\,c+g\right)}{d}\right)$$

Involving $\sin(d\,z+e)\sin\left(c\,z^r+g\right)$

01.06.21.0660.01

$$\int \sin(d\,z+e)\sin\left(c\,z^2+g\right)dz = \frac{1}{2\sqrt{-c}\sqrt{c}}\left(\sqrt{\frac{\pi}{2}}\left(\sqrt{c}\cos\left(\frac{d^2}{4c}+e-g\right)C\left(\frac{d-2cz}{\sqrt{-c}\sqrt{2\pi}}\right)-\sqrt{-c}\cos\left(\frac{d^2}{4c}-e-g\right)C\left(\frac{d+2cz}{\sqrt{c}\sqrt{2\pi}}\right)-\sqrt{-c}\,S\left(\frac{d+2cz}{\sqrt{c}\sqrt{2\pi}}\right)\sin\left(\frac{d^2}{4c}-e-g\right)-\sqrt{c}\,S\left(\frac{d-2cz}{\sqrt{-c}\sqrt{2\pi}}\right)\sin\left(\frac{d^2}{4c}+e-g\right)\right)\right)$$

01.06.21.0661.01

$$\int \sin(d\,z+e)\sin\left(\sqrt{z}\,c+g\right)dz = \frac{1}{2}\left(\frac{1}{d^{3/2}}\left(c\sqrt{\frac{\pi}{2}}\left(\cos\left(\frac{c^2}{4d}-e+g\right)C\left(\frac{2d\sqrt{z}-c}{\sqrt{d}\sqrt{2\pi}}\right)+\cos\left(\frac{c^2-4d(e+g)}{4d}\right)C\left(\frac{c+2d\sqrt{z}}{\sqrt{d}\sqrt{2\pi}}\right)+S\left(\frac{c+2d\sqrt{z}}{\sqrt{d}\sqrt{2\pi}}\right)\sin\left(\frac{c^2-4d(e+g)}{4d}\right)+S\left(\frac{2d\sqrt{z}-c}{\sqrt{d}\sqrt{2\pi}}\right)\sin\left(\frac{c^2}{4d}-e+g\right)\right)\right)-\frac{2\cos(e+d\,z)\sin\left(\sqrt{z}\,c+g\right)}{d}\right)$$

Involving $\sin(b z^r) \sin(c z^r + g)$

01.06.21.0662.01

$$\int \sin(b z^r) \sin(c z^r + g) \, dz = \frac{1}{4r} \left(e^{-i g} z \left(-(-i (b-c) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -i (b-c) z^r\right) - e^{2 i g} (i (b-c) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i (b-c) z^r\right) + e^{2 i g} (-i (b+c) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -i (b+c) z^r\right) + (i (b+c) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i (b+c) z^r\right) \right) \right)$$

01.06.21.0663.01

$$\int \sin(b z^2) \sin(c z^2 + g) \, dz = \frac{1}{2} \sqrt{\frac{\pi}{2}} \left(\frac{\cos(g) C\left(\sqrt{b-c} \sqrt{\frac{2}{\pi}} z\right) + S\left(\sqrt{b-c} \sqrt{\frac{2}{\pi}} z\right) \sin(g)}{\sqrt{b-c}} + \frac{S\left(\sqrt{b+c} \sqrt{\frac{2}{\pi}} z\right) \sin(g) - \cos(g) C\left(\sqrt{b+c} \sqrt{\frac{2}{\pi}} z\right)}{\sqrt{b+c}} \right)$$

01.06.21.0664.01

$$\int \sin\left(b \sqrt{z}\right) \sin\left(\sqrt{z} c + g\right) dz = \frac{1}{2} \left(\frac{2 \cos\left((b-c) \sqrt{z}\right) \left(\cos(g) + (c-b) \sqrt{z} \sin(g)\right)}{(b-c)^2} + \frac{2 \left((b-c) \sqrt{z} \cos(g) + \sin(g)\right) \sin\left((b-c) \sqrt{z}\right)}{(b-c)^2} - \frac{2 \cos\left((b+c) \sqrt{z}\right) \left(\cos(g) + (b+c) \sqrt{z} \sin(g)\right)}{(b+c)^2} - \frac{2 \left((b+c) \sqrt{z} \cos(g) - \sin(g)\right) \sin\left((b+c) \sqrt{z}\right)}{(b+c)^2} \right)$$

Involving $\sin(b z^r + e) \sin(c z^r + g)$

01.06.21.0665.01

$$\int \sin(b z^r + e) \sin(c z^r + g) \, dz = \frac{1}{4r} e^{-i (e+g)} z \left(-e^{2 i e} \Gamma\left(\frac{1}{r}, -i (b-c) z^r\right) (-i (b-c) z^r)^{-1/r} - e^{2 i g} (i (b-c) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i (b-c) z^r\right) + e^{2 i (e+g)} (-i (b+c) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -i (b+c) z^r\right) + (i (b+c) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i (b+c) z^r\right) \right)$$

01.06.21.0666.01

$$\int \sin(b z^2 + e) \sin(c z^2 + g) \, dz = \frac{1}{2} \sqrt{\frac{\pi}{2}} \left(\frac{\cos(e-g)\, C\left(\sqrt{b-c} \sqrt{\frac{2}{\pi}} z\right) - S\left(\sqrt{b-c} \sqrt{\frac{2}{\pi}} z\right) \sin(e-g)}{\sqrt{b-c}} + \frac{S\left(\sqrt{b+c} \sqrt{\frac{2}{\pi}} z\right) \sin(e+g) - \cos(e+g)\, C\left(\sqrt{b+c} \sqrt{\frac{2}{\pi}} z\right)}{\sqrt{b+c}} \right)$$

01.06.21.0667.01

$$\int \sin(\sqrt{z}\, b + e) \sin(\sqrt{z}\, c + g) \, dz = \frac{1}{2} \left(\frac{2 \cos((b-c)\sqrt{z}) (\cos(e-g) + (b-c)\sqrt{z} \sin(e-g))}{(b-c)^2} + \frac{2 ((b-c)\sqrt{z} \cos(e-g) - \sin(e-g)) \sin((b-c)\sqrt{z})}{(b-c)^2} - \frac{2 \cos((b+c)\sqrt{z}) (\cos(e+g) + (b+c)\sqrt{z} \sin(e+g))}{(b+c)^2} - \frac{2 ((b+c)\sqrt{z} \cos(e+g) - \sin(e+g)) \sin((b+c)\sqrt{z})}{(b+c)^2} \right)$$

Involving $\sin(d z) \sin(c z^r + f z)$

01.06.21.0668.01

$$\int \sin(d z) \sin(c z^2 + f z) \, dz = \frac{1}{2 \sqrt{-c} \sqrt{c}} \left(\sqrt{\frac{\pi}{2}} \left(\sqrt{c} \cos\left(\frac{(d-f)^2}{4c}\right) C\left(\frac{d-f-2cz}{\sqrt{-c} \sqrt{2\pi}}\right) - \sqrt{-c} \cos\left(\frac{(d+f)^2}{4c}\right) C\left(\frac{d+f+2cz}{\sqrt{c} \sqrt{2\pi}}\right) - \sqrt{c}\, S\left(\frac{d-f-2cz}{\sqrt{-c} \sqrt{2\pi}}\right) \sin\left(\frac{(d-f)^2}{4c}\right) - \sqrt{-c}\, S\left(\frac{d+f+2cz}{\sqrt{c} \sqrt{2\pi}}\right) \sin\left(\frac{(d+f)^2}{4c}\right) \right) \right)$$

01.06.21.0669.01

$$\int \sin(d z) \sin(\sqrt{z}\, c + f z) \, dz = \frac{1}{2} \left(\frac{c \sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{c^2}{4(d-f)}\right) C\left(\frac{2(d-f)\sqrt{z} - c}{\sqrt{d-f} \sqrt{2\pi}}\right) + S\left(\frac{2(d-f)\sqrt{z} - c}{\sqrt{d-f} \sqrt{2\pi}}\right) \sin\left(\frac{c^2}{4(d-f)}\right) \right)}{(d-f)^{3/2}} + \frac{c \sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{c^2}{4(d+f)}\right) C\left(\frac{c + 2(d+f)\sqrt{z}}{\sqrt{d+f} \sqrt{2\pi}}\right) + S\left(\frac{c + 2(d+f)\sqrt{z}}{\sqrt{d+f} \sqrt{2\pi}}\right) \sin\left(\frac{c^2}{4(d+f)}\right) \right)}{(d+f)^{3/2}} - \frac{\sin(c\sqrt{z} - (d-f) z)}{d-f} - \frac{\sin(\sqrt{z}\, c + (d+f) z)}{d+f} \right)$$

Involving $\sin(d z + e) \sin(c z^r + f z)$

01.06.21.0670.01

$$\int \sin(d z+e)\sin(c z^2+f z)\,dz = \frac{1}{2\sqrt{-c}\sqrt{c}}\left(\sqrt{\frac{\pi}{2}}\left(\sqrt{c}\cos\left(\frac{(d-f)^2}{4c}+e\right)C\left(\frac{d-f-2cz}{\sqrt{-c}\sqrt{2\pi}}\right)-\sqrt{-c}\cos\left(e-\frac{(d+f)^2}{4c}\right)C\left(\frac{d+f+2cz}{\sqrt{c}\sqrt{2\pi}}\right)-\sqrt{c}\,S\left(\frac{d-f-2cz}{\sqrt{-c}\sqrt{2\pi}}\right)\sin\left(\frac{(d-f)^2}{4c}+e\right)+\sqrt{-c}\,S\left(\frac{d+f+2cz}{\sqrt{c}\sqrt{2\pi}}\right)\sin\left(e-\frac{(d+f)^2}{4c}\right)\right)\right)$$

01.06.21.0671.01

$$\int \sin(d z+e)\sin(\sqrt{z}\,c+f z)\,dz = \frac{1}{2}\left(\frac{c\sqrt{\frac{\pi}{2}}\left(\cos\left(e-\frac{c^2}{4(d-f)}\right)C\left(\frac{2(d-f)\sqrt{z}-c}{\sqrt{d-f}\sqrt{2\pi}}\right)-S\left(\frac{2(d-f)\sqrt{z}-c}{\sqrt{d-f}\sqrt{2\pi}}\right)\sin\left(e-\frac{c^2}{4(d-f)}\right)\right)}{(d-f)^{3/2}}+\frac{c\sqrt{\frac{\pi}{2}}\left(\cos\left(e-\frac{c^2}{4(d+f)}\right)C\left(\frac{c+2(d+f)\sqrt{z}}{\sqrt{d+f}\sqrt{2\pi}}\right)-S\left(\frac{c+2(d+f)\sqrt{z}}{\sqrt{d+f}\sqrt{2\pi}}\right)\sin\left(e-\frac{c^2}{4(d+f)}\right)\right)}{(d+f)^{3/2}}+\frac{\sin(-\sqrt{z}\,c+e+(d-f)z)}{d-f}-\frac{\sin(\sqrt{z}\,c+e+(d+f)z)}{d+f}\right)$$

Involving $\sin(b z^r)\sin(c z^r+f z)$

01.06.21.0672.01

$$\int \sin(b z^2)\sin(c z^2+f z)\,dz = \frac{1}{2\sqrt{b-c}\sqrt{b+c}}\left(\sqrt{\frac{\pi}{2}}\left(\sqrt{b+c}\cos\left(\frac{f^2}{4(b-c)}\right)C\left(\frac{-f+2bz-2cz}{\sqrt{b-c}\sqrt{2\pi}}\right)-\sqrt{b-c}\cos\left(\frac{f^2}{4(b+c)}\right)C\left(\frac{f+2(b+c)z}{\sqrt{b+c}\sqrt{2\pi}}\right)+\sqrt{b+c}\,S\left(\frac{-f+2bz-2cz}{\sqrt{b-c}\sqrt{2\pi}}\right)\sin\left(\frac{f^2}{4(b-c)}\right)-\sqrt{b-c}\,S\left(\frac{f+2(b+c)z}{\sqrt{b+c}\sqrt{2\pi}}\right)\sin\left(\frac{f^2}{4(b+c)}\right)\right)\right)$$

01.06.21.0673.01

$$\int \sin(b\sqrt{z})\sin(\sqrt{z}\,c+f z)\,dz = \frac{1}{2}\left(-\frac{(b-c)\sqrt{\frac{\pi}{2}}\left(\cos\left(\frac{(b-c)^2}{4f}\right)C\left(\frac{b-c-2f\sqrt{z}}{\sqrt{-f}\sqrt{2\pi}}\right)-S\left(\frac{b-c-2f\sqrt{z}}{\sqrt{-f}\sqrt{2\pi}}\right)\sin\left(\frac{(b-c)^2}{4f}\right)\right)}{(-f)^{3/2}}+\frac{(b+c)\sqrt{\frac{\pi}{2}}\left(\cos\left(\frac{(b+c)^2}{4f}\right)C\left(\frac{b+c+2f\sqrt{z}}{\sqrt{f}\sqrt{2\pi}}\right)+S\left(\frac{b+c+2f\sqrt{z}}{\sqrt{f}\sqrt{2\pi}}\right)\sin\left(\frac{(b+c)^2}{4f}\right)\right)}{f^{3/2}}-\frac{\sin(\sqrt{z}\,(b+c)+f z)}{f}-\frac{\sin((b-c)\sqrt{z}-f z)}{f}\right)$$

Involving $\sin(b z^r + e) \sin(c z^r + f z)$

01.06.21.0674.01

$$\int \sin(b z^2 + e) \sin(c z^2 + f z)\, dz = \frac{1}{2 \sqrt{b-c} \sqrt{b+c}} \left(\sqrt{\frac{\pi}{2}} \left(\sqrt{b+c} \cos\left(e - \frac{f^2}{4(b-c)}\right) C\left(\frac{-f + 2 b z - 2 c z}{\sqrt{b-c} \sqrt{2\pi}}\right) - \sqrt{b-c} \cos\left(e - \frac{f^2}{4(b+c)}\right) C\left(\frac{f + 2(b+c) z}{\sqrt{b+c} \sqrt{2\pi}}\right) - \sqrt{b+c}\, S\left(\frac{-f + 2 b z - 2 c z}{\sqrt{b-c} \sqrt{2\pi}}\right) \sin\left(e - \frac{f^2}{4(b-c)}\right) + \sqrt{b-c}\, S\left(\frac{f + 2(b+c) z}{\sqrt{b+c} \sqrt{2\pi}}\right) \sin\left(e - \frac{f^2}{4(b+c)}\right)\right)\right)$$

01.06.21.0675.01

$$\int \sin(\sqrt{z}\, b + e) \sin(\sqrt{z}\, c + f z)\, dz = \frac{1}{2} \left(-\frac{(b-c) \sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{(b-c)^2}{4 f} + e\right) C\left(\frac{b-c-2 f \sqrt{z}}{\sqrt{-f} \sqrt{2\pi}}\right) - S\left(\frac{b-c-2 f \sqrt{z}}{\sqrt{-f} \sqrt{2\pi}}\right) \sin\left(\frac{(b-c)^2}{4 f} + e\right)\right)}{(-f)^{3/2}} + \frac{(b+c) \sqrt{\frac{\pi}{2}} \left(\cos\left(e - \frac{(b+c)^2}{4 f}\right) C\left(\frac{b+c+2 f \sqrt{z}}{\sqrt{f} \sqrt{2\pi}}\right) - S\left(\frac{b+c+2 f \sqrt{z}}{\sqrt{f} \sqrt{2\pi}}\right) \sin\left(e - \frac{(b+c)^2}{4 f}\right)\right)}{f^{3/2}} - \frac{\sin(\sqrt{z}\, (b+c) + e + f z)}{f} - \frac{\sin(\sqrt{z}\, (b-c) + e - f z)}{f}\right)$$

Involving $\sin(b z^r + d z) \sin(c z^r + f z)$

01.06.21.0676.01

$$\int \sin(b z^2 + d z) \sin(c z^2 + f z)\, dz = \frac{1}{2 \sqrt{b-c} \sqrt{b+c}} \left(\sqrt{\frac{\pi}{2}} \left(\sqrt{b+c} \cos\left(\frac{(d-f)^2}{4(b-c)}\right) C\left(\frac{d - f + 2 b z - 2 c z}{\sqrt{b-c} \sqrt{2\pi}}\right) - \sqrt{b-c} \cos\left(\frac{(d+f)^2}{4(b+c)}\right) C\left(\frac{d + f + 2(b+c) z}{\sqrt{b+c} \sqrt{2\pi}}\right) + \sqrt{b+c}\, S\left(\frac{d - f + 2 b z - 2 c z}{\sqrt{b-c} \sqrt{2\pi}}\right) \sin\left(\frac{(d-f)^2}{4(b-c)}\right) - \sqrt{b-c}\, S\left(\frac{d + f + 2(b+c) z}{\sqrt{b+c} \sqrt{2\pi}}\right) \sin\left(\frac{(d+f)^2}{4(b+c)}\right)\right)\right)$$

01.06.21.0677.01

$$\int \sin\left(\sqrt{z}\, b + d\, z\right) \sin\left(\sqrt{z}\, c + f\, z\right) dz = \frac{1}{2} \left(-\frac{(b-c)\sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{(b-c)^2}{4(d-f)}\right) C\left(\frac{b-c+2(d-f)\sqrt{z}}{\sqrt{d-f}\,\sqrt{2\pi}}\right) + S\left(\frac{b-c+2(d-f)\sqrt{z}}{\sqrt{d-f}\,\sqrt{2\pi}}\right) \sin\left(\frac{(b-c)^2}{4(d-f)}\right)\right)}{(d-f)^{3/2}} + \frac{(b+c)\sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{(b+c)^2}{4(d+f)}\right) C\left(\frac{b+c+2(d+f)\sqrt{z}}{\sqrt{d+f}\,\sqrt{2\pi}}\right) + S\left(\frac{b+c+2(d+f)\sqrt{z}}{\sqrt{d+f}\,\sqrt{2\pi}}\right) \sin\left(\frac{(b+c)^2}{4(d+f)}\right)\right)}{(d+f)^{3/2}} + \frac{\sin\left(\sqrt{z}\,(b-c) + (d-f)\,z\right)}{d-f} - \frac{\sin\left(\sqrt{z}\,(b+c) + (d+f)\,z\right)}{d+f} \right)$$

Involving $\sin(d\, z) \sin\left(c\, z^r + f\, z + g\right)$

01.06.21.0678.01

$$\int \sin(d\, z) \sin\left(c\, z^2 + f\, z + g\right) dz = \frac{1}{2\sqrt{-c}\,\sqrt{c}} \left(\sqrt{\frac{\pi}{2}} \left(\sqrt{c}\, \cos\left(\frac{(d-f)^2}{4c} - g\right) C\left(\frac{d-f-2c\,z}{\sqrt{-c}\,\sqrt{2\pi}}\right) - \sqrt{-c}\, \cos\left(\frac{(d+f)^2}{4c} - g\right) C\left(\frac{d+f+2c\,z}{\sqrt{c}\,\sqrt{2\pi}}\right) - \sqrt{c}\, S\left(\frac{d-f-2c\,z}{\sqrt{-c}\,\sqrt{2\pi}}\right) \sin\left(\frac{(d-f)^2}{4c} - g\right) - \sqrt{-c}\, S\left(\frac{d+f+2c\,z}{\sqrt{c}\,\sqrt{2\pi}}\right) \sin\left(\frac{(d+f)^2}{4c} - g\right) \right) \right)$$

01.06.21.0679.01

$$\int \sin(d\, z) \sin\left(\sqrt{z}\, c + f\, z + g\right) dz = \frac{1}{2} \left(\frac{c\sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{c^2}{4(d+f)} - g\right) C\left(\frac{c+2(d+f)\sqrt{z}}{\sqrt{d+f}\,\sqrt{2\pi}}\right) + S\left(\frac{c+2(d+f)\sqrt{z}}{\sqrt{d+f}\,\sqrt{2\pi}}\right) \sin\left(\frac{c^2}{4(d+f)} - g\right)\right)}{(d+f)^{3/2}} + \frac{c\sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{c^2}{4(d-f)} + g\right) C\left(\frac{2(d-f)\sqrt{z} - c}{\sqrt{d-f}\,\sqrt{2\pi}}\right) + S\left(\frac{2(d-f)\sqrt{z} - c}{\sqrt{d-f}\,\sqrt{2\pi}}\right) \sin\left(\frac{c^2}{4(d-f)} + g\right)\right)}{(d-f)^{3/2}} - \frac{\sin\left(\sqrt{z}\, c + g - (d-f)\,z\right)}{d-f} - \frac{\sin\left(\sqrt{z}\, c + g + (d+f)\,z\right)}{d+f} \right)$$

Involving $\sin(d\, z + e) \sin\left(c\, z^r + f\, z + g\right)$

01.06.21.0680.01

$$\int \sin(d\,z+e)\sin\left(c\,z^2+f\,z+g\right)dz = \frac{1}{2\sqrt{-c}\,\sqrt{c}}\left(\sqrt{\frac{\pi}{2}}\left(\sqrt{c}\,\cos\left(\frac{(d-f)^2}{4\,c}+e-g\right)C\left(\frac{d-f-2\,c\,z}{\sqrt{-c}\,\sqrt{2\,\pi}}\right)-\sqrt{-c}\,\cos\left(-\frac{(d+f)^2}{4\,c}+e+g\right)C\left(\frac{d+f+2\,c\,z}{\sqrt{c}\,\sqrt{2\,\pi}}\right)-\sqrt{c}\,S\left(\frac{d-f-2\,c\,z}{\sqrt{-c}\,\sqrt{2\,\pi}}\right)\sin\left(\frac{(d-f)^2}{4\,c}+e-g\right)+\sqrt{-c}\,S\left(\frac{d+f+2\,c\,z}{\sqrt{c}\,\sqrt{2\,\pi}}\right)\sin\left(-\frac{(d+f)^2}{4\,c}+e+g\right)\right)\right)$$

01.06.21.0681.01

$$\int \sin(d\,z+e)\sin\left(\sqrt{z}\,c+f\,z+g\right)dz = \frac{1}{2}\left(\frac{1}{(d-f)^{3/2}}\left(c\sqrt{\frac{\pi}{2}}\left(\cos\left(-\frac{c^2}{4\,(d-f)}+e-g\right)C\left(\frac{2\,(d-f)\sqrt{z}-c}{\sqrt{d-f}\,\sqrt{2\,\pi}}\right)-S\left(\frac{2\,(d-f)\sqrt{z}-c}{\sqrt{d-f}\,\sqrt{2\,\pi}}\right)\sin\left(-\frac{c^2}{4\,(d-f)}+e-g\right)\right)\right)+\frac{1}{(d+f)^{3/2}}\left(c\sqrt{\frac{\pi}{2}}\left(\cos\left(-\frac{c^2}{4\,(d+f)}+e+g\right)C\left(\frac{c+2\,(d+f)\sqrt{z}}{\sqrt{d+f}\,\sqrt{2\,\pi}}\right)-S\left(\frac{c+2\,(d+f)\sqrt{z}}{\sqrt{d+f}\,\sqrt{2\,\pi}}\right)\sin\left(-\frac{c^2}{4\,(d+f)}+e+g\right)\right)\right)+\frac{\sin\left(-\sqrt{z}\,c+e-g+(d-f)\,z\right)}{d-f}-\frac{\sin\left(\sqrt{z}\,c+e+g+(d+f)\,z\right)}{d+f}\right)$$

Involving $\sin(b\,z^r)\sin(c\,z^r+f\,z+g)$

01.06.21.0682.01

$$\int \sin\left(b\,z^2\right)\sin\left(c\,z^2+f\,z+g\right)dz = \frac{1}{2\sqrt{b-c}\,\sqrt{b+c}}\left(\sqrt{\frac{\pi}{2}}\left(\sqrt{b+c}\,\cos\left(\frac{f^2}{4\,(b-c)}+g\right)C\left(\frac{-f+2\,b\,z-2\,c\,z}{\sqrt{b-c}\,\sqrt{2\,\pi}}\right)-\sqrt{b-c}\,\cos\left(\frac{f^2}{4\,(b+c)}-g\right)C\left(\frac{f+2\,(b+c)\,z}{\sqrt{b+c}\,\sqrt{2\,\pi}}\right)-\sqrt{b-c}\,S\left(\frac{f+2\,(b+c)\,z}{\sqrt{b+c}\,\sqrt{2\,\pi}}\right)\sin\left(\frac{f^2}{4\,(b+c)}-g\right)+\sqrt{b+c}\,S\left(\frac{-f+2\,b\,z-2\,c\,z}{\sqrt{b-c}\,\sqrt{2\,\pi}}\right)\sin\left(\frac{f^2}{4\,(b-c)}+g\right)\right)\right)$$

01.06.21.0683.01

$$\int \sin\left(b\sqrt{z}\right)\sin\left(\sqrt{z}\;c+f\,z+g\right)dz == \frac{1}{2}\left(-\frac{(b-c)\sqrt{\frac{\pi}{2}}\left(\cos\left(\frac{(b-c)^2}{4f}-g\right)C\left(\frac{b-c-2f\sqrt{z}}{\sqrt{-f}\sqrt{2\pi}}\right)-S\left(\frac{b-c-2f\sqrt{z}}{\sqrt{-f}\sqrt{2\pi}}\right)\sin\left(\frac{(b-c)^2}{4f}-g\right)\right)}{(-f)^{3/2}}+\right.$$

$$\frac{(b+c)\sqrt{\frac{\pi}{2}}\left(\cos\left(\frac{(b+c)^2}{4f}-g\right)C\left(\frac{b+c+2f\sqrt{z}}{\sqrt{f}\sqrt{2\pi}}\right)+S\left(\frac{b+c+2f\sqrt{z}}{\sqrt{f}\sqrt{2\pi}}\right)\sin\left(\frac{(b+c)^2}{4f}-g\right)\right)}{f^{3/2}}+$$

$$\left.\frac{\sin\left(-\sqrt{z}\;(b-c)+g+f\,z\right)}{f}-\frac{\sin\left(\sqrt{z}\;(b+c)+g+f\,z\right)}{f}\right)$$

Involving $\sin\left(b\,z^r+e\right)\sin\left(c\,z^r+f\,z+g\right)$

01.06.21.0684.01

$$\int \sin\left(b\,z^2+e\right)\sin\left(c\,z^2+f\,z+g\right)dz == \frac{1}{2\sqrt{b-c}\;\sqrt{b+c}}$$

$$\left(\sqrt{\frac{\pi}{2}}\left(\sqrt{b+c}\;\cos\left(-\frac{f^2}{4(b-c)}+e-g\right)C\left(\frac{-f+2\,b\,z-2\,c\,z}{\sqrt{b-c}\;\sqrt{2\pi}}\right)-\sqrt{b-c}\;\cos\left(-\frac{f^2}{4(b+c)}+e+g\right)C\left(\frac{f+2\,(b+c)\,z}{\sqrt{b+c}\;\sqrt{2\pi}}\right)-\right.\right.$$

$$\left.\left.\sqrt{b+c}\;S\left(\frac{-f+2\,b\,z-2\,c\,z}{\sqrt{b-c}\;\sqrt{2\pi}}\right)\sin\left(-\frac{f^2}{4(b-c)}+e-g\right)+\sqrt{b-c}\;S\left(\frac{f+2\,(b+c)\,z}{\sqrt{b+c}\;\sqrt{2\pi}}\right)\sin\left(-\frac{f^2}{4(b+c)}+e+g\right)\right)\right)$$

01.06.21.0685.01

$$\int \sin\left(\sqrt{z}\;b+e\right)\sin\left(\sqrt{z}\;c+f\,z+g\right)dz ==$$

$$\frac{1}{2}\left(-\frac{1}{(-f)^{3/2}}\left((b-c)\sqrt{\frac{\pi}{2}}\left(\cos\left(\frac{(b-c)^2}{4f}+e-g\right)C\left(\frac{b-c-2f\sqrt{z}}{\sqrt{-f}\;\sqrt{2\pi}}\right)-S\left(\frac{b-c-2f\sqrt{z}}{\sqrt{-f}\;\sqrt{2\pi}}\right)\sin\left(\frac{(b-c)^2}{4f}+e-g\right)\right)\right)+\right.$$

$$\frac{1}{f^{3/2}}\left((b+c)\sqrt{\frac{\pi}{2}}\left(\cos\left(-\frac{(b+c)^2}{4f}+e+g\right)C\left(\frac{b+c+2f\sqrt{z}}{\sqrt{f}\;\sqrt{2\pi}}\right)-S\left(\frac{b+c+2f\sqrt{z}}{\sqrt{f}\;\sqrt{2\pi}}\right)\sin\left(-\frac{(b+c)^2}{4f}+e+g\right)\right)\right)-$$

$$\left.\frac{\sin\left(\sqrt{z}\;(b+c)+e+g+f\,z\right)}{f}-\frac{\sin\left(\sqrt{z}\;(b-c)+e-g-f\,z\right)}{f}\right)$$

Involving $\sin\left(b\,z^r+d\,z\right)\sin\left(c\,z^r+f\,z+g\right)$

01.06.21.0686.01

$$\int \sin(b z^2 + d z) \sin(c z^2 + f z + g)\, dz = \frac{1}{2\sqrt{b-c}\,\sqrt{b+c}} \left(\sqrt{\frac{\pi}{2}} \left(\sqrt{b+c}\, \cos\left(\frac{(d-f)^2}{4(b-c)} + g\right) C\left(\frac{d-f+2bz-2cz}{\sqrt{b-c}\,\sqrt{2\pi}}\right) - \sqrt{b-c}\, \cos\left(\frac{(d+f)^2}{4(b+c)} - g\right) C\left(\frac{d+f+2(b+c)z}{\sqrt{b+c}\,\sqrt{2\pi}}\right) - \sqrt{b-c}\, S\left(\frac{d+f+2(b+c)z}{\sqrt{b+c}\,\sqrt{2\pi}}\right) \sin\left(\frac{(d+f)^2}{4(b+c)} - g\right) + \sqrt{b+c}\, S\left(\frac{d-f+2bz-2cz}{\sqrt{b-c}\,\sqrt{2\pi}}\right) \sin\left(\frac{(d-f)^2}{4(b-c)} + g\right)\right)\right)$$

01.06.21.0687.01

$$\int \sin(\sqrt{z}\, b + d z) \sin(\sqrt{z}\, c + f z + g)\, dz = \frac{1}{2}\left(\frac{1}{(d+f)^{3/2}} \left((b+c)\sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{(b+c)^2}{4(d+f)} - g\right) C\left(\frac{b+c+2(d+f)\sqrt{z}}{\sqrt{d+f}\,\sqrt{2\pi}}\right) + S\left(\frac{b+c+2(d+f)\sqrt{z}}{\sqrt{d+f}\,\sqrt{2\pi}}\right) \sin\left(\frac{(b+c)^2}{4(d+f)} - g\right)\right)\right) - \frac{1}{(d-f)^{3/2}} \left((b-c)\sqrt{\frac{\pi}{2}} \left(\cos\left(\frac{(b-c)^2}{4(d-f)} + g\right) C\left(\frac{b-c+2(d-f)\sqrt{z}}{\sqrt{d-f}\,\sqrt{2\pi}}\right) + S\left(\frac{b-c+2(d-f)\sqrt{z}}{\sqrt{d-f}\,\sqrt{2\pi}}\right) \sin\left(\frac{(b-c)^2}{4(d-f)} + g\right)\right)\right) - \frac{\sin(-\sqrt{z}\,(b-c) + g - (d-f)z)}{d-f} - \frac{\sin(\sqrt{z}\,(b+c) + g + (d+f)z)}{d+f}\right)$$

Involving $\sin(b z^r + d z + e) \sin(c z^r + f z + g)$

01.06.21.0688.01

$$\int \sin(b z^2 + d z + e) \sin(c z^2 + f z + g)\, dz = \frac{1}{2\sqrt{b-c}\,\sqrt{b+c}} \sqrt{\frac{\pi}{2}} \left(\sqrt{b+c}\, \cos\left(-\frac{(d-f)^2}{4(b-c)} + e - g\right) C\left(\frac{d-f+2bz-2cz}{\sqrt{b-c}\,\sqrt{2\pi}}\right) - \sqrt{b-c}\, \cos\left(-\frac{(d+f)^2}{4(b+c)} + e + g\right) C\left(\frac{d+f+2(b+c)z}{\sqrt{b+c}\,\sqrt{2\pi}}\right) - \sqrt{b+c}\, S\left(\frac{d-f+2bz-2cz}{\sqrt{b-c}\,\sqrt{2\pi}}\right) \sin\left(-\frac{(d-f)^2}{4(b-c)} + e - g\right) + \sqrt{b-c}\, S\left(\frac{d+f+2(b+c)z}{\sqrt{b+c}\,\sqrt{2\pi}}\right) \sin\left(-\frac{(d+f)^2}{4(b+c)} + e + g\right)\right)$$

01.06.21.0689.01

$$\int \sin\left(\sqrt{z}\; b + d\,z + e\right) \sin\left(\sqrt{z}\; c + f\,z + g\right) dz = \frac{1}{2}\left(\frac{1}{(d-f)^{3/2}} \sqrt{\frac{\pi}{2}}\; (b-c)\,(-1) \left(\cos\left(-\frac{(b-c)^2}{4\,(d-f)} + e - g\right) C\left(\frac{b-c+2\,(d-f)\sqrt{z}}{\sqrt{d-f}\;\sqrt{2\,\pi}}\right) - S\left(\frac{b-c+2\,(d-f)\sqrt{z}}{\sqrt{d-f}\;\sqrt{2\,\pi}}\right) \sin\left(-\frac{(b-c)^2}{4\,(d-f)} + e - g\right)\right) + \frac{1}{(d+f)^{3/2}} (b+c) \sqrt{\frac{\pi}{2}} \left(\cos\left(-\frac{(b+c)^2}{4\,(d+f)} + e + g\right) C\left(\frac{b+c+2\,(d+f)\sqrt{z}}{\sqrt{d+f}\;\sqrt{2\,\pi}}\right) - S\left(\frac{b+c+2\,(d+f)\sqrt{z}}{\sqrt{d+f}\;\sqrt{2\,\pi}}\right) \sin\left(-\frac{(b+c)^2}{4\,(d+f)} + e + g\right)\right) + \frac{\sin\left(\sqrt{z}\;(b-c) + e - g + (d-f)\,z\right)}{d-f} - \frac{\sin\left(\sqrt{z}\;(b+c) + e + g + (d+f)\,z\right)}{d+f}\right)$$

Involving products of several direct functions

Involving $\sin(a\,z + \alpha)\sin(b\,z + \beta)\sin(c\,z + \gamma)$

01.06.21.0690.01

$$\int \sin(a\,z)\sin(b\,z)\sin(c\,z)\,dz = \frac{1}{4}\left(\frac{\cos((a-b-c)\,z)}{a-b-c} + \frac{\cos((a+b+c)\,z)}{a+b+c} - \frac{\cos((a+b-c)\,z)}{a+b-c} - \frac{\cos((a-b+c)\,z)}{a-b+c}\right)$$

01.06.21.0691.01

$$\int \sin(a\,z+\alpha)\sin(b\,z+\beta)\sin(c\,z+\gamma)\,dz = \frac{1}{4}\left(\frac{\cos((a-b-c)\,z)\cos(\alpha-\beta-\gamma)}{a-b-c} + \frac{\cos((a+b+c)\,z)\cos(\alpha+\beta+\gamma)}{a+b+c} + \frac{\sin((a+b-c)\,z)\sin(\alpha+\beta-\gamma)}{a+b-c} + \frac{\sin((a-b+c)\,z)\sin(\alpha-\beta+\gamma)}{a-b+c} - \frac{\sin((a-b-c)\,z)\sin(\alpha-\beta-\gamma)}{a-b-c} - \frac{\cos((a+b-c)\,z)\cos(\alpha+\beta-\gamma)}{a+b-c} - \frac{\cos((a-b+c)\,z)\cos(\alpha-\beta+\gamma)}{a-b+c} - \frac{\sin((a+b+c)\,z)\sin(\alpha+\beta+\gamma)}{a+b+c}\right)$$

01.06.21.0692.01

$$\int \sin(z)\sin(a+z)\sin(b+z)\,dz = \frac{1}{12}\left(-3\cos(a-b-z) - 3\cos(a-b+z) - 3\cos(a+b+z) + \cos(a+b+3\,z)\right)$$

Involving $\prod_{k=1}^{n}\sin(a_k\,z)$

01.06.21.0693.01

$$\int \prod_{k=1}^{n}\sin(a_k\,z)\,dz = (-2)^{-n}\sum_{\substack{k_1=-1\\ \Delta k_1=2}}^{1}\;\sum_{\substack{k_2=-1\\ \Delta k_2=2}}^{1}\cdots\sum_{\substack{k_n=-1\\ \Delta k_n=2}}^{1}\left(\frac{1}{\sum_{j=1}^{n}(k_j\,a_j)}\sin\left(\sum_{j=1}^{n}k_j\left(a_j\,z+\frac{\pi}{2}\right)\right)\right)$$

Involving products of powers of the direct function

Involving product of power of the direct function and the direct function

Involving $\sin(c\, z) \sin^{\nu}(a\, z)$

01.06.21.0694.01

$$\int \sin(c\, z) \sin^{\nu}(a\, z)\, dz = -\frac{1}{2\left(c^2 - a^2 \nu^2\right)} e^{-i c z} \left(1 - e^{2 i a z}\right)^{-\nu} \sin^{\nu}(a\, z) \left(e^{2 i c z} (c + a \nu)\, {}_2F_1\!\left(\frac{c - a \nu}{2 a}, -\nu; \frac{1}{2}\left(\frac{c}{a} - \nu + 2\right); e^{2 i a z}\right) + (c - a \nu)\, {}_2F_1\!\left(-\frac{c + a \nu}{2 a}, -\nu; -\frac{c + a (\nu - 2)}{2 a}; e^{2 i a z}\right)\right)$$

01.06.21.0695.01

$$\int \sin(c\, z) \sin^{\nu}(a\, z)\, dz = -\frac{1}{c} 2^{-\nu-1} \left(2 \binom{\nu}{\frac{\nu}{2}} \cos(c\, z)\, (1 - \nu \bmod 2) + c\, i^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \left(\frac{e^{-i (c + 2 a k - a \nu) z}}{c + 2 a k - a \nu} + \frac{e^{i (\pi \nu + (c + 2 a k - a \nu) z)}}{c + 2 a k - a \nu} + \frac{e^{i (c - 2 a k + a \nu) z}}{c - 2 a k + a \nu} + \frac{e^{i (\pi \nu - (c - 2 a k + a \nu) z)}}{c - 2 a k + a \nu}\right) \binom{\nu}{k}\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0696.01

$$\int \sin(c\, z) \sin^{\frac{1}{2}}(a\, z)\, dz = \frac{1}{\left(a^2 - 4 c^2\right) \sqrt{1 - e^{2 i a z}}} e^{-i c z} \sin^{\frac{1}{2}}(a\, z) \left((a + 2 c)\, e^{2 i c z}\, {}_2F_1\!\left(\frac{c}{2 a} - \frac{1}{4}, -\frac{1}{2}; \frac{c}{2 a} + \frac{3}{4}; e^{2 i a z}\right) - (a - 2 c)\, {}_2F_1\!\left(-\frac{a + 2 c}{4 a}, -\frac{1}{2}; \frac{3}{4} - \frac{c}{2 a}; e^{2 i a z}\right)\right)$$

01.06.21.0697.01

$$\int \frac{\sin(c\, z)}{\sin^{\frac{1}{2}}(a\, z)}\, dz = \frac{1}{\left(a^2 - 4 c^2\right) \sin^{\frac{1}{2}}(a\, z)} \left(e^{-i c z} \sqrt{1 - e^{2 i a z}} \left((a + 2 c)\, {}_2F_1\!\left(\frac{a - 2 c}{4 a}, \frac{1}{2}; \frac{5}{4} - \frac{c}{2 a}; e^{2 i a z}\right) - (a - 2 c)\, e^{2 i c z}\, {}_2F_1\!\left(\frac{a + 2 c}{4 a}, \frac{1}{2}; \frac{c}{2 a} + \frac{5}{4}; e^{2 i a z}\right)\right)\right)$$

01.06.21.0698.01

$$\int \sin((\nu + 2)\, z) \sin^{\nu}(z)\, dz = \frac{\sin^{\nu+1}(z) \sin(z (\nu + 1))}{\nu + 1}$$

01.06.21.0699.01

$$\int \sin(a\, z) \sin^{\frac{1}{2}}(2 a\, z)\, dz = -\frac{\sin^{\frac{1}{2}}(2 a\, z) \cos(a\, z)}{2 a} - \frac{\cos(a\, z)}{6 a \sqrt[4]{\sin^2(a\, z)}}\, {}_2F_1\!\left(\frac{3}{4}, \frac{3}{4}; \frac{7}{4}; \cos^2(a\, z)\right) \sin^{\frac{1}{2}}(2 a\, z)$$

01.06.21.0700.01

$$\int \frac{\sin(a\, z)}{\sin^{\frac{1}{2}}(2 a\, z)}\, dz = -\frac{\csc(a\, z)}{a}\, {}_2F_1\!\left(\frac{1}{4}, \frac{1}{4}; \frac{5}{4}; \cos^2(a\, z)\right) \sqrt[4]{\sin^2(a\, z)}\ \sin^{\frac{1}{2}}(2 a\, z)$$

01.06.21.0701.01

$$\int \sin(2 a\, z) \sin^{\nu}(a\, z)\, dz = \frac{2 \sin^{\nu+2}(a\, z)}{a (\nu + 2)}$$

Involving $\sin(c z + d) \sin^{\nu}(a z)$

01.06.21.0702.01

$$\int \sin(d + c z) \sin^{\nu}(a z)\, dz = \frac{1}{(a \nu - c)(c + a \nu)} \left(2^{-\nu-1} e^{-i c z} \left(1 - e^{2 i a z}\right)^{-\nu} \left(-i e^{-i a z} \left(-1 + e^{2 i a z}\right)\right)^{\nu} \left(e^{2 i c z} (c + a \nu)\, {}_2F_1\left(\frac{c - a \nu}{2 a}, -\nu; \frac{1}{2}\left(\frac{c}{a} - \nu + 2\right); e^{2 i a z}\right) (\cos(d) + i \sin(d)) + (c - a \nu)\, {}_2F_1\left(-\frac{c + a \nu}{2 a}, -\nu; -\frac{c + a(\nu - 2)}{2 a}; e^{2 i a z}\right) (\cos(d) - i \sin(d))\right)\right)$$

01.06.21.0703.01

$$\int \sin(c z + d) \sin^{\nu}(a z)\, dz = -\frac{1}{c} 2^{-\nu-1} \left(2 \binom{\nu}{\frac{\nu}{2}} \cos(d + c z)(1 - \nu \bmod 2) + c\, i^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{i d} \left(\frac{e^{-i(2 d + (c + 2 a k - a \nu) z)}}{c + 2 a k - a \nu} + \frac{e^{i(\pi \nu + (c + 2 a k - a \nu) z)}}{c + 2 a k - a \nu} + \frac{e^{i(c - 2 a k + a \nu) z}}{c - 2 a k + a \nu} + \frac{e^{i(-2 d + \pi \nu - c z + 2 a k z - a \nu z)}}{c - 2 a k + a \nu}\right) \binom{\nu}{k}\right) /; \nu \in \mathbb{N}^+$$

Involving $\sin(c z) \sin^{\nu}(a z + b)$

01.06.21.0704.01

$$\int \sin(c z) \sin^{\nu}(a z + b)\, dz = -\frac{1}{2\left(c^2 - a^2 \nu^2\right)} e^{-i c z} \left(1 - e^{2 i (b + a z)}\right)^{-\nu} \sin^{\nu}(b + a z) \left(e^{2 i c z} (c + a \nu)\, {}_2F_1\left(\frac{c - a \nu}{2 a}, -\nu; \frac{1}{2}\left(\frac{c}{a} - \nu + 2\right); e^{2 i (b + a z)}\right) + (c - a \nu)\, {}_2F_1\left(-\frac{c + a \nu}{2 a}, -\nu; -\frac{c + a(\nu - 2)}{2 a}; e^{2 i (b + a z)}\right)\right)$$

01.06.21.0705.01

$$\int \sin(c z) \sin^{\nu}(a z + b)\, dz = -\frac{1}{c} 2^{-\nu-1} \left(2 \binom{\nu}{\frac{\nu}{2}} \cos(c z)(1 - \nu \bmod 2) + i^{-\nu} c \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{-i b (2 k + \nu)} \left(\frac{e^{-i((c + 2 a k - a \nu) z - 2 b \nu)}}{c + 2 a k - a \nu} + \frac{e^{i(4 b k + \pi \nu + (c + 2 a k - a \nu) z)}}{c + 2 a k - a \nu} + \frac{e^{i(2 b \nu + (c - 2 a k + a \nu) z)}}{c - 2 a k + a \nu} + \frac{e^{i(4 b k + 2 a z k + \pi \nu - c z - a \nu z)}}{c - 2 a k + a \nu}\right) \binom{\nu}{k}\right) /; \nu \in \mathbb{N}^+$$

Involving $\sin(c z + d) \sin^{\nu}(a z + b)$

01.06.21.0706.01

$$\int \sin(d + c z) \sin^{\nu}(b + a z)\, dz = -\frac{1}{2\left(c^2 - a^2 \nu^2\right)} \left(e^{-i(d + c z)} \left(1 - e^{2 i (b + a z)}\right)^{-\nu} \left(e^{2 i (d + c z)} (c + a \nu)\, {}_2F_1\left(\frac{c - a \nu}{2 a}, -\nu; \frac{1}{2}\left(\frac{c}{a} - \nu + 2\right); e^{2 i (b + a z)}\right) + (c - a \nu)\, {}_2F_1\left(-\frac{c + a \nu}{2 a}, -\nu; -\frac{c + a(\nu - 2)}{2 a}; e^{2 i (b + a z)}\right)\right) \sin^{\nu}(b + a z)\right)$$

01.06.21.0707.01

$$\int \sin(d+c\,z)\sin^{\nu}(b+a\,z)\,dz = -\frac{1}{c}2^{-\nu-1}\left(2\binom{\nu}{\frac{\nu}{2}}\cos(d+c\,z)\,(1-\nu \bmod 2)+c\,i^{-\nu}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k e^{i(d-b(2k+\nu))}\left(\frac{e^{i(4bk+\pi\nu+(c+2ak-a\nu)z)}}{c+2ak-a\nu}+\frac{e^{-i(2d-2b\nu+(c+2ak-a\nu)z)}}{c+2ak-a\nu}+\frac{e^{i(2b\nu+(c-2ak+a\nu)z)}}{c-2ak+a\nu}+\frac{e^{i(-2d+4bk+\pi\nu-cz+2akz-a\nu z)}}{c-2ak+a\nu}\right)\binom{\nu}{k}\right)/;\ \nu\in\mathbb{N}^+$$

Involving $\sin(b\,z^r)\sin^{\nu}(c\,z)$

01.06.21.0708.01

$$\int \sin(b\,z^2)\sin^{\nu}(c\,z)\,dz = \frac{2^{-\nu-\frac{1}{2}}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}S\left(\sqrt{b}\sqrt{\frac{2}{\pi}}\,z\right)(1-\nu \bmod 2)}{\sqrt{b}} - 2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{-b}}\left(\cos\left(\frac{1}{2}\pi(1-\nu)-\frac{(c\nu-2cs)^2}{4b}\right)C\left(\frac{-2cs+c\nu-2bz}{\sqrt{-b}\sqrt{2\pi}}\right)+S\left(\frac{-2cs+c\nu-2bz}{\sqrt{-b}\sqrt{2\pi}}\right)\sin\left(\frac{1}{2}\pi(1-\nu)-\frac{(c\nu-2cs)^2}{4b}\right)\right)+\frac{1}{\sqrt{-b}}\left(\cos\left(\frac{1}{2}\pi(\nu+1)-\frac{(2cs-c\nu)^2}{4b}\right)C\left(\frac{2cs-c\nu-2bz}{\sqrt{-b}\sqrt{2\pi}}\right)+S\left(\frac{2cs-c\nu-2bz}{\sqrt{-b}\sqrt{2\pi}}\right)\sin\left(\frac{1}{2}\pi(\nu+1)-\frac{(2cs-c\nu)^2}{4b}\right)\right)\right)/;\ \nu\in\mathbb{N}^+$$

01.06.21.0709.01

$$\int \sin\left(b\sqrt{z}\right)\sin^{\nu}(c\,z)\,dz = \frac{2^{1-\nu}\binom{\nu}{\frac{\nu}{2}}(\nu \bmod 2-1)\left(b\sqrt{z}\cos\left(b\sqrt{z}\right)-\sin\left(b\sqrt{z}\right)\right)}{b^2} - 2^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{(c\nu-2cs)^{3/2}}\left(b\sqrt{2\pi}\cos\left(\frac{1}{2}\pi(\nu-1)-\frac{b^2}{4(c\nu-2cs)}\right)C\left(\frac{2(c\nu-2cs)\sqrt{z}-b}{\sqrt{2\pi}\sqrt{c\nu-2cs}}\right)-b\sqrt{2\pi}\,S\left(\frac{2(c\nu-2cs)\sqrt{z}-b}{\sqrt{2\pi}\sqrt{c\nu-2cs}}\right)\sin\left(\frac{1}{2}\pi(\nu-1)-\frac{b^2}{4(c\nu-2cs)}\right)+2\sqrt{c\nu-2cs}\sin\left(-\sqrt{z}\,b+\frac{1}{2}\pi(\nu-1)+(c\nu-2cs)z\right)\right)+\frac{1}{(2cs-c\nu)^{3/2}}\left(b\sqrt{2\pi}\cos\left(\frac{b^2}{4(2cs-c\nu)}+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{2(2cs-c\nu)\sqrt{z}-b}{\sqrt{2\pi}\sqrt{2cs-c\nu}}\right)+b\sqrt{2\pi}\,S\left(\frac{2(2cs-c\nu)\sqrt{z}-b}{\sqrt{2\pi}\sqrt{2cs-c\nu}}\right)\sin\left(\frac{b^2}{4(2cs-c\nu)}+\frac{1}{2}\pi(\nu+1)\right)-2\sqrt{2cs-c\nu}\sin\left(\sqrt{z}\,b+\frac{1}{2}\pi(\nu+1)-(2cs-c\nu)z\right)\right)\right)/;\ \nu\in\mathbb{N}^+$$

Involving $\sin\left(b z^r + e\right) \sin^\nu(c z)$

01.06.21.0710.01

$$\int \sin\left(b z^2 + e\right) \sin^\nu(c z)\, dz = -\frac{2^{-\nu-\frac{1}{2}} \sqrt{\pi}}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-\cos(e)\, S\left(\sqrt{b} \sqrt{\frac{2}{\pi}}\, z\right) - C\left(\sqrt{b} \sqrt{\frac{2}{\pi}}\, z\right) \sin(e)\right) - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{-b}} \left(\cos\left(-\frac{(c \nu - 2 c s)^2}{4 b} + e + \frac{1}{2} \pi (1 - \nu)\right) C\left(\frac{-2 c s + c \nu - 2 b z}{\sqrt{-b}\, \sqrt{2 \pi}}\right) + S\left(\frac{-2 c s + c \nu - 2 b z}{\sqrt{-b}\, \sqrt{2 \pi}}\right) \sin\left(-\frac{(c \nu - 2 c s)^2}{4 b} + e + \frac{1}{2} \pi (1 - \nu)\right)\right) + \frac{1}{\sqrt{-b}} \left(\cos\left(-\frac{(2 c s - c \nu)^2}{4 b} + e + \frac{1}{2} \pi (\nu + 1)\right) C\left(\frac{2 c s - c \nu - 2 b z}{\sqrt{-b}\, \sqrt{2 \pi}}\right) + S\left(\frac{2 c s - c \nu - 2 b z}{\sqrt{-b}\, \sqrt{2 \pi}}\right) \sin\left(-\frac{(2 c s - c \nu)^2}{4 b} + e + \frac{1}{2} \pi (\nu + 1)\right)\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.0711.01

$$\int \sin\left(\sqrt{z}\, b + e\right) \sin^\nu(c z)\, dz = \frac{2^{1-\nu} \binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2 - 1) \left(b \sqrt{z} \cos\left(\sqrt{z}\, b + e\right) - \sin\left(\sqrt{z}\, b + e\right)\right)}{b^2} - 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(c \nu - 2 c s)^{3/2}} \left(b \sqrt{2 \pi} \cos\left(\frac{b^2}{4 (c \nu - 2 c s)} + e - \frac{1}{2} \pi (\nu - 1)\right) C\left(\frac{2 (c \nu - 2 c s) \sqrt{z} - b}{\sqrt{2 \pi}\, \sqrt{c \nu - 2 c s}}\right) + b \sqrt{2 \pi}\, S\left(\frac{2 (c \nu - 2 c s) \sqrt{z} - b}{\sqrt{2 \pi}\, \sqrt{c \nu - 2 c s}}\right) \sin\left(\frac{b^2}{4 (c \nu - 2 c s)} + e - \frac{1}{2} \pi (\nu - 1)\right) - 2 \sqrt{c \nu - 2 c s} \sin\left(\sqrt{z}\, b + e - \frac{1}{2} \pi (\nu - 1) - (c \nu - 2 c s) z\right)\right) + \frac{1}{(2 c s - c \nu)^{3/2}} \left(b \sqrt{2 \pi} \cos\left(\frac{b^2}{4 (2 c s - c \nu)} + e + \frac{1}{2} \pi (\nu + 1)\right) C\left(\frac{2 (2 c s - c \nu) \sqrt{z} - b}{\sqrt{2 \pi}\, \sqrt{2 c s - c \nu}}\right) + b \sqrt{2 \pi}\, S\left(\frac{2 (2 c s - c \nu) \sqrt{z} - b}{\sqrt{2 \pi}\, \sqrt{2 c s - c \nu}}\right) \sin\left(\frac{b^2}{4 (2 c s - c \nu)} + e + \frac{1}{2} \pi (\nu + 1)\right) - 2 \sqrt{2 c s - c \nu} \sin\left(\sqrt{z}\, b + e + \frac{1}{2} \pi (\nu + 1) - (2 c s - c \nu) z\right)\right)\right) /; \nu \in \mathbb{N}^+$$

Involving $\sin\left(b z^r + d z\right) \sin^\nu(c z)$

01.06.21.0712.01

$$\int \sin\left(b z^2 + d z\right) \sin^{\nu}(c z)\, dz = -\frac{2^{-\nu-\frac{1}{2}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(C\left(\frac{d+2 b z}{\sqrt{b} \sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4 b}\right) - \cos\left(\frac{d^2}{4 b}\right) S\left(\frac{d+2 b z}{\sqrt{b} \sqrt{2\pi}}\right)\right)}{\sqrt{b}} - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s}$$
$$\left(\frac{1}{\sqrt{-b}} \left(\cos\left(\frac{1}{2} \pi (1-\nu) - \frac{(-d - 2 c s + c \nu)^2}{4 b}\right) C\left(\frac{-d - 2 c s + c \nu - 2 b z}{\sqrt{-b} \sqrt{2\pi}}\right) + S\left(\frac{-d - 2 c s + c \nu - 2 b z}{\sqrt{-b} \sqrt{2\pi}}\right) \sin\left(\frac{1}{2} \pi (1-\nu) - \frac{(-d - 2 c s + c \nu)^2}{4 b}\right)\right) + \frac{1}{\sqrt{-b}} \left(\cos\left(\frac{1}{2} \pi (\nu+1) - \frac{(-d + 2 c s - c \nu)^2}{4 b}\right) C\left(\frac{-d + 2 c s - c \nu - 2 b z}{\sqrt{-b} \sqrt{2\pi}}\right) + S\left(\frac{-d + 2 c s - c \nu - 2 b z}{\sqrt{-b} \sqrt{2\pi}}\right) \sin\left(\frac{1}{2} \pi (\nu+1) - \frac{(-d + 2 c s - c \nu)^2}{4 b}\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0713.01

$$\int \sin\left(\sqrt{z}\, b + d z\right) \sin^{\nu}(c z)\, dz = \frac{1}{d^{3/2}} \left(2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2 \sqrt{d} \cos\left(\sqrt{z}\, b + d z\right) - b \sqrt{2\pi} \cos\left(\frac{b^2}{4 d}\right) S\left(\frac{b + 2 d \sqrt{z}}{\sqrt{d} \sqrt{2\pi}}\right) + b \sqrt{2\pi}\, C\left(\frac{b + 2 d \sqrt{z}}{\sqrt{d} \sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4 d}\right)\right)\right) - 2^{-\nu-1}$$
$$\sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d - 2 c s + c \nu)^{3/2}} \left(b \sqrt{2\pi} \cos\left(\frac{1}{2} \pi (\nu-1) - \frac{b^2}{4 (-d - 2 c s + c \nu)}\right) C\left(\frac{2 (-d - 2 c s + c \nu) \sqrt{z} - b}{\sqrt{2\pi} \sqrt{-d - 2 c s + c \nu}}\right) - b \sqrt{2\pi}\, S\left(\frac{2 (-d - 2 c s + c \nu) \sqrt{z} - b}{\sqrt{2\pi} \sqrt{-d - 2 c s + c \nu}}\right) \sin\left(\frac{1}{2} \pi (\nu-1) - \frac{b^2}{4 (-d - 2 c s + c \nu)}\right) + 2 \sqrt{-d - 2 c s + c \nu} \sin\left(-\sqrt{z}\, b + \frac{1}{2} \pi (\nu-1) + (-d - 2 c s + c \nu) z\right)\right) + \frac{1}{(-d + 2 c s - c \nu)^{3/2}} \left(b \sqrt{2\pi} \cos\left(\frac{b^2}{4 (-d + 2 c s - c \nu)} + \frac{1}{2} \pi (\nu+1)\right) C\left(\frac{2 (-d + 2 c s - c \nu) \sqrt{z} - b}{\sqrt{2\pi} \sqrt{-d + 2 c s - c \nu}}\right) + b \sqrt{2\pi}\, S\left(\frac{2 (-d + 2 c s - c \nu) \sqrt{z} - b}{\sqrt{2\pi} \sqrt{-d + 2 c s - c \nu}}\right) \sin\left(\frac{b^2}{4 (-d + 2 c s - c \nu)} + \frac{1}{2} \pi (\nu+1)\right) - 2 \sqrt{-d + 2 c s - c \nu} \sin\left(\sqrt{z}\, b + \frac{1}{2} \pi (\nu+1) - (-d + 2 c s - c \nu) z\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin\left(b z^r + d z + e\right) \sin^{\nu}(c z)$

01.06.21.0714.01

$$\int \sin\left(b z^2 + d z + e\right) \sin^\nu(c z)\, dz = -\frac{1}{\sqrt{b}} \left(2^{-\nu-\frac{1}{2}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(C\left(\frac{d + 2 b z}{\sqrt{b}\, \sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4 b} - e\right) - \cos\left(\frac{d^2}{4 b} - e\right) S\left(\frac{d + 2 b z}{\sqrt{b}\, \sqrt{2\pi}}\right)\right)\right) - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{-b}} \left(\cos\left(-\frac{(-d - 2 c s + c \nu)^2}{4 b} + e + \frac{1}{2} \pi (1 - \nu)\right) C\left(\frac{-d - 2 c s + c \nu - 2 b z}{\sqrt{-b}\, \sqrt{2\pi}}\right) + S\left(\frac{-d - 2 c s + c \nu - 2 b z}{\sqrt{-b}\, \sqrt{2\pi}}\right) \sin\left(-\frac{(-d - 2 c s + c \nu)^2}{4 b} + e + \frac{1}{2} \pi (1 - \nu)\right)\right) + \frac{1}{\sqrt{-b}} \left(\cos\left(-\frac{(-d + 2 c s - c \nu)^2}{4 b} + e + \frac{1}{2} \pi (\nu + 1)\right) C\left(\frac{-d + 2 c s - c \nu - 2 b z}{\sqrt{-b}\, \sqrt{2\pi}}\right) + S\left(\frac{-d + 2 c s - c \nu - 2 b z}{\sqrt{-b}\, \sqrt{2\pi}}\right) \sin\left(-\frac{(-d + 2 c s - c \nu)^2}{4 b} + e + \frac{1}{2} \pi (\nu + 1)\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0715.01

$$\int \sin\left(\sqrt{z}\, b + d z + e\right) \sin^\nu(c z)\, dz = \frac{1}{d^{3/2}} \left(2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2 \sqrt{d} \cos\left(\sqrt{z}\, b + e + d z\right) - b \sqrt{2\pi} \cos\left(\frac{b^2}{4 d} - e\right) S\left(\frac{b + 2 d \sqrt{z}}{\sqrt{d}\, \sqrt{2\pi}}\right) + b \sqrt{2\pi}\, C\left(\frac{b + 2 d \sqrt{z}}{\sqrt{d}\, \sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4 d} - e\right)\right)\right) - 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d - 2 c s + c \nu)^{3/2}} \left(b \sqrt{2\pi} \cos\left(\frac{b^2}{4 (-d - 2 c s + c \nu)} + e - \frac{1}{2} \pi (\nu - 1)\right) C\left(\frac{2 (-d - 2 c s + c \nu) \sqrt{z} - b}{\sqrt{2\pi}\, \sqrt{-d - 2 c s + c \nu}}\right) + b \sqrt{2\pi}\, S\left(\frac{2 (-d - 2 c s + c \nu) \sqrt{z} - b}{\sqrt{2\pi}\, \sqrt{-d - 2 c s + c \nu}}\right) \sin\left(\frac{b^2}{4 (-d - 2 c s + c \nu)} + e - \frac{1}{2} \pi (\nu - 1)\right) - 2 \sqrt{-d - 2 c s + c \nu} \sin\left(\sqrt{z}\, b + e - \frac{1}{2} \pi (\nu - 1) - (-d - 2 c s + c \nu) z\right)\right) + \frac{1}{(-d + 2 c s - c \nu)^{3/2}} \left(b \sqrt{2\pi} \cos\left(\frac{b^2}{4 (-d + 2 c s - c \nu)} + e + \frac{1}{2} \pi (\nu + 1)\right) C\left(\frac{2 (-d + 2 c s - c \nu) \sqrt{z} - b}{\sqrt{2\pi}\, \sqrt{-d + 2 c s - c \nu}}\right) + b \sqrt{2\pi}\, S\left(\frac{2 (-d + 2 c s - c \nu) \sqrt{z} - b}{\sqrt{2\pi}\, \sqrt{-d + 2 c s - c \nu}}\right) \sin\left(\frac{b^2}{4 (-d + 2 c s - c \nu)} + e + \frac{1}{2} \pi (\nu + 1)\right) - 2 \sqrt{-d + 2 c s - c \nu} \sin\left(\sqrt{z}\, b + e + \frac{1}{2} \pi (\nu + 1) - (-d + 2 c s - c \nu) z\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin\left(b z^r\right) \sin^\nu(f z + g)$

01.06.21.0716.01

$$\int \sin(b z^2) \sin^\nu(f z + g) \, dz = \frac{2^{-\nu-\frac{1}{2}} (1 - \nu \bmod 2)}{\sqrt{b}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} S\left(\sqrt{b} \sqrt{\frac{2}{\pi}} z\right) - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{-b}} \left(\cos\left(\frac{(2 f s - f \nu)^2}{4 b} + g (2 s - \nu) - \frac{1}{2} \pi (\nu + 1) \right) C\left(\frac{2 f s - f \nu - 2 b z}{\sqrt{-b} \sqrt{2 \pi}} \right) - S\left(\frac{2 f s - f \nu - 2 b z}{\sqrt{-b} \sqrt{2 \pi}} \right) \sin\left(\frac{(2 f s - f \nu)^2}{4 b} + g (2 s - \nu) - \frac{1}{2} \pi (\nu + 1) \right) \right) + \frac{1}{\sqrt{-b}} \left(\cos\left(-\frac{(f \nu - 2 f s)^2}{4 b} + \frac{1}{2} \pi (1 - \nu) + g (2 s - \nu) \right) C\left(\frac{-2 f s + f \nu - 2 b z}{\sqrt{-b} \sqrt{2 \pi}} \right) + S\left(\frac{-2 f s + f \nu - 2 b z}{\sqrt{-b} \sqrt{2 \pi}} \right) \sin\left(-\frac{(f \nu - 2 f s)^2}{4 b} + \frac{1}{2} \pi (1 - \nu) + g (2 s - \nu) \right) \right) \right) /; \nu \in \mathbb{N}^+$$

01.06.21.0717.01

$$\int \sin(b \sqrt{z}) \sin^\nu(f z + g) \, dz = \frac{2^{1-\nu} \binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2 - 1) \left(b \sqrt{z} \cos(b \sqrt{z}) - \sin(b \sqrt{z}) \right)}{b^2} - 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(2 f s - f \nu)^{3/2}} \left(b \sqrt{2 \pi} \cos\left(-\frac{b^2}{4 (2 f s - f \nu)} + 2 g s - g \nu - \frac{1}{2} \pi (\nu + 1) \right) C\left(\frac{2 (2 f s - f \nu) \sqrt{z} - b}{\sqrt{2 \pi} \sqrt{2 f s - f \nu}} \right) - b \sqrt{2 \pi} S\left(\frac{2 (2 f s - f \nu) \sqrt{z} - b}{\sqrt{2 \pi} \sqrt{2 f s - f \nu}} \right) \sin\left(-\frac{b^2}{4 (2 f s - f \nu)} + 2 g s - g \nu - \frac{1}{2} \pi (\nu + 1) \right) + 2 \sqrt{2 f s - f \nu} \sin\left(-\sqrt{z} \, b + 2 g s - g \nu - \frac{1}{2} \pi (\nu + 1) + (2 f s - f \nu) z \right) \right) + \frac{1}{(f \nu - 2 f s)^{3/2}} \left(b \sqrt{2 \pi} \cos\left(\frac{b^2}{4 (f \nu - 2 f s)} + 2 g s - \frac{1}{2} \pi (\nu - 1) - g \nu \right) C\left(\frac{2 (f \nu - 2 f s) \sqrt{z} - b}{\sqrt{2 \pi} \sqrt{f \nu - 2 f s}} \right) + b \sqrt{2 \pi} S\left(\frac{2 (f \nu - 2 f s) \sqrt{z} - b}{\sqrt{2 \pi} \sqrt{f \nu - 2 f s}} \right) \sin\left(\frac{b^2}{4 (f \nu - 2 f s)} + 2 g s - \frac{1}{2} \pi (\nu - 1) - g \nu \right) - 2 \sqrt{f \nu - 2 f s} \sin\left(\sqrt{z} \, b + 2 g s - \frac{1}{2} \pi (\nu - 1) - g \nu - (f \nu - 2 f s) z \right) \right) \right) /; \nu \in \mathbb{N}^+$$

Involving $\sin(b z^r + e) \sin^\nu(f z + g)$

01.06.21.0718.01

$$\int \sin\left(b z^2+e\right)\sin^{\nu}(f z+g)\,dz = -\frac{2^{-\nu-\frac{1}{2}}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\left(-\cos(e)\,S\left(\sqrt{b}\sqrt{\frac{2}{\pi}}\,z\right)-C\left(\sqrt{b}\sqrt{\frac{2}{\pi}}\,z\right)\sin(e)\right)}{\sqrt{b}} - 2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{-b}}\left(\cos\left(-\frac{(f\nu-2fs)^2}{4b}+e+\frac{1}{2}\pi(1-\nu)+g(2s-\nu)\right)C\left(\frac{-2fs+f\nu-2bz}{\sqrt{-b}\sqrt{2\pi}}\right)+S\left(\frac{-2fs+f\nu-2bz}{\sqrt{-b}\sqrt{2\pi}}\right)\sin\left(-\frac{(f\nu-2fs)^2}{4b}+e+\frac{1}{2}\pi(1-\nu)+g(2s-\nu)\right)\right)+\frac{1}{\sqrt{-b}}\left(\cos\left(-\frac{(2fs-f\nu)^2}{4b}+e-g(2s-\nu)+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{2fs-f\nu-2bz}{\sqrt{-b}\sqrt{2\pi}}\right)+S\left(\frac{2fs-f\nu-2bz}{\sqrt{-b}\sqrt{2\pi}}\right)\sin\left(-\frac{(2fs-f\nu)^2}{4b}+e-g(2s-\nu)+\frac{1}{2}\pi(\nu+1)\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.0719.01

$$\int \sin\left(\sqrt{z}\,b+e\right)\sin^{\nu}(f z+g)\,dz = \frac{2^{1-\nu}\binom{\nu}{\frac{\nu}{2}}(\nu \bmod 2-1)\left(b\sqrt{z}\cos\left(\sqrt{z}\,b+e\right)-\sin\left(\sqrt{z}\,b+e\right)\right)}{b^2} - 2^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{(f\nu-2fs)^{3/2}}\left(b\sqrt{2\pi}\cos\left(\frac{b^2}{4(f\nu-2fs)}+e+2gs-\frac{1}{2}\pi(\nu-1)-g\nu\right)C\left(\frac{2(f\nu-2fs)\sqrt{z}-b}{\sqrt{2\pi}\sqrt{f\nu-2fs}}\right)+b\sqrt{2\pi}\,S\left(\frac{2(f\nu-2fs)\sqrt{z}-b}{\sqrt{2\pi}\sqrt{f\nu-2fs}}\right)\sin\left(\frac{b^2}{4(f\nu-2fs)}+e+2gs-\frac{1}{2}\pi(\nu-1)-g\nu\right)-2\sqrt{f\nu-2fs}\,\sin\left(\sqrt{z}\,b+e+2gs-\frac{1}{2}\pi(\nu-1)-g\nu-(f\nu-2fs)z\right)\right)+\frac{1}{(2fs-f\nu)^{3/2}}\left(b\sqrt{2\pi}\cos\left(\frac{b^2}{4(2fs-f\nu)}+e-2gs+g\nu+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{2(2fs-f\nu)\sqrt{z}-b}{\sqrt{2\pi}\sqrt{2fs-f\nu}}\right)+b\sqrt{2\pi}\,S\left(\frac{2(2fs-f\nu)\sqrt{z}-b}{\sqrt{2\pi}\sqrt{2fs-f\nu}}\right)\sin\left(\frac{b^2}{4(2fs-f\nu)}+e-2gs+g\nu+\frac{1}{2}\pi(\nu+1)\right)-2\sqrt{2fs-f\nu}\,\sin\left(\sqrt{z}\,b+e-2gs+g\nu+\frac{1}{2}\pi(\nu+1)-(2fs-f\nu)z\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

Involving $\sin\left(b z^r+d z\right)\sin^{\nu}(f z+g)$

01.06.21.0720.01

$$\int \sin\left(b z^2 + d z\right) \sin^{\nu}(g + f z)\, dz = -\frac{2^{-\nu-\frac{1}{2}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(C\left(\frac{d+2bz}{\sqrt{b}\sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4b}\right) - \cos\left(\frac{d^2}{4b}\right) S\left(\frac{d+2bz}{\sqrt{b}\sqrt{2\pi}}\right)\right)}{\sqrt{b}} -$$

$$2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{-b}} \left(\cos\left(\frac{(-d + 2 f s - f \nu)^2}{4b} + g(2s - \nu) - \frac{1}{2}\pi(\nu + 1)\right) C\left(\frac{-d + 2 f s - f \nu - 2 b z}{\sqrt{-b}\sqrt{2\pi}}\right) -\right.\right.$$

$$S\left(\frac{-d + 2 f s - f \nu - 2 b z}{\sqrt{-b}\sqrt{2\pi}}\right) \sin\left(\frac{(-d + 2 f s - f \nu)^2}{4b} + g(2s - \nu) - \frac{1}{2}\pi(\nu + 1)\right)\Bigg) +$$

$$\frac{1}{\sqrt{-b}} \left(\cos\left(-\frac{(-d - 2 f s + f \nu)^2}{4b} + \frac{1}{2}\pi(1 - \nu) + g(2s - \nu)\right) C\left(\frac{-d - 2 f s + f \nu - 2 b z}{\sqrt{-b}\sqrt{2\pi}}\right) +\right.$$

$$\left.\left.\left. S\left(\frac{-d - 2 f s + f \nu - 2 b z}{\sqrt{-b}\sqrt{2\pi}}\right) \sin\left(-\frac{(-d - 2 f s + f \nu)^2}{4b} + \frac{1}{2}\pi(1 - \nu) + g(2s - \nu)\right)\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0721.01

$$\int \sin\left(\sqrt{z}\, b + d z\right) \sin^{\nu}(g + f z)\, dz =$$

$$\frac{1}{d^{3/2}} \left(2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2\sqrt{d} \cos\left(\sqrt{z}\, b + d z\right) - b\sqrt{2\pi} \cos\left(\frac{b^2}{4d}\right) S\left(\frac{b + 2 d \sqrt{z}}{\sqrt{d}\sqrt{2\pi}}\right) +\right.\right.$$

$$\left.\left. b\sqrt{2\pi}\, C\left(\frac{b + 2 d \sqrt{z}}{\sqrt{d}\sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4d}\right)\right)\right) - 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d + 2 f s - f \nu)^{3/2}}\right.$$

$$\left(b\sqrt{2\pi} \cos\left(-\frac{b^2}{4(-d + 2 f s - f \nu)} + 2 g s - g \nu - \frac{1}{2}\pi(\nu + 1)\right) C\left(\frac{2(-d + 2 f s - f \nu)\sqrt{z} - b}{\sqrt{2\pi}\sqrt{-d + 2 f s - f \nu}}\right) -\right.$$

$$b\sqrt{2\pi}\, S\left(\frac{2(-d + 2 f s - f \nu)\sqrt{z} - b}{\sqrt{2\pi}\sqrt{-d + 2 f s - f \nu}}\right) \sin\left(-\frac{b^2}{4(-d + 2 f s - f \nu)} + 2 g s - g \nu - \frac{1}{2}\pi(\nu + 1)\right) +$$

$$\left. 2\sqrt{-d + 2 f s - f \nu} \sin\left(-\sqrt{z}\, b + 2 g s - g \nu - \frac{1}{2}\pi(\nu + 1) + (-d + 2 f s - f \nu) z\right)\right) + \frac{1}{(-d - 2 f s + f \nu)^{3/2}}$$

$$\left(b\sqrt{2\pi} \cos\left(\frac{b^2}{4(-d - 2 f s + f \nu)} + 2 g s - \frac{1}{2}\pi(\nu - 1) - g \nu\right) C\left(\frac{2(-d - 2 f s + f \nu)\sqrt{z} - b}{\sqrt{2\pi}\sqrt{-d - 2 f s + f \nu}}\right) +\right.$$

$$b\sqrt{2\pi}\, S\left(\frac{2(-d - 2 f s + f \nu)\sqrt{z} - b}{\sqrt{2\pi}\sqrt{-d - 2 f s + f \nu}}\right) \sin\left(\frac{b^2}{4(-d - 2 f s + f \nu)} + 2 g s - \frac{1}{2}\pi(\nu - 1) - g \nu\right) -$$

$$\left.\left. 2\sqrt{-d - 2 f s + f \nu} \sin\left(\sqrt{z}\, b + 2 g s - \frac{1}{2}\pi(\nu - 1) - g \nu - (-d - 2 f s + f \nu) z\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin(b z^r + d z + e)\sin^\nu(f z + g)$

01.06.21.0722.01

$$\int \sin(b z^2 + d z + e)\sin^\nu(f z + g)\,dz = -\frac{1}{\sqrt{b}}\left(2^{-\nu-\frac{1}{2}}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\left(C\left(\frac{d+2 b z}{\sqrt{b}\sqrt{2\pi}}\right)\sin\left(\frac{d^2}{4 b}-e\right)-\cos\left(\frac{d^2}{4 b}-e\right)S\left(\frac{d+2 b z}{\sqrt{b}\sqrt{2\pi}}\right)\right)\right)-$$
$$2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{-b}}\left(\cos\left(-\frac{(-d-2 f s+f \nu)^2}{4 b}+e+\frac{1}{2}\pi(1-\nu)+g(2 s-\nu)\right)C\left(\frac{-d-2 f s+f \nu-2 b z}{\sqrt{-b}\sqrt{2\pi}}\right)+\right.\right.$$
$$\left.S\left(\frac{-d-2 f s+f \nu-2 b z}{\sqrt{-b}\sqrt{2\pi}}\right)\sin\left(-\frac{(-d-2 f s+f \nu)^2}{4 b}+e+\frac{1}{2}\pi(1-\nu)+g(2 s-\nu)\right)\right)+$$
$$\frac{1}{\sqrt{-b}}\left(\cos\left(-\frac{(-d+2 f s-f \nu)^2}{4 b}+e-g(2 s-\nu)+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{-d+2 f s-f \nu-2 b z}{\sqrt{-b}\sqrt{2\pi}}\right)+\right.$$
$$\left.\left.S\left(\frac{-d+2 f s-f \nu-2 b z}{\sqrt{-b}\sqrt{2\pi}}\right)\sin\left(-\frac{(-d+2 f s-f \nu)^2}{4 b}+e-g(2 s-\nu)+\frac{1}{2}\pi(\nu+1)\right)\right)\right)\ /;\ \nu\in\mathbb{N}^+$$

01.06.21.0723.01

$$\int \sin\left(\sqrt{z}\, b + d\, z + e\right) \sin^{\nu}(f\, z + g)\, dz = \frac{1}{d^{3/2}} \left(2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2\sqrt{d}\, \cos\left(\sqrt{z}\, b + e + d\, z\right) - b\sqrt{2\pi}\, \cos\left(\frac{b^2}{4\, d} - e\right) S\left(\frac{b + 2\, d\sqrt{z}}{\sqrt{d}\, \sqrt{2\pi}}\right) + b\sqrt{2\pi}\, C\left(\frac{b + 2\, d\sqrt{z}}{\sqrt{d}\, \sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4\, d} - e\right)\right)\right) - 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d - 2\, f\, s + f\, \nu)^{3/2}} \left(b\sqrt{2\pi}\, \cos\left(\frac{b^2}{4\, (-d - 2\, f\, s + f\, \nu)} + e + 2\, g\, s - \frac{1}{2}\pi\, (\nu - 1) - g\, \nu\right) C\left(\frac{2\, (-d - 2\, f\, s + f\, \nu)\sqrt{z} - b}{\sqrt{2\pi}\, \sqrt{-d - 2\, f\, s + f\, \nu}}\right) + b\sqrt{2\pi}\, S\left(\frac{2\, (-d - 2\, f\, s + f\, \nu)\sqrt{z} - b}{\sqrt{2\pi}\, \sqrt{-d - 2\, f\, s + f\, \nu}}\right) \sin\left(\frac{b^2}{4\, (-d - 2\, f\, s + f\, \nu)} + e + 2\, g\, s - \frac{1}{2}\pi\, (\nu - 1) - g\, \nu\right) - 2\sqrt{-d - 2\, f\, s + f\, \nu}\, \sin\left(\sqrt{z}\, b + e + 2\, g\, s - \frac{1}{2}\pi\, (\nu - 1) - g\, \nu - (-d - 2\, f\, s + f\, \nu)\, z\right)\right) + \frac{1}{(-d + 2\, f\, s - f\, \nu)^{3/2}} \left(b\sqrt{2\pi}\, \cos\left(\frac{b^2}{4\, (-d + 2\, f\, s - f\, \nu)} + e - 2\, g\, s + g\, \nu + \frac{1}{2}\pi\, (\nu + 1)\right) C\left(\frac{2\, (-d + 2\, f\, s - f\, \nu)\sqrt{z} - b}{\sqrt{2\pi}\, \sqrt{-d + 2\, f\, s - f\, \nu}}\right) + b\sqrt{2\pi}\, S\left(\frac{2\, (-d + 2\, f\, s - f\, \nu)\sqrt{z} - b}{\sqrt{2\pi}\, \sqrt{-d + 2\, f\, s - f\, \nu}}\right) \sin\left(\frac{b^2}{4\, (-d + 2\, f\, s - f\, \nu)} + e - 2\, g\, s + g\, \nu + \frac{1}{2}\pi\, (\nu + 1)\right) - 2\sqrt{-d + 2\, f\, s - f\, \nu}\, \sin\left(\sqrt{z}\, b + e - 2\, g\, s + g\, \nu + \frac{1}{2}\pi\, (\nu + 1) - (-d + 2\, f\, s - f\, \nu)\, z\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin(b\, z) \sin^{\nu}(c\, z^r)$

01.06.21.0724.01

$$\int \sin(b\, z) \sin^{\nu}\left(c\, z^2\right) dz = -\frac{2^{-\nu} (1 - \nu \bmod 2)}{b} \binom{\nu}{\frac{\nu}{2}} \cos(b\, z) - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{\sqrt{2\, c\, k - c\, \nu}} \left((-1)^{k+\nu} \binom{\nu}{k} \left(\left(S\left(\frac{2\, (2\, c\, k - c\, \nu)\, z - b}{\sqrt{2\pi}\, \sqrt{2\, c\, k - c\, \nu}}\right) - S\left(\frac{b + 2\, (2\, c\, k - c\, \nu)\, z}{\sqrt{2\pi}\, \sqrt{2\, c\, k - c\, \nu}}\right)\right) \cos\left(\frac{b^2}{4\, (2\, c\, k - c\, \nu)} + \frac{\pi\, \nu}{2}\right) - \sin\left(\frac{b^2}{4\, (2\, c\, k - c\, \nu)} + \frac{\pi\, \nu}{2}\right) \left(C\left(\frac{2\, (2\, c\, k - c\, \nu)\, z - b}{\sqrt{2\pi}\, \sqrt{2\, c\, k - c\, \nu}}\right) - C\left(\frac{b + 2\, (2\, c\, k - c\, \nu)\, z}{\sqrt{2\pi}\, \sqrt{2\, c\, k - c\, \nu}}\right)\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0725.01

$$\int \sin(b\,z)\sin^{\nu}\left(c\sqrt{z}\right)dz = -\frac{2^{-\nu}\cos(b\,z)\,(1-\nu \bmod 2)}{b}\binom{\nu}{\frac{\nu}{2}} - \frac{1}{(-b)^{3/2}}\,2^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(c\sqrt{2\pi}\,(2s-\nu)\left(\cos\left(\frac{1}{4}\left(\frac{c^2(\nu-2s)^2}{b}+2\pi\nu\right)\right)S\left(\frac{c(\nu-2s)-2b\sqrt{z}}{\sqrt{-b}\sqrt{2\pi}}\right) - \cos\left(\frac{\pi\nu}{2}-\frac{c^2(\nu-2s)^2}{4b}\right)S\left(\frac{b\left(2\sqrt{z}\,b-2cs+c\nu\right)}{(-b)^{3/2}\sqrt{2\pi}}\right) + C\left(\frac{-2\sqrt{z}\,b-2cs+c\nu}{\sqrt{-b}\sqrt{2\pi}}\right)\sin\left(\frac{1}{4}\left(\frac{c^2(\nu-2s)^2}{b}+2\pi\nu\right)\right) + C\left(\frac{b\left(2\sqrt{z}\,b-2cs+c\nu\right)}{(-b)^{3/2}\sqrt{2\pi}}\right)\sin\left(\frac{\pi\nu}{2}-\frac{c^2(\nu-2s)^2}{4b}\right)\right) - 4\sqrt{-b}\,\cos\left(\frac{\pi\nu}{2}+c(\nu-2s)\sqrt{z}\right)\cos(b\,z)\right)\,/;\,\nu\in\mathbb{N}^+$$

Involving $\sin(d\,z+e)\sin^{\nu}\left(c\,z^{r}\right)$

01.06.21.0726.01

$$\int \sin(e+d\,z)\sin^{\nu}\left(c\,z^2\right)dz = -\frac{2^{-\nu}(1-\nu \bmod 2)}{d}\binom{\nu}{\frac{\nu}{2}}\cos(e+d\,z) - 2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{c\nu-2cs}}\left(\cos\left(\frac{d^2}{4(c\nu-2cs)}+e+\frac{1}{2}\pi(1-\nu)\right)C\left(\frac{2(c\nu-2cs)z-d}{\sqrt{2\pi}\sqrt{c\nu-2cs}}\right) + S\left(\frac{2(c\nu-2cs)z-d}{\sqrt{2\pi}\sqrt{c\nu-2cs}}\right)\sin\left(\frac{d^2}{4(c\nu-2cs)}+e+\frac{1}{2}\pi(1-\nu)\right)\right) + \frac{1}{\sqrt{2cs-c\nu}}\left(\cos\left(\frac{d^2}{4(2cs-c\nu)}+e+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{2(2cs-c\nu)z-d}{\sqrt{2\pi}\sqrt{2cs-c\nu}}\right) + S\left(\frac{2(2cs-c\nu)z-d}{\sqrt{2\pi}\sqrt{2cs-c\nu}}\right)\sin\left(\frac{d^2}{4(2cs-c\nu)}+e+\frac{1}{2}\pi(\nu+1)\right)\right)\right)\,/;\,\nu\in\mathbb{N}^+$$

01.06.21.0727.01

$$\int \sin(e+d\,z)\sin^{\nu}\left(c\sqrt{z}\right)dz = -\frac{2^{-\nu}(1-\nu \bmod 2)}{d}\binom{\nu}{\frac{\nu}{2}}\cos(e+d\,z) - \frac{2^{-\nu-1}}{(-d)^{3/2}}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(c\sqrt{2\pi}\,(2s-\nu)\left(\cos\left(e-\frac{c^2(\nu-2s)^2+2d\pi\nu}{4d}\right)S\left(\frac{c(\nu-2s)-2d\sqrt{z}}{\sqrt{-d}\sqrt{2\pi}}\right)-\cos\left(-\frac{c^2(\nu-2s)^2}{4d}+e+\frac{\pi\nu}{2}\right)S\left(\frac{d\left(2\sqrt{z}\,d-2cs+c\nu\right)}{(-d)^{3/2}\sqrt{2\pi}}\right)+C\left(\frac{d\left(2\sqrt{z}\,d-2cs+c\nu\right)}{(-d)^{3/2}\sqrt{2\pi}}\right)\sin\left(-\frac{c^2(\nu-2s)^2}{4d}+e+\frac{\pi\nu}{2}\right)-C\left(\frac{-2\sqrt{z}\,d-2cs+c\nu}{\sqrt{-d}\sqrt{2\pi}}\right)\sin\left(-\frac{c^2(\nu-2s)^2}{4d}+e-\frac{\pi\nu}{2}\right)\right)-4\sqrt{-d}\cos\left(\frac{\pi\nu}{2}+c(\nu-2s)\sqrt{z}\right)\cos(e+d\,z)\right)\,/;\,\nu\in\mathbb{N}^+$$

Involving $\sin(b\,z^r)\sin^{\nu}(c\,z^r)$

01.06.21.0728.01

$$\int \sin(b\,z^r)\sin^{\nu}(c\,z^r)\,dz = \frac{i\,2^{-\nu-1}(1-\nu \bmod 2)}{r}\,z\binom{\nu}{\frac{\nu}{2}}\left((-i\,b\,z^r)^{-1/r}\,\Gamma\left(\frac{1}{r},-i\,b\,z^r\right)-(i\,b\,z^r)^{-1/r}\,\Gamma\left(\frac{1}{r},i\,b\,z^r\right)\right) - \frac{(2\,i)^{-\nu-1}z}{r}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^{\nu}\,\Gamma\left(\frac{1}{r},(-i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r\right)((-i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r)^{-1/r}+(-1)^{\nu+1}((i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r)^{-1/r}\,\Gamma\left(\frac{1}{r},(i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r\right)+((-i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r)^{-1/r}\,\Gamma\left(\frac{1}{r},(-i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r\right)-((i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r)^{-1/r}\,\Gamma\left(\frac{1}{r},(i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r\right)\right)\,/;\,\nu\in\mathbb{N}^+$$

01.06.21.0729.01

$$\int \sin\left(b\,z^2\right)\sin^{\nu}\left(c\,z^2\right)dz = \frac{2^{-\nu-\frac{1}{2}}\sqrt{\pi}\,(1-\nu \bmod 2)}{\sqrt{b}}\binom{\nu}{\frac{\nu}{2}}S\left(\sqrt{b}\sqrt{\frac{2}{\pi}}\,z\right) - 2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{-b-2cs+c\nu}}\left(\cos\left(\frac{1}{2}\pi(1-\nu)\right)C\left(\sqrt{\frac{2}{\pi}}\sqrt{-b-2cs+c\nu}\,z\right)+S\left(\sqrt{\frac{2}{\pi}}\sqrt{-b-2cs+c\nu}\,z\right)\sin\left(\frac{1}{2}\pi(1-\nu)\right)\right)+\frac{1}{\sqrt{-b+2cs-c\nu}}\left(\cos\left(\frac{1}{2}\pi(\nu+1)\right)C\left(\sqrt{\frac{2}{\pi}}\sqrt{-b+2cs-c\nu}\,z\right)+S\left(\sqrt{\frac{2}{\pi}}\sqrt{-b+2cs-c\nu}\,z\right)\sin\left(\frac{1}{2}\pi(\nu+1)\right)\right)\right)\,/;\,\nu\in\mathbb{N}^+$$

01.06.21.0730.01

$$\int \sin\left(b\sqrt{z}\right)\sin^{\nu}\left(c\sqrt{z}\right)dz = \frac{2^{1-\nu}}{b^2}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\left(\sin\left(b\sqrt{z}\right)-b\sqrt{z}\cos\left(b\sqrt{z}\right)\right)-2^{1-\nu}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{(-b-2cs+c\nu)^2}\left(\cos\left(\frac{1}{2}\pi(\nu-1)+(-b-2cs+c\nu)\sqrt{z}\right)+(-b-2cs+c\nu)\sqrt{z}\sin\left(\frac{1}{2}\pi(\nu-1)+(-b-2cs+c\nu)\sqrt{z}\right)\right)+\frac{1}{(-b+2cs-c\nu)^2}\left(\cos\left(\frac{1}{2}\pi(\nu+1)-(-b+2cs-c\nu)\sqrt{z}\right)-(-b+2cs-c\nu)\sqrt{z}\sin\left(\frac{1}{2}\pi(\nu+1)-(-b+2cs-c\nu)\sqrt{z}\right)\right)\right)\text{ /; }\nu\in\mathbb{N}^+$$

Involving $\sin(b z^r + e)\sin^{\nu}(c z^r)$

01.06.21.0731.01

$$\int \sin(b z^r+e)\sin^{\nu}(c z^r)\,dz = \frac{1}{r}\left(i\,2^{-\nu-1}z\binom{\nu}{\frac{\nu}{2}}\left(e^{ie}(-i b z^r)^{-1/r}\Gamma\left(\frac{1}{r},-i b z^r\right)-e^{-ie}(i b z^r)^{-1/r}\Gamma\left(\frac{1}{r},i b z^r\right)\right)(1-\nu \bmod 2)\right)-\frac{(2i)^{-\nu-1}z}{r}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^{\nu}e^{ie}\Gamma\left(\frac{1}{r},(-ib-2ics+ic\nu)z^r\right)((-ib-2ics+ic\nu)z^r)^{-1/r}+(-1)^{\nu+1}e^{-ie}((ib-2ics+ic\nu)z^r)^{-1/r}\Gamma\left(\frac{1}{r},(ib-2ics+ic\nu)z^r\right)+e^{ie}((-ib+2ics-ic\nu)z^r)^{-1/r}\Gamma\left(\frac{1}{r},(-ib+2ics-ic\nu)z^r\right)-e^{-ie}((ib+2ics-ic\nu)z^r)^{-1/r}\Gamma\left(\frac{1}{r},(ib+2ics-ic\nu)z^r\right)\right)\text{ /; }\nu\in\mathbb{N}^+$$

01.06.21.0732.01

$$\int \sin\left(b z^2+e\right)\sin^{\nu}\left(c z^2\right)dz = -\frac{2^{-\nu-\frac{1}{2}}\sqrt{\pi}}{\sqrt{b}}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\left(-\cos(e)\,S\left(\sqrt{b}\sqrt{\frac{2}{\pi}}\,z\right)-C\left(\sqrt{b}\sqrt{\frac{2}{\pi}}\,z\right)\sin(e)\right)-2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{-b-2cs+c\nu}}\left(\cos\left(e+\frac{1}{2}\pi(1-\nu)\right)C\left(\sqrt{\frac{2}{\pi}}\sqrt{-b-2cs+c\nu}\,z\right)+S\left(\sqrt{\frac{2}{\pi}}\sqrt{-b-2cs+c\nu}\,z\right)\sin\left(e+\frac{1}{2}\pi(1-\nu)\right)\right)+\frac{1}{\sqrt{-b+2cs-c\nu}}\left(\cos\left(e+\frac{1}{2}\pi(\nu+1)\right)C\left(\sqrt{\frac{2}{\pi}}\sqrt{-b+2cs-c\nu}\,z\right)+S\left(\sqrt{\frac{2}{\pi}}\sqrt{-b+2cs-c\nu}\,z\right)\sin\left(e+\frac{1}{2}\pi(\nu+1)\right)\right)\right)\text{ /; }\nu\in\mathbb{N}^+$$

01.06.21.0733.01

$$\int \sin\left(\sqrt{z}\, b+e\right) \sin^{\nu}\left(c \sqrt{z}\right) dz = \frac{2^{1-\nu} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\sin\left(\sqrt{z}\, b+e\right) - b\sqrt{z} \cos\left(\sqrt{z}\, b+e\right)\right)}{b^2} + 2^{1-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \left((-1)^k \binom{\nu}{k} \left(\sin\left(e+\frac{\pi \nu}{2}+(b+c(2k-\nu))\sqrt{z}\right)(b-c(2k-\nu))^2 + (b+c(2k-\nu))\left((b-c(2k-\nu))\sqrt{z}\left((c(2k-\nu)-b)\cos\left(e+\frac{\pi\nu}{2}+(b+c(2k-\nu))\sqrt{z}\right) + (-b-c(2k-\nu))\cos\left(e+(b-c(2k-\nu))\sqrt{z}-\frac{\pi\nu}{2}\right)\right) + (b+c(2k-\nu))\sin\left(e+(b-c(2k-\nu))\sqrt{z}-\frac{\pi\nu}{2}\right)\right)\right)\right) \Big/ \left((b-c(2k-\nu))^2 (b+c(2k-\nu))^2\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin\left(b z^r + d z\right) \sin^{\nu}\left(c z^r\right)$

01.06.21.0734.01

$$\int \sin\left(b z^2 + d z\right) \sin^{\nu}\left(c z^2\right) dz = -\frac{2^{-\nu-\frac{1}{2}} \sqrt{\pi}}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(C\left(\frac{d+2bz}{\sqrt{b}\sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4b}\right) - \cos\left(\frac{d^2}{4b}\right) S\left(\frac{d+2bz}{\sqrt{b}\sqrt{2\pi}}\right)\right) - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{-b-2cs+c\nu}} \left(\cos\left(\frac{d^2}{4(-b-2cs+c\nu)} + \frac{1}{2}\pi(1-\nu)\right) C\left(\frac{2(-b-2cs+c\nu)z-d}{\sqrt{2\pi}\sqrt{-b-2cs+c\nu}}\right) + S\left(\frac{2(-b-2cs+c\nu)z-d}{\sqrt{2\pi}\sqrt{-b-2cs+c\nu}}\right) \sin\left(\frac{d^2}{4(-b-2cs+c\nu)} + \frac{1}{2}\pi(1-\nu)\right)\right) + \frac{1}{\sqrt{-b+2cs-c\nu}} \left(\cos\left(\frac{d^2}{4(-b+2cs-c\nu)} + \frac{1}{2}\pi(\nu+1)\right) C\left(\frac{2(-b+2cs-c\nu)z-d}{\sqrt{2\pi}\sqrt{-b+2cs-c\nu}}\right) + S\left(\frac{2(-b+2cs-c\nu)z-d}{\sqrt{2\pi}\sqrt{-b+2cs-c\nu}}\right) \sin\left(\frac{d^2}{4(-b+2cs-c\nu)} + \frac{1}{2}\pi(\nu+1)\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0735.01

$$\int \sin\left(\sqrt{z}\, b + d\, z\right) \sin^{\nu}\left(c\sqrt{z}\right) dz = \frac{1}{d^{3/2}} \left(2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2\sqrt{d}\, \cos\left(\sqrt{z}\, b + d\, z\right) - b\sqrt{2\pi}\, \cos\left(\frac{b^2}{4d}\right) S\left(\frac{b + 2d\sqrt{z}}{\sqrt{d}\,\sqrt{2\pi}}\right) + b\sqrt{2\pi}\, C\left(\frac{b + 2d\sqrt{z}}{\sqrt{d}\,\sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4d}\right)\right)\right) - 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d)^{3/2}} \left(\sqrt{2\pi}\, (b - 2cs + c\nu) \cos\left(\frac{1}{2}\pi(\nu+1) - \frac{(-b + 2cs - c\nu)^2}{4d}\right) C\left(\frac{-b + 2cs - c\nu - 2d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) - \sqrt{2\pi}\, (-b + 2cs - c\nu) S\left(\frac{-b + 2cs - c\nu - 2d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) \sin\left(\frac{1}{2}\pi(\nu+1) - \frac{(-b + 2cs - c\nu)^2}{4d}\right) - 2\sqrt{-d}\, \sin\left(\frac{1}{2}\pi(\nu+1) + d\, z - (-b + 2cs - c\nu)\sqrt{z}\right)\right) + \frac{1}{(-d)^{3/2}} \left(\sqrt{2\pi}\, (b + 2cs - c\nu) \cos\left(\frac{(-b - 2cs + c\nu)^2}{4d} + \frac{1}{2}\pi(\nu-1)\right) C\left(\frac{-b - 2cs + c\nu - 2d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) + \sqrt{2\pi}\, (-b - 2cs + c\nu) S\left(\frac{-b - 2cs + c\nu - 2d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) \sin\left(\frac{(-b - 2cs + c\nu)^2}{4d} + \frac{1}{2}\pi(\nu-1)\right) + 2\sqrt{-d}\, \sin\left(\frac{1}{2}\pi(\nu-1) - d\, z + (-b - 2cs + c\nu)\sqrt{z}\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin\left(b\, z^r + d\, z + e\right) \sin^{\nu}\left(c\, z^r\right)$

01.06.21.0736.01

$$\int \sin\left(b\, z^2 + d\, z + e\right) \sin^{\nu}\left(c\, z^2\right) dz = -\frac{2^{-\nu-\frac{1}{2}}\sqrt{\pi}}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(C\left(\frac{d + 2bz}{\sqrt{b}\,\sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4b} - e\right) - \cos\left(\frac{d^2}{4b} - e\right) S\left(\frac{d + 2bz}{\sqrt{b}\,\sqrt{2\pi}}\right)\right) - 2^{-\nu-\frac{1}{2}}\sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{-b - 2cs + c\nu}} \left(\cos\left(\frac{d^2}{4(-b - 2cs + c\nu)} + e + \frac{1}{2}\pi(1-\nu)\right) C\left(\frac{2(-b - 2cs + c\nu)z - d}{\sqrt{2\pi}\,\sqrt{-b - 2cs + c\nu}}\right) + S\left(\frac{2(-b - 2cs + c\nu)z - d}{\sqrt{2\pi}\,\sqrt{-b - 2cs + c\nu}}\right) \sin\left(\frac{d^2}{4(-b - 2cs + c\nu)} + e + \frac{1}{2}\pi(1-\nu)\right)\right) + \frac{1}{\sqrt{-b + 2cs - c\nu}} \left(\cos\left(\frac{d^2}{4(-b + 2cs - c\nu)} + e + \frac{1}{2}\pi(\nu+1)\right) C\left(\frac{2(-b + 2cs - c\nu)z - d}{\sqrt{2\pi}\,\sqrt{-b + 2cs - c\nu}}\right) + S\left(\frac{2(-b + 2cs - c\nu)z - d}{\sqrt{2\pi}\,\sqrt{-b + 2cs - c\nu}}\right) \sin\left(\frac{d^2}{4(-b + 2cs - c\nu)} + e + \frac{1}{2}\pi(\nu+1)\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0737.01

$$\int \sin\left(\sqrt{z}\; b + d\,z + e\right) \sin^{\nu}\left(c\sqrt{z}\right) dz = \frac{1}{d^{3/2}} \left(2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2\sqrt{d}\, \cos\left(\sqrt{z}\; b + e + d\,z\right) - b\sqrt{2\pi}\, \cos\left(\frac{b^2}{4\,d} - e\right) S\left(\frac{b + 2\,d\sqrt{z}}{\sqrt{d}\,\sqrt{2\pi}}\right) + b\sqrt{2\pi}\; C\left(\frac{b + 2\,d\sqrt{z}}{\sqrt{d}\,\sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4\,d} - e\right)\right)\right) - 2^{-\nu-1} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d)^{3/2}} \left(\sqrt{2\pi}\; (b + 2\,c\,s - c\,\nu) \cos\left(-\frac{(-b - 2\,c\,s + c\,\nu)^2}{4\,d} + e - \frac{1}{2}\pi(\nu - 1)\right) C\left(\frac{-b - 2\,c\,s + c\,\nu - 2\,d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) - \sqrt{2\pi}\; (-b - 2\,c\,s + c\,\nu)\, S\left(\frac{-b - 2\,c\,s + c\,\nu - 2\,d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) \sin\left(-\frac{(-b - 2\,c\,s + c\,\nu)^2}{4\,d} + e - \frac{1}{2}\pi(\nu - 1)\right) - 2\sqrt{-d}\; \sin\left(e - \frac{1}{2}\pi(\nu - 1) + d\,z - (-b - 2\,c\,s + c\,\nu)\sqrt{z}\right)\right) + \frac{1}{(-d)^{3/2}} \left(\sqrt{2\pi}\; (b - 2\,c\,s + c\,\nu) \cos\left(-\frac{(-b + 2\,c\,s - c\,\nu)^2}{4\,d} + e + \frac{1}{2}\pi(\nu + 1)\right) C\left(\frac{-b + 2\,c\,s - c\,\nu - 2\,d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) - \sqrt{2\pi}\; (-b + 2\,c\,s - c\,\nu)\, S\left(\frac{-b + 2\,c\,s - c\,\nu - 2\,d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) \sin\left(-\frac{(-b + 2\,c\,s - c\,\nu)^2}{4\,d} + e + \frac{1}{2}\pi(\nu + 1)\right) - 2\sqrt{-d}\; \sin\left(e + \frac{1}{2}\pi(\nu + 1) + d\,z - (-b + 2\,c\,s - c\,\nu)\sqrt{z}\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin(d\,z)\sin^{\nu}\left(c\,z^r + g\right)$

01.06.21.0738.01

$$\int \sin(d\,z) \sin^{\nu}\left(c\,z^2 + g\right) dz = \frac{2^{-\nu} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sin\left(\frac{1}{2}(-2\,d\,z - \pi)\right)}{d} - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{c\,\nu - 2\,c\,s}} \left(\cos\left(\frac{d^2}{4\,(c\,\nu - 2\,c\,s)} + \frac{1}{2}\pi(1 - \nu) + g\,(2\,s - \nu)\right) C\left(\frac{2\,(c\,\nu - 2\,c\,s)\,z - d}{\sqrt{2\pi}\,\sqrt{c\,\nu - 2\,c\,s}}\right) + S\left(\frac{2\,(c\,\nu - 2\,c\,s)\,z - d}{\sqrt{2\pi}\,\sqrt{c\,\nu - 2\,c\,s}}\right) \sin\left(\frac{d^2}{4\,(c\,\nu - 2\,c\,s)} + \frac{1}{2}\pi(1 - \nu) + g\,(2\,s - \nu)\right)\right) + \frac{1}{\sqrt{2\,c\,s - c\,\nu}} \left(\cos\left(-\frac{d^2}{4\,(2\,c\,s - c\,\nu)} + g\,(2\,s - \nu) - \frac{1}{2}\pi(\nu + 1)\right) C\left(\frac{2\,(2\,c\,s - c\,\nu)\,z - d}{\sqrt{2\pi}\,\sqrt{2\,c\,s - c\,\nu}}\right) - S\left(\frac{2\,(2\,c\,s - c\,\nu)\,z - d}{\sqrt{2\pi}\,\sqrt{2\,c\,s - c\,\nu}}\right) \sin\left(-\frac{d^2}{4\,(2\,c\,s - c\,\nu)} + g\,(2\,s - \nu) - \frac{1}{2}\pi(\nu + 1)\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.0739.01

$$\int \sin(d\,z)\sin^{\nu}\left(\sqrt{z}\;c+g\right)dz = -\frac{2^{-\nu}\binom{\nu}{\frac{\nu}{2}}\cos(d\,z)\,(1-\nu\bmod 2)}{d} - 2^{-\nu-1}$$
$$\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{(-d)^{3/2}}\left(\sqrt{2\pi}\,(2\,c\,s-c\,\nu)\cos\left(-\frac{(c\,\nu-2\,c\,s)^2}{4\,d}+2\,g\,s-\frac{1}{2}\pi(\nu-1)-g\,\nu\right)C\left(\frac{-2\sqrt{z}\;d-2\,c\,s+c\,\nu}{\sqrt{-d}\;\sqrt{2\pi}}\right)-\right.\right.$$
$$\sqrt{2\pi}\,(c\,\nu-2\,c\,s)\,S\left(\frac{-2\sqrt{z}\;d-2\,c\,s+c\,\nu}{\sqrt{-d}\;\sqrt{2\pi}}\right)\sin\left(-\frac{(c\,\nu-2\,c\,s)^2}{4\,d}+2\,g\,s-\frac{1}{2}\pi(\nu-1)-g\,\nu\right)-$$
$$\left.2\sqrt{-d}\;\sin\left(2\,g\,s-\frac{1}{2}\pi(\nu-1)-g\,\nu+d\,z-(c\,\nu-2\,c\,s)\sqrt{z}\right)\right)+$$
$$\frac{1}{(-d)^{3/2}}\left(\sqrt{2\pi}\,(c\,\nu-2\,c\,s)\cos\left(\frac{(2\,c\,s-c\,\nu)^2}{4\,d}+2\,g\,s-g\,\nu-\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{-2\sqrt{z}\;d+2\,c\,s-c\,\nu}{\sqrt{-d}\;\sqrt{2\pi}}\right)+\right.$$
$$\sqrt{2\pi}\,(2\,c\,s-c\,\nu)\,S\left(\frac{-2\sqrt{z}\;d+2\,c\,s-c\,\nu}{\sqrt{-d}\;\sqrt{2\pi}}\right)\sin\left(\frac{(2\,c\,s-c\,\nu)^2}{4\,d}+2\,g\,s-g\,\nu-\frac{1}{2}\pi(\nu+1)\right)+$$
$$\left.\left.2\sqrt{-d}\;\sin\left(2\,g\,s-g\,\nu-\frac{1}{2}\pi(\nu+1)-d\,z+(2\,c\,s-c\,\nu)\sqrt{z}\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

Involving $\sin(d\,z+e)\sin^{\nu}(c\,z^r+g)$

01.06.21.0740.01

$$\int \sin(e+d\,z)\sin^{\nu}\left(c\,z^2+g\right)dz = -\frac{2^{-\nu}\binom{\nu}{\frac{\nu}{2}}(1-\nu\bmod 2)\sin\left(e+\frac{1}{2}(2\,d\,z+\pi)\right)}{d} -$$
$$2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{c\,\nu-2\,c\,s}}\left(\cos\left(\frac{d^2}{4\,(c\,\nu-2\,c\,s)}+e+\frac{1}{2}\pi(1-\nu)+g\,(2\,s-\nu)\right)C\left(\frac{2\,(c\,\nu-2\,c\,s)\,z-d}{\sqrt{2\pi}\;\sqrt{c\,\nu-2\,c\,s}}\right)+\right.\right.$$
$$\left.S\left(\frac{2\,(c\,\nu-2\,c\,s)\,z-d}{\sqrt{2\pi}\;\sqrt{c\,\nu-2\,c\,s}}\right)\sin\left(\frac{d^2}{4\,(c\,\nu-2\,c\,s)}+e+\frac{1}{2}\pi(1-\nu)+g\,(2\,s-\nu)\right)\right)+$$
$$\frac{1}{\sqrt{2\,c\,s-c\,\nu}}\left(\cos\left(\frac{d^2}{4\,(2\,c\,s-c\,\nu)}+e-g\,(2\,s-\nu)+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{2\,(2\,c\,s-c\,\nu)\,z-d}{\sqrt{2\pi}\;\sqrt{2\,c\,s-c\,\nu}}\right)+\right.$$
$$\left.\left.\left.S\left(\frac{2\,(2\,c\,s-c\,\nu)\,z-d}{\sqrt{2\pi}\;\sqrt{2\,c\,s-c\,\nu}}\right)\sin\left(\frac{d^2}{4\,(2\,c\,s-c\,\nu)}+e-g\,(2\,s-\nu)+\frac{1}{2}\pi(\nu+1)\right)\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.0741.01

$$\int \sin(e+d\,z)\sin^{\nu}\left(\sqrt{z}\,c+g\right)dz = -\frac{2^{-\nu}\binom{\nu}{\frac{\nu}{2}}\cos(e+d\,z)\,(1-\nu \bmod 2)}{d} - 2^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}$$
$$\left(\frac{1}{(-d)^{3/2}}\left(\sqrt{2\pi}\,(2\,c\,s-c\,\nu)\cos\left(-\frac{(c\,\nu-2\,c\,s)^2}{4\,d}+e+2\,g\,s-\frac{1}{2}\pi(\nu-1)-g\,\nu\right)C\left(\frac{-2\sqrt{z}\,d-2\,c\,s+c\,\nu}{\sqrt{-d}\,\sqrt{2\pi}}\right)-\right.\right.$$
$$\sqrt{2\pi}\,(c\,\nu-2\,c\,s)\,S\left(\frac{-2\sqrt{z}\,d-2\,c\,s+c\,\nu}{\sqrt{-d}\,\sqrt{2\pi}}\right)\sin\left(-\frac{(c\,\nu-2\,c\,s)^2}{4\,d}+e+2\,g\,s-\frac{1}{2}\pi(\nu-1)-g\,\nu\right)-$$
$$\left.2\sqrt{-d}\,\sin\left(e+2\,g\,s-\frac{1}{2}\pi(\nu-1)-g\,\nu+d\,z-(c\,\nu-2\,c\,s)\sqrt{z}\right)\right)+$$
$$\frac{1}{(-d)^{3/2}}\left(\sqrt{2\pi}\,(c\,\nu-2\,c\,s)\cos\left(-\frac{(2\,c\,s-c\,\nu)^2}{4\,d}+e-2\,g\,s+g\,\nu+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{-2\sqrt{z}\,d+2\,c\,s-c\,\nu}{\sqrt{-d}\,\sqrt{2\pi}}\right)-\right.$$
$$\sqrt{2\pi}\,(2\,c\,s-c\,\nu)\,S\left(\frac{-2\sqrt{z}\,d+2\,c\,s-c\,\nu}{\sqrt{-d}\,\sqrt{2\pi}}\right)\sin\left(-\frac{(2\,c\,s-c\,\nu)^2}{4\,d}+e-2\,g\,s+g\,\nu+\frac{1}{2}\pi(\nu+1)\right)-$$
$$\left.\left.2\sqrt{-d}\,\sin\left(e-2\,g\,s+g\,\nu+\frac{1}{2}\pi(\nu+1)+d\,z-(2\,c\,s-c\,\nu)\sqrt{z}\right)\right)\right)\; /;\; \nu\in\mathbb{N}^+$$

Involving $\sin(b\,z^r)\sin^{\nu}(c\,z^r+g)$

01.06.21.0742.01

$$\int \sin(b\,z^r)\sin^{\nu}(c\,z^r+g)\,dz = \frac{i\,2^{-\nu-1}(1-\nu \bmod 2)}{r}\,z\binom{\nu}{\frac{\nu}{2}}\left((-i\,b\,z^r)^{-1/r}\,\Gamma\left(\frac{1}{r},-i\,b\,z^r\right)-(i\,b\,z^r)^{-1/r}\,\Gamma\left(\frac{1}{r},i\,b\,z^r\right)\right)-$$
$$\frac{(2\,i)^{-\nu-1}\,z}{r}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^{\nu}\,e^{2\,i\,g\,s-i\,g\,\nu}\,\Gamma\left(\frac{1}{r},(-i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r\right)((-i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r)^{-1/r}+\right.$$
$$(-1)^{\nu+1}\,e^{2\,i\,g\,s-i\,g\,\nu}\,((i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r)^{-1/r}\,\Gamma\left(\frac{1}{r},(i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r\right)+e^{i\,g\,\nu-2\,i\,g\,s}\,((-i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r)^{-1/r}$$
$$\left.\Gamma\left(\frac{1}{r},(-i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r\right)-e^{i\,g\,\nu-2\,i\,g\,s}\,((i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r)^{-1/r}\,\Gamma\left(\frac{1}{r},(i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r\right)\right)\; /;\; \nu\in\mathbb{N}^+$$

01.06.21.0743.01

$$\int \sin\left(b z^2\right) \sin^v\left(c z^2 + g\right) dz = \frac{2^{-v-\frac{1}{2}} \sqrt{\pi} \, (1 - v \bmod 2)}{\sqrt{b}} \binom{v}{\frac{v}{2}} S\left(\sqrt{b} \sqrt{\frac{2}{\pi}} \, z\right) - 2^{-v-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{s+v} \binom{v}{s} \left(\frac{1}{\sqrt{-b - 2 c s + c v}} \left(\cos\left(\frac{1}{2} \pi (1-v) + g (2s - v)\right) C\left(\sqrt{\frac{2}{\pi}} \sqrt{-b - 2 c s + c v} \, z\right) + S\left(\sqrt{\frac{2}{\pi}} \sqrt{-b - 2 c s + c v} \, z\right) \sin\left(\frac{1}{2} \pi (1-v) + g (2s - v)\right)\right) + \frac{1}{\sqrt{-b + 2 c s - c v}} \left(\cos\left(g (2s - v) - \frac{1}{2} \pi (v+1)\right) C\left(\sqrt{\frac{2}{\pi}} \sqrt{-b + 2 c s - c v} \, z\right) - S\left(\sqrt{\frac{2}{\pi}} \sqrt{-b + 2 c s - c v} \, z\right) \sin\left(g (2s - v) - \frac{1}{2} \pi (v+1)\right)\right)\right) /; v \in \mathbb{N}^+$$

01.06.21.0744.01

$$\int \sin\left(b \sqrt{z}\right) \sin^v\left(\sqrt{z} \, c + g\right) dz = \frac{2^{1-v}}{b^2} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \left(\sin\left(b \sqrt{z}\right) - b \sqrt{z} \cos\left(b \sqrt{z}\right)\right) + 2^{1-v} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(\frac{1}{(c (v - 2 s) - b)^2} \left(\cos\left(\frac{1}{2} \pi (1-v) + g (v - 2s) + (c (v - 2s) - b) \sqrt{z}\right) + (c (v - 2s) - b) \sqrt{z} \sin\left(\frac{1}{2} \pi (1-v) + g (v - 2s) + (c (v - 2s) - b) \sqrt{z}\right)\right) + \frac{1}{(-b - c (v - 2s))^2} \left(\cos\left(\frac{1}{2} \pi (v+1) - g (v - 2s) + (-b - c (v - 2s)) \sqrt{z}\right) + (-b - c (v - 2s)) \sqrt{z} \sin\left(\frac{1}{2} \pi (v+1) - g (v - 2s) + (-b - c (v - 2s)) \sqrt{z}\right)\right)\right) /; v \in \mathbb{N}^+$$

Involving $\sin\left(b z^r + e\right) \sin^v\left(c z^r + g\right)$

01.06.21.0745.01

$$\int \sin(b z^r + e) \sin^v(c z^r + g) \, dz = \frac{i \, 2^{-v-1} (1 - v \bmod 2)}{r} z \binom{v}{\frac{v}{2}} \left(e^{i e} (-i b z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -i b z^r\right) - e^{-i e} (i b z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i b z^r\right)\right) - \frac{(2 i)^{-v-1} z}{r} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left((-1)^v e^{i e + 2 i g s - i g v} \Gamma\left(\frac{1}{r}, (-i b - 2 i c s + i c v) z^r\right) ((-i b - 2 i c s + i c v) z^r)^{-1/r} + (-1)^{v+1} e^{-i e + 2 i g s - i g v} ((i b - 2 i c s + i c v) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (i b - 2 i c s + i c v) z^r\right) + e^{i e - 2 i g s + i g v} ((-i b + 2 i c s - i c v) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-i b + 2 i c s - i c v) z^r\right) - e^{-i e - 2 i g s + i g v} ((i b + 2 i c s - i c v) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (i b + 2 i c s - i c v) z^r\right)\right) /; v \in \mathbb{N}^+$$

01.06.21.0746.01

$$\int \sin\left(b\,z^2+e\right)\sin^{\nu}\left(c\,z^2+g\right)dz = -\frac{2^{-\nu-\frac{1}{2}}\sqrt{\pi}\,(1-\nu \bmod 2)}{\sqrt{b}}\binom{\nu}{\frac{\nu}{2}}\left(-\cos(e)\,S\left(\sqrt{b}\,\sqrt{\frac{2}{\pi}}\,z\right)-C\left(\sqrt{b}\,\sqrt{\frac{2}{\pi}}\,z\right)\sin(e)\right)-2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{-b-2\,c\,s+c\,\nu}}\left(\cos\left(e+\frac{1}{2}\pi(1-\nu)+g\,(2\,s-\nu)\right)C\left(\sqrt{\frac{2}{\pi}}\sqrt{-b-2\,c\,s+c\,\nu}\,z\right)+S\left(\sqrt{\frac{2}{\pi}}\sqrt{-b-2\,c\,s+c\,\nu}\,z\right)\sin\left(e+\frac{1}{2}\pi(1-\nu)+g\,(2\,s-\nu)\right)\right)+\frac{1}{\sqrt{-b+2\,c\,s-c\,\nu}}\left(\cos\left(e-g\,(2\,s-\nu)+\frac{1}{2}\pi(\nu+1)\right)C\left(\sqrt{\frac{2}{\pi}}\sqrt{-b+2\,c\,s-c\,\nu}\,z\right)+S\left(\sqrt{\frac{2}{\pi}}\sqrt{-b+2\,c\,s-c\,\nu}\,z\right)\sin\left(e-g\,(2\,s-\nu)+\frac{1}{2}\pi(\nu+1)\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.0747.01

$$\int \sin\left(\sqrt{z}\,b+e\right)\sin^{\nu}\left(\sqrt{z}\,c+g\right)dz = \frac{2^{1-\nu}(1-\nu \bmod 2)\left(\sin\left(\sqrt{z}\,b+e\right)-b\sqrt{z}\cos\left(\sqrt{z}\,b+e\right)\right)}{b^2}\binom{\nu}{\frac{\nu}{2}}+2^{1-\nu}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\left((-1)^k\binom{\nu}{k}\left(\sin\left(e+\frac{\pi\nu}{2}-g\,(\nu-2\,k)+(b+c\,(2\,k-\nu))\sqrt{z}\right)(b-c\,(2\,k-\nu))^2+(b+c\,(2\,k-\nu))\left((b-c\,(2\,k-\nu))\sqrt{z}\left((c\,(2\,k-\nu)-b)\cos\left(e+\frac{\pi\nu}{2}-g\,(\nu-2\,k)+(b+c\,(2\,k-\nu))\sqrt{z}\right)-(b+c\,(2\,k-\nu))\cos\left(e+g\,(\nu-2\,k)+(b-c\,(2\,k-\nu))\sqrt{z}-\frac{\pi\nu}{2}\right)\right)+(b+c\,(2\,k-\nu))\sin\left(e+g\,(\nu-2\,k)+(b-c\,(2\,k-\nu))\sqrt{z}-\frac{\pi\nu}{2}\right)\right)\right)\right)\Big/\left((b-c\,(2\,k-\nu))^2\,(b+c\,(2\,k-\nu))^2\right)\;/;\;\nu\in\mathbb{N}^+$$

Involving $\sin\left(b\,z^r+d\,z\right)\sin^{\nu}\left(c\,z^r+g\right)$

01.06.21.0748.01

$$\int \sin\left(b\,z^2+d\,z+e\right)\sin^{\nu}\left(c\,z^2+g\right)dz = -\frac{2^{-\nu-\frac{1}{2}}\sqrt{\pi}}{\sqrt{b}}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\left(C\left(\frac{d+2\,b\,z}{\sqrt{b}\,\sqrt{2\,\pi}}\right)\sin\left(\frac{d^2}{4\,b}-e\right)-\cos\left(\frac{d^2}{4\,b}-e\right)S\left(\frac{d+2\,b\,z}{\sqrt{b}\,\sqrt{2\,\pi}}\right)\right)-2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{-b-2\,c\,s+c\,\nu}}\left(\cos\left(\frac{d^2}{4\,(-b-2\,c\,s+c\,\nu)}+e+\frac{1}{2}\pi(1-\nu)+g\,(2\,s-\nu)\right)C\left(\frac{2\,(-b-2\,c\,s+c\,\nu)\,z-d}{\sqrt{2\,\pi}\,\sqrt{-b-2\,c\,s+c\,\nu}}\right)+S\left(\frac{2\,(-b-2\,c\,s+c\,\nu)\,z-d}{\sqrt{2\,\pi}\,\sqrt{-b-2\,c\,s+c\,\nu}}\right)\sin\left(\frac{d^2}{4\,(-b-2\,c\,s+c\,\nu)}+e+\frac{1}{2}\pi(1-\nu)+g\,(2\,s-\nu)\right)\right)+\frac{1}{\sqrt{-b+2\,c\,s-c\,\nu}}\left(\cos\left(\frac{d^2}{4\,(-b+2\,c\,s-c\,\nu)}+e-g\,(2\,s-\nu)+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{2\,(-b+2\,c\,s-c\,\nu)\,z-d}{\sqrt{2\,\pi}\,\sqrt{-b+2\,c\,s-c\,\nu}}\right)+S\left(\frac{2\,(-b+2\,c\,s-c\,\nu)\,z-d}{\sqrt{2\,\pi}\,\sqrt{-b+2\,c\,s-c\,\nu}}\right)\sin\left(\frac{d^2}{4\,(-b+2\,c\,s-c\,\nu)}+e-g\,(2\,s-\nu)+\frac{1}{2}\pi(\nu+1)\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.0749.01

$$\int \sin\left(\sqrt{z}\, b + d\, z\right) \sin^{\nu}\left(\sqrt{z}\, c + g\right) dz = \frac{1}{d^{3/2}} \left(2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2 \sqrt{d} \cos\left(\sqrt{z}\, b + d\, z\right) - b \sqrt{2\pi} \cos\left(\frac{b^2}{4 d}\right) S\left(\frac{b + 2 d \sqrt{z}}{\sqrt{d} \sqrt{2\pi}}\right) + b \sqrt{2\pi}\, C\left(\frac{b + 2 d \sqrt{z}}{\sqrt{d} \sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4 d}\right)\right)\right) - 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d)^{3/2}} \left(\sqrt{2\pi}\, (b + 2 c s - c \nu) \cos\left(-\frac{(-b - 2 c s + c \nu)^2}{4 d} + 2 g s - \frac{1}{2} \pi (\nu - 1) - g \nu\right) C\left(\frac{-b - 2 c s + c \nu - 2 d \sqrt{z}}{\sqrt{-d} \sqrt{2\pi}}\right) - \sqrt{2\pi}\, (-b - 2 c s + c \nu) S\left(\frac{-b - 2 c s + c \nu - 2 d \sqrt{z}}{\sqrt{-d} \sqrt{2\pi}}\right) \sin\left(-\frac{(-b - 2 c s + c \nu)^2}{4 d} + 2 g s - \frac{1}{2} \pi (\nu - 1) - g \nu\right) - 2 \sqrt{-d} \sin\left(2 g s - \frac{1}{2} \pi (\nu - 1) - g \nu + d z - (-b - 2 c s + c \nu) \sqrt{z}\right)\right) + \frac{1}{(-d)^{3/2}} \left(\sqrt{2\pi}\, (b - 2 c s + c \nu) \cos\left(\frac{(-b + 2 c s - c \nu)^2}{4 d} + 2 g s - g \nu - \frac{1}{2} \pi (\nu + 1)\right) C\left(\frac{-b + 2 c s - c \nu - 2 d \sqrt{z}}{\sqrt{-d} \sqrt{2\pi}}\right) + \sqrt{2\pi}\, (-b + 2 c s - c \nu) S\left(\frac{-b + 2 c s - c \nu - 2 d \sqrt{z}}{\sqrt{-d} \sqrt{2\pi}}\right) \sin\left(\frac{(-b + 2 c s - c \nu)^2}{4 d} + 2 g s - g \nu - \frac{1}{2} \pi (\nu + 1)\right) + 2 \sqrt{-d} \sin\left(2 g s - g \nu - \frac{1}{2} \pi (\nu + 1) - d z + (-b + 2 c s - c \nu) \sqrt{z}\right)\right)\right) /; \nu \in \mathbb{N}^+$$

Involving $\sin\left(b z^r + d z + e\right) \sin^{\nu}\left(c z^r + g\right)$

01.06.21.0750.01

$$\int \sin\left(b z^2 + d z + e\right) \sin^{\nu}\left(c z^2 + g\right) dz = -\frac{2^{-\nu-\frac{1}{2}} \sqrt{\pi}}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(C\left(\frac{d + 2 b z}{\sqrt{b} \sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4 b} - e\right) - \cos\left(\frac{d^2}{4 b} - e\right) S\left(\frac{d + 2 b z}{\sqrt{b} \sqrt{2\pi}}\right)\right) - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{-b - 2 c s + c \nu}} \left(\cos\left(\frac{d^2}{4 (-b - 2 c s + c \nu)} + e + \frac{1}{2} \pi (1 - \nu) + g (2 s - \nu)\right) C\left(\frac{2 (-b - 2 c s + c \nu) z - d}{\sqrt{2\pi} \sqrt{-b - 2 c s + c \nu}}\right) + S\left(\frac{2 (-b - 2 c s + c \nu) z - d}{\sqrt{2\pi} \sqrt{-b - 2 c s + c \nu}}\right) \sin\left(\frac{d^2}{4 (-b - 2 c s + c \nu)} + e + \frac{1}{2} \pi (1 - \nu) + g (2 s - \nu)\right)\right) + \frac{1}{\sqrt{-b + 2 c s - c \nu}} \left(\cos\left(\frac{d^2}{4 (-b + 2 c s - c \nu)} + e - g (2 s - \nu) + \frac{1}{2} \pi (\nu + 1)\right) C\left(\frac{2 (-b + 2 c s - c \nu) z - d}{\sqrt{2\pi} \sqrt{-b + 2 c s - c \nu}}\right) + S\left(\frac{2 (-b + 2 c s - c \nu) z - d}{\sqrt{2\pi} \sqrt{-b + 2 c s - c \nu}}\right) \sin\left(\frac{d^2}{4 (-b + 2 c s - c \nu)} + e - g (2 s - \nu) + \frac{1}{2} \pi (\nu + 1)\right)\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.0751.01

$$\int \sin\left(\sqrt{z}\, b + d\, z + e\right) \sin^{\nu}\left(\sqrt{z}\, c + g\right) dz = \frac{1}{d^{3/2}} \left(2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2\sqrt{d}\, \cos\left(\sqrt{z}\, b + e + d\, z\right) - b\sqrt{2\pi}\, \cos\left(\frac{b^2}{4\, d} - e\right) S\left(\frac{b + 2\, d\sqrt{z}}{\sqrt{d}\,\sqrt{2\pi}}\right) + b\sqrt{2\pi}\, C\left(\frac{b + 2\, d\sqrt{z}}{\sqrt{d}\,\sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4\, d} - e\right)\right)\right) - 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d)^{3/2}} \left(\sqrt{2\pi}\, (b + 2\, c\, s - c\, \nu) \cos\left(-\frac{(-b - 2\, c\, s + c\, \nu)^2}{4\, d} + e + 2\, g\, s - \frac{1}{2}\pi(\nu - 1) - g\, \nu\right) C\left(\frac{-b - 2\, c\, s + c\, \nu - 2\, d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) - \sqrt{2\pi}\, (-b - 2\, c\, s + c\, \nu) S\left(\frac{-b - 2\, c\, s + c\, \nu - 2\, d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) \sin\left(-\frac{(-b - 2\, c\, s + c\, \nu)^2}{4\, d} + e + 2\, g\, s - \frac{1}{2}\pi(\nu - 1) - g\, \nu\right) - 2\sqrt{-d}\, \sin\left(e + 2\, g\, s - \frac{1}{2}\pi(\nu - 1) - g\, \nu + d\, z - (-b - 2\, c\, s + c\, \nu)\sqrt{z}\right)\right) + \frac{1}{(-d)^{3/2}} \left(\sqrt{2\pi}\, (b - 2\, c\, s + c\, \nu) \cos\left(-\frac{(-b + 2\, c\, s - c\, \nu)^2}{4\, d} + e - 2\, g\, s + g\, \nu + \frac{1}{2}\pi(\nu + 1)\right) C\left(\frac{-b + 2\, c\, s - c\, \nu - 2\, d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) - \sqrt{2\pi}\, (-b + 2\, c\, s - c\, \nu) S\left(\frac{-b + 2\, c\, s - c\, \nu - 2\, d\sqrt{z}}{\sqrt{-d}\,\sqrt{2\pi}}\right) \sin\left(-\frac{(-b + 2\, c\, s - c\, \nu)^2}{4\, d} + e - 2\, g\, s + g\, \nu + \frac{1}{2}\pi(\nu + 1)\right) - 2\sqrt{-d}\, \sin\left(e - 2\, g\, s + g\, \nu + \frac{1}{2}\pi(\nu + 1) + d\, z - (-b + 2\, c\, s - c\, \nu)\sqrt{z}\right)\right)\right) /;\, \nu \in \mathbb{N}^+$$

Involving $\sin(d\, z) \sin^{\nu}\left(c\, z^r + f\, z\right)$

01.06.21.0752.01

$$\int \sin(d\, z) \sin^{\nu}\left(c\, z^2 + f\, z\right) dz = \frac{2^{-\nu} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sin\left(\frac{1}{2}(-2\, d\, z - \pi)\right)}{d} - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{c\, \nu - 2\, c\, s}} \left(\cos\left(\frac{(-d - 2\, f\, s + f\, \nu)^2}{4\, (c\, \nu - 2\, c\, s)} + \frac{1}{2}\pi(1 - \nu)\right) C\left(\frac{-d - 2\, f\, s + f\, \nu + 2\, (c\, \nu - 2\, c\, s)\, z}{\sqrt{2\pi}\,\sqrt{c\, \nu - 2\, c\, s}}\right) + S\left(\frac{-d - 2\, f\, s + f\, \nu + 2\, (c\, \nu - 2\, c\, s)\, z}{\sqrt{2\pi}\,\sqrt{c\, \nu - 2\, c\, s}}\right) \sin\left(\frac{(-d - 2\, f\, s + f\, \nu)^2}{4\, (c\, \nu - 2\, c\, s)} + \frac{1}{2}\pi(1 - \nu)\right)\right) + \frac{1}{\sqrt{2\, c\, s - c\, \nu}} \left(\cos\left(\frac{(-d + 2\, f\, s - f\, \nu)^2}{4\, (2\, c\, s - c\, \nu)} + \frac{1}{2}\pi(\nu + 1)\right) C\left(\frac{-d + 2\, f\, s - f\, \nu + 2\, (2\, c\, s - c\, \nu)\, z}{\sqrt{2\pi}\,\sqrt{2\, c\, s - c\, \nu}}\right) + S\left(\frac{-d + 2\, f\, s - f\, \nu + 2\, (2\, c\, s - c\, \nu)\, z}{\sqrt{2\pi}\,\sqrt{2\, c\, s - c\, \nu}}\right) \sin\left(\frac{(-d + 2\, f\, s - f\, \nu)^2}{4\, (2\, c\, s - c\, \nu)} + \frac{1}{2}\pi(\nu + 1)\right)\right)\right) /;\, \nu \in \mathbb{N}^+$$

01.06.21.0753.01

$$\int \sin(d\,z)\sin^{\nu}\left(\sqrt{z}\;c+f\,z\right)dz = -\frac{2^{-\nu}\binom{\nu}{\frac{\nu}{2}}\cos(d\,z)\,(1-\nu \bmod 2)}{d} - 2^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{(-d-2\,f\,s+f\,\nu)^{3/2}}\left(\sqrt{2\pi}\,(2\,c\,s-c\,\nu)\cos\left(\frac{1}{2}\pi(\nu-1)-\frac{(c\,\nu-2\,c\,s)^2}{4\,(-d-2\,f\,s+f\,\nu)}\right)C\left(\frac{-2\,c\,s+c\,\nu+2\,(-d-2\,f\,s+f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d-2\,f\,s+f\,\nu}}\right)+\sqrt{2\pi}\,(c\,\nu-2\,c\,s)\,S\left(\frac{-2\,c\,s+c\,\nu+2\,(-d-2\,f\,s+f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d-2\,f\,s+f\,\nu}}\right)\sin\left(\frac{1}{2}\pi(\nu-1)-\frac{(c\,\nu-2\,c\,s)^2}{4\,(-d-2\,f\,s+f\,\nu)}\right)+2\sqrt{-d-2\,f\,s+f\,\nu}\,\sin\left(\frac{1}{2}\pi(\nu-1)+(-d-2\,f\,s+f\,\nu)\,z+(c\,\nu-2\,c\,s)\sqrt{z}\right)\right)+\frac{1}{(-d+2\,f\,s-f\,\nu)^{3/2}}\left(\sqrt{2\pi}\,(c\,\nu-2\,c\,s)\cos\left(\frac{(2\,c\,s-c\,\nu)^2}{4\,(-d+2\,f\,s-f\,\nu)}+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{2\,c\,s-c\,\nu+2\,(-d+2\,f\,s-f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d+2\,f\,s-f\,\nu}}\right)-\sqrt{2\pi}\,(2\,c\,s-c\,\nu)\,S\left(\frac{2\,c\,s-c\,\nu+2\,(-d+2\,f\,s-f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d+2\,f\,s-f\,\nu}}\right)\sin\left(\frac{(2\,c\,s-c\,\nu)^2}{4\,(-d+2\,f\,s-f\,\nu)}+\frac{1}{2}\pi(\nu+1)\right)-2\sqrt{-d+2\,f\,s-f\,\nu}\,\sin\left(\frac{1}{2}\pi(\nu+1)-(-d+2\,f\,s-f\,\nu)\,z-(2\,c\,s-c\,\nu)\sqrt{z}\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

Involving $\sin(d\,z+e)\sin^{\nu}\left(c\,z^r+f\,z\right)$

01.06.21.0754.01

$$\int \sin(d\,z+e)\sin^{\nu}\left(c\,z^2+f\,z\right)dz = -\frac{2^{-\nu}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sin\left(e+\frac{1}{2}(2\,d\,z+\pi)\right)}{d} - 2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{c\,\nu-2\,c\,s}}\left(\cos\left(\frac{(-d-2\,f\,s+f\,\nu)^2}{4\,(c\,\nu-2\,c\,s)}+e+\frac{1}{2}\pi(1-\nu)\right)C\left(\frac{-d-2\,f\,s+f\,\nu+2\,(c\,\nu-2\,c\,s)\,z}{\sqrt{2\pi}\,\sqrt{c\,\nu-2\,c\,s}}\right)+S\left(\frac{-d-2\,f\,s+f\,\nu+2\,(c\,\nu-2\,c\,s)\,z}{\sqrt{2\pi}\,\sqrt{c\,\nu-2\,c\,s}}\right)\sin\left(\frac{(-d-2\,f\,s+f\,\nu)^2}{4\,(c\,\nu-2\,c\,s)}+e+\frac{1}{2}\pi(1-\nu)\right)\right)+\frac{1}{\sqrt{2\,c\,s-c\,\nu}}\left(\cos\left(\frac{(-d+2\,f\,s-f\,\nu)^2}{4\,(2\,c\,s-c\,\nu)}+e+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{-d+2\,f\,s-f\,\nu+2\,(2\,c\,s-c\,\nu)\,z}{\sqrt{2\pi}\,\sqrt{2\,c\,s-c\,\nu}}\right)+S\left(\frac{-d+2\,f\,s-f\,\nu+2\,(2\,c\,s-c\,\nu)\,z}{\sqrt{2\pi}\,\sqrt{2\,c\,s-c\,\nu}}\right)\sin\left(\frac{(-d+2\,f\,s-f\,\nu)^2}{4\,(2\,c\,s-c\,\nu)}+e+\frac{1}{2}\pi(\nu+1)\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.0755.01

$$\int \sin(d\,z+e)\sin^{\nu}\left(\sqrt{z}\,c+f\,z\right)dz = -\frac{2^{-\nu}\binom{\nu}{\frac{\nu}{2}}\cos(e+d\,z)\,(1-\nu \bmod 2)}{d} - 2^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\Bigg(\frac{1}{(-d-2\,f\,s+f\,\nu)^{3/2}}\Bigg(\sqrt{2\pi}\,(2\,c\,s-c\,\nu)\cos\left(\frac{(c\,\nu-2\,c\,s)^2}{4\,(-d-2\,f\,s+f\,\nu)}+e-\frac{1}{2}\pi(\nu-1)\right)C\left(\frac{-2\,c\,s+c\,\nu+2\,(-d-2\,f\,s+f\,\nu)\sqrt{z}}{\sqrt{2\pi}\sqrt{-d-2\,f\,s+f\,\nu}}\right)-\sqrt{2\pi}\,(c\,\nu-2\,c\,s)\,S\left(\frac{-2\,c\,s+c\,\nu+2\,(-d-2\,f\,s+f\,\nu)\sqrt{z}}{\sqrt{2\pi}\sqrt{-d-2\,f\,s+f\,\nu}}\right)\sin\left(\frac{(c\,\nu-2\,c\,s)^2}{4\,(-d-2\,f\,s+f\,\nu)}+e-\frac{1}{2}\pi(\nu-1)\right)-2\sqrt{-d-2\,f\,s+f\,\nu}\,\sin\left(e-\frac{1}{2}\pi(\nu-1)-(-d-2\,f\,s+f\,\nu)\,z-(c\,\nu-2\,c\,s)\sqrt{z}\right)\Bigg)+\frac{1}{(-d+2\,f\,s-f\,\nu)^{3/2}}\Bigg(\sqrt{2\pi}\,(c\,\nu-2\,c\,s)\cos\left(\frac{(2\,c\,s-c\,\nu)^2}{4\,(-d+2\,f\,s-f\,\nu)}+e+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{2\,c\,s-c\,\nu+2\,(-d+2\,f\,s-f\,\nu)\sqrt{z}}{\sqrt{2\pi}\sqrt{-d+2\,f\,s-f\,\nu}}\right)-\sqrt{2\pi}\,(2\,c\,s-c\,\nu)\,S\left(\frac{2\,c\,s-c\,\nu+2\,(-d+2\,f\,s-f\,\nu)\sqrt{z}}{\sqrt{2\pi}\sqrt{-d+2\,f\,s-f\,\nu}}\right)\sin\left(\frac{(2\,c\,s-c\,\nu)^2}{4\,(-d+2\,f\,s-f\,\nu)}+e+\frac{1}{2}\pi(\nu+1)\right)-2\sqrt{-d+2\,f\,s-f\,\nu}\,\sin\left(e+\frac{1}{2}\pi(\nu+1)-(-d+2\,f\,s-f\,\nu)\,z-(2\,c\,s-c\,\nu)\sqrt{z}\right)\Bigg)\Bigg)\,/;\,\nu\in\mathbb{N}^+$$

Involving $\sin(b\,z^r)\sin^{\nu}(c\,z^r+f\,z)$

01.06.21.0756.01

$$\int \sin\left(b\,z^2\right)\sin^{\nu}\left(c\,z^2+f\,z\right)dz = \frac{2^{-\nu-\frac{1}{2}}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}S\left(\sqrt{b}\sqrt{\frac{2}{\pi}}\,z\right)(1-\nu \bmod 2)}{\sqrt{b}} - 2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\Bigg(\frac{1}{\sqrt{-b-2\,c\,s+c\,\nu}}\Bigg(\cos\left(\frac{(f\,\nu-2\,f\,s)^2}{4\,(-b-2\,c\,s+c\,\nu)}+\frac{1}{2}\pi(1-\nu)\right)C\left(\frac{-2\,f\,s+f\,\nu+2\,(-b-2\,c\,s+c\,\nu)\,z}{\sqrt{2\pi}\sqrt{-b-2\,c\,s+c\,\nu}}\right)+S\left(\frac{-2\,f\,s+f\,\nu+2\,(-b-2\,c\,s+c\,\nu)\,z}{\sqrt{2\pi}\sqrt{-b-2\,c\,s+c\,\nu}}\right)\sin\left(\frac{(f\,\nu-2\,f\,s)^2}{4\,(-b-2\,c\,s+c\,\nu)}+\frac{1}{2}\pi(1-\nu)\right)\Bigg)+\frac{1}{\sqrt{-b+2\,c\,s-c\,\nu}}\Bigg(\cos\left(\frac{(2\,f\,s-f\,\nu)^2}{4\,(-b+2\,c\,s-c\,\nu)}+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{2\,f\,s-f\,\nu+2\,(-b+2\,c\,s-c\,\nu)\,z}{\sqrt{2\pi}\sqrt{-b+2\,c\,s-c\,\nu}}\right)+S\left(\frac{2\,f\,s-f\,\nu+2\,(-b+2\,c\,s-c\,\nu)\,z}{\sqrt{2\pi}\sqrt{-b+2\,c\,s-c\,\nu}}\right)\sin\left(\frac{(2\,f\,s-f\,\nu)^2}{4\,(-b+2\,c\,s-c\,\nu)}+\frac{1}{2}\pi(\nu+1)\right)\Bigg)\Bigg)\,/;\,\nu\in\mathbb{N}^+$$

01.06.21.0757.01

$$\int \sin\left(b\sqrt{z}\right)\sin^{\nu}\left(\sqrt{z}\,c+f\,z\right)dz = \frac{2^{1-\nu}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\left(\sin\left(b\sqrt{z}\right)-b\sqrt{z}\cos\left(b\sqrt{z}\right)\right)}{b^2} - 2^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{(f\,\nu-2\,f\,s)^{3/2}}\left(\sqrt{2\pi}\,(b+2\,c\,s-c\,\nu)\cos\left(\frac{1}{2}\pi(\nu-1)-\frac{(-b-2\,c\,s+c\,\nu)^2}{4(f\,\nu-2\,f\,s)}\right)C\left(\frac{-b-2\,c\,s+c\,\nu+2(f\,\nu-2\,f\,s)\sqrt{z}}{\sqrt{2\pi}\sqrt{f\,\nu-2\,f\,s}}\right)+\sqrt{2\pi}\,(-b-2\,c\,s+c\,\nu)\,S\left(\frac{-b-2\,c\,s+c\,\nu+2(f\,\nu-2\,f\,s)\sqrt{z}}{\sqrt{2\pi}\sqrt{f\,\nu-2\,f\,s}}\right)\sin\left(\frac{1}{2}\pi(\nu-1)-\frac{(-b-2\,c\,s+c\,\nu)^2}{4(f\,\nu-2\,f\,s)}\right)+2\sqrt{f\,\nu-2\,f\,s}\,\sin\left(\frac{1}{2}\pi(\nu-1)+(f\,\nu-2\,f\,s)\,z+(-b-2\,c\,s+c\,\nu)\sqrt{z}\right)\right)+\frac{1}{(2\,f\,s-f\,\nu)^{3/2}}\left(\sqrt{2\pi}\,(b-2\,c\,s+c\,\nu)\cos\left(\frac{(-b+2\,c\,s-c\,\nu)^2}{4(2\,f\,s-f\,\nu)}+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{-b+2\,c\,s-c\,\nu+2(2\,f\,s-f\,\nu)\sqrt{z}}{\sqrt{2\pi}\sqrt{2\,f\,s-f\,\nu}}\right)-\sqrt{2\pi}\,(-b+2\,c\,s-c\,\nu)\,S\left(\frac{-b+2\,c\,s-c\,\nu+2(2\,f\,s-f\,\nu)\sqrt{z}}{\sqrt{2\pi}\sqrt{2\,f\,s-f\,\nu}}\right)\sin\left(\frac{(-b+2\,c\,s-c\,\nu)^2}{4(2\,f\,s-f\,\nu)}+\frac{1}{2}\pi(\nu+1)\right)-2\sqrt{2\,f\,s-f\,\nu}\,\sin\left(\frac{1}{2}\pi(\nu+1)-(2\,f\,s-f\,\nu)\,z-(-b+2\,c\,s-c\,\nu)\sqrt{z}\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

Involving $\sin\left(b\,z^r+e\right)\sin^{\nu}\left(c\,z^r+f\,z\right)$

01.06.21.0758.01

$$\int \sin\left(b z^2 + e\right) \sin^{\nu}\left(c z^2 + f z\right) dz = \frac{2^{-\nu-\frac{1}{2}}}{\sqrt{b}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(\cos(e) S\left(\sqrt{b} \sqrt{\frac{2}{\pi}} z\right) + C\left(\sqrt{b} \sqrt{\frac{2}{\pi}} z\right) \sin(e)\right) - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{-b - 2 c s + c \nu}} \left(\cos\left(\frac{(f \nu - 2 f s)^2}{4(-b - 2 c s + c \nu)} + e + \frac{1}{2} \pi (1 - \nu) \right) C\left(\frac{-2 f s + f \nu + 2(-b - 2 c s + c \nu) z}{\sqrt{2\pi} \sqrt{-b - 2 c s + c \nu}} \right) + S\left(\frac{-2 f s + f \nu + 2(-b - 2 c s + c \nu) z}{\sqrt{2\pi} \sqrt{-b - 2 c s + c \nu}} \right) \sin\left(\frac{(f \nu - 2 f s)^2}{4(-b - 2 c s + c \nu)} + e + \frac{1}{2} \pi (1 - \nu) \right) \right) + \frac{1}{\sqrt{-b + 2 c s - c \nu}} \left(\cos\left(\frac{(2 f s - f \nu)^2}{4(-b + 2 c s - c \nu)} + e + \frac{1}{2} \pi (\nu + 1) \right) C\left(\frac{2 f s - f \nu + 2(-b + 2 c s - c \nu) z}{\sqrt{2\pi} \sqrt{-b + 2 c s - c \nu}} \right) + S\left(\frac{2 f s - f \nu + 2(-b + 2 c s - c \nu) z}{\sqrt{2\pi} \sqrt{-b + 2 c s - c \nu}} \right) \sin\left(\frac{(2 f s - f \nu)^2}{4(-b + 2 c s - c \nu)} + e + \frac{1}{2} \pi (\nu + 1) \right) \right) \right) /; \nu \in \mathbb{N}^+$$

01.06.21.0759.01

$$\int \sin^m\left(\sqrt{z}\, b + e\right) \sin^{\nu}\left(\sqrt{z}\, c + f z\right) dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - m \bmod 2)(1 - \nu \bmod 2) + 2^{-m-\nu} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{(f(\nu - 2k))^{3/2}} \left((-1)^{k+\nu} \binom{\nu}{k} \left(-c \sqrt{2\pi} (\nu - 2k) \cos\left(\frac{\pi \nu}{2} - \frac{c^2(\nu - 2k)}{4 f} \right) C\left(\frac{c(\nu - 2k) + 2 f \sqrt{z} (\nu - 2k)}{\sqrt{2\pi} \sqrt{f(\nu - 2k)}} \right) + c \sqrt{2\pi} (\nu - 2k) S\left(\frac{c(\nu - 2k) + 2 f \sqrt{z} (\nu - 2k)}{\sqrt{2\pi} \sqrt{f(\nu - 2k)}} \right) \sin\left(\frac{\pi \nu}{2} - \frac{c^2(\nu - 2k)}{4 f} \right) + 2 \sqrt{f(\nu - 2k)} \sin\left(\frac{\pi \nu}{2} + f(\nu - 2k) z + c(\nu - 2k) \sqrt{z} \right) \right) \right) + \frac{1}{b^2} \left(2^{-m-\nu+2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \frac{1}{(m - 2k)^2} \left((-1)^{k+m} \binom{m}{k} \left(\cos\left(2 e k - e m + b(2k - m)\sqrt{z} - \frac{m\pi}{2} \right) + b(2k - m)\sqrt{z} \sin\left(2 e k - e m + b(2k - m)\sqrt{z} - \frac{m\pi}{2} \right) \right) \right) \right) + 2^{-m-\nu} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(f\nu - 2 f s)^{3/2}} \left(\sqrt{2\pi} (-2 b k + b m + 2 c s - c \nu) \cos\left(-\frac{(2 b k - b m - 2 c s + c \nu)^2}{4(f \nu - 2 f s)} + 2 e k - e m + \frac{1}{2} \pi (\nu - m) \right) C\left(\frac{2 b k - b m - 2 c s + c \nu + 2(f \nu - 2 f s)\sqrt{z}}{\sqrt{2\pi} \sqrt{f \nu - 2 f s}} \right) + \right.\right.$$

$$\sqrt{2\pi}\,(2bk-bm-2cs+cv)\,S\!\left(\frac{2bk-bm-2cs+cv+2(fv-2fs)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{fv-2fs}}\right)$$
$$\sin\!\left(-\frac{(2bk-bm-2cs+cv)^2}{4(fv-2fs)}+2ek-em+\frac{1}{2}\pi(v-m)\right)+$$
$$2\sqrt{fv-2fs}\,\sin\!\left(2ek-em+\frac{1}{2}\pi(v-m)+(fv-2fs)z+(2bk-bm-2cs+cv)\sqrt{z}\right)\Bigg)+$$
$$\frac{1}{(2fs-fv)^{3/2}}\Bigg(\sqrt{2\pi}\,(-2bk+bm-2cs+cv)\cos\!\Bigg(-\frac{(2bk-bm+2cs-cv)^2}{4(2fs-fv)}+2ek-$$
$$em-\frac{1}{2}\pi(m+v)\Bigg)C\!\left(\frac{2bk-bm+2cs-cv+2(2fs-fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2fs-fv}}\right)+$$
$$\sqrt{2\pi}\,(2bk-bm+2cs-cv)\,S\!\left(\frac{2bk-bm+2cs-cv+2(2fs-fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2fs-fv}}\right)$$
$$\sin\!\left(-\frac{(2bk-bm+2cs-cv)^2}{4(2fs-fv)}+2ek-em-\frac{1}{2}\pi(m+v)\right)+2\sqrt{2fs-fv}$$
$$\sin\!\left(2ek-em-\frac{1}{2}\pi(m+v)+(2fs-fv)z+(2bk-bm+2cs-cv)\sqrt{z}\right)\Bigg)\Bigg)\,/;\ m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving $\sin(b z^r + d z)\sin^v(c z^r + f z)$

01.06.21.0760.01

$$\int\sin(bz^2+dz)\sin^v(cz^2+fz)\,dz=$$
$$\frac{2^{-v-\frac{1}{2}}}{\sqrt{b}}\sqrt{\pi}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\left(\cos\!\left(\frac{d^2}{4b}\right)S\!\left(\frac{d+2bz}{\sqrt{b}\,\sqrt{2\pi}}\right)-C\!\left(\frac{d+2bz}{\sqrt{b}\,\sqrt{2\pi}}\right)\sin\!\left(\frac{d^2}{4b}\right)\right)-2^{-v-\frac{1}{2}}\sqrt{\pi}$$
$$\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\Bigg(\frac{1}{\sqrt{-b-2cs+cv}}\Bigg(\cos\!\left(\frac{(-d-2fs+fv)^2}{4(-b-2cs+cv)}+\frac{1}{2}\pi(1-v)\right)C\!\left(\frac{-d-2fs+fv+2(-b-2cs+cv)z}{\sqrt{2\pi}\,\sqrt{-b-2cs+cv}}\right)+$$
$$S\!\left(\frac{-d-2fs+fv+2(-b-2cs+cv)z}{\sqrt{2\pi}\,\sqrt{-b-2cs+cv}}\right)\sin\!\left(\frac{(-d-2fs+fv)^2}{4(-b-2cs+cv)}+\frac{1}{2}\pi(1-v)\right)\Bigg)+$$
$$\frac{1}{\sqrt{-b+2cs-cv}}\Bigg(\cos\!\left(\frac{(-d+2fs-fv)^2}{4(-b+2cs-cv)}+\frac{1}{2}\pi(v+1)\right)C\!\left(\frac{-d+2fs-fv+2(-b+2cs-cv)z}{\sqrt{2\pi}\,\sqrt{-b+2cs-cv}}\right)+$$
$$S\!\left(\frac{-d+2fs-fv+2(-b+2cs-cv)z}{\sqrt{2\pi}\,\sqrt{-b+2cs-cv}}\right)\sin\!\left(\frac{(-d+2fs-fv)^2}{4(-b+2cs-cv)}+\frac{1}{2}\pi(v+1)\right)\Bigg)\Bigg)\,/;\ v\in\mathbb{N}^+$$

01.06.21.0761.01

$$\int \sin\left(\sqrt{z}\, b + d\, z\right) \sin^{v}\left(\sqrt{z}\, c + f\, z\right) dz = \frac{1}{d^{3/2}} \left(2^{-v-1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \left(-2\sqrt{d} \cos\left(\sqrt{z}\, b + d\, z\right) - b\sqrt{2\pi} \cos\left(\frac{b^2}{4d}\right) S\left(\frac{b + 2d\sqrt{z}}{\sqrt{d}\sqrt{2\pi}}\right) + b\sqrt{2\pi}\, C\left(\frac{b + 2d\sqrt{z}}{\sqrt{d}\sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4d}\right)\right)\right) -$$

$$2^{-v-1} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{s+v} \binom{v}{s} \left(\frac{1}{(-d - 2fs + fv)^{3/2}} \left(\sqrt{2\pi}\, (b + 2cs - cv) \cos\left(\frac{1}{2}\pi(v-1) - \frac{(-b - 2cs + cv)^2}{4(-d - 2fs + fv)}\right)\right.\right.$$

$$C\left(\frac{-b - 2cs + cv + 2(-d - 2fs + fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{-d - 2fs + fv}}\right) + \sqrt{2\pi}\, (-b - 2cs + cv)$$

$$S\left(\frac{-b - 2cs + cv + 2(-d - 2fs + fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{-d - 2fs + fv}}\right) \sin\left(\frac{1}{2}\pi(v-1) - \frac{(-b - 2cs + cv)^2}{4(-d - 2fs + fv)}\right) +$$

$$\left.2\sqrt{-d - 2fs + fv}\, \sin\left(\frac{1}{2}\pi(v-1) + (-d - 2fs + fv)z + (-b - 2cs + cv)\sqrt{z}\right)\right) +$$

$$\frac{1}{(-d + 2fs - fv)^{3/2}} \left(\sqrt{2\pi}\, (b - 2cs + cv) \cos\left(\frac{(-b + 2cs - cv)^2}{4(-d + 2fs - fv)} + \frac{1}{2}\pi(v+1)\right)\right.$$

$$C\left(\frac{-b + 2cs - cv + 2(-d + 2fs - fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{-d + 2fs - fv}}\right) - \sqrt{2\pi}\, (-b + 2cs - cv)$$

$$S\left(\frac{-b + 2cs - cv + 2(-d + 2fs - fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{-d + 2fs - fv}}\right) \sin\left(\frac{(-b + 2cs - cv)^2}{4(-d + 2fs - fv)} + \frac{1}{2}\pi(v+1)\right) -$$

$$\left.\left.2\sqrt{-d + 2fs - fv}\, \sin\left(\frac{1}{2}\pi(v+1) - (-d + 2fs - fv)z - (-b + 2cs - cv)\sqrt{z}\right)\right)\right) /;\ v \in \mathbb{N}^+$$

Involving $\sin\left(b z^r + d z + e\right) \sin^{v}\left(c z^r + f z\right)$

01.06.21.0762.01

$$\int \sin\left(b z^2 + d z + e\right) \sin^{\nu}\left(c z^2 + f z\right) dz =$$

$$-\frac{2^{-\nu-\frac{1}{2}}\sqrt{\pi}}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(C\left(\frac{d + 2 b z}{\sqrt{b}\sqrt{2\pi}}\right) \sin\left(\frac{d^2}{4 b} - e\right) - \cos\left(\frac{d^2}{4 b} - e\right) S\left(\frac{d + 2 b z}{\sqrt{b}\sqrt{2\pi}}\right)\right) - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s}$$

$$\left(\frac{1}{\sqrt{-b - 2 c s + c \nu}} \left(\cos\left(\frac{(-d - 2 f s + f \nu)^2}{4(-b - 2 c s + c \nu)} + e + \frac{1}{2}\pi(1 - \nu)\right) C\left(\frac{-d - 2 f s + f \nu + 2(-b - 2 c s + c \nu) z}{\sqrt{2\pi}\sqrt{-b - 2 c s + c \nu}}\right) + \right.\right.$$

$$\left. S\left(\frac{-d - 2 f s + f \nu + 2(-b - 2 c s + c \nu) z}{\sqrt{2\pi}\sqrt{-b - 2 c s + c \nu}}\right) \sin\left(\frac{(-d - 2 f s + f \nu)^2}{4(-b - 2 c s + c \nu)} + e + \frac{1}{2}\pi(1 - \nu)\right)\right) +$$

$$\frac{1}{\sqrt{-b + 2 c s - c \nu}} \left(\cos\left(\frac{(-d + 2 f s - f \nu)^2}{4(-b + 2 c s - c \nu)} + e + \frac{1}{2}\pi(\nu + 1)\right) C\left(\frac{-d + 2 f s - f \nu + 2(-b + 2 c s - c \nu) z}{\sqrt{2\pi}\sqrt{-b + 2 c s - c \nu}}\right) + \right.$$

$$\left.\left. S\left(\frac{-d + 2 f s - f \nu + 2(-b + 2 c s - c \nu) z}{\sqrt{2\pi}\sqrt{-b + 2 c s - c \nu}}\right) \sin\left(\frac{(-d + 2 f s - f \nu)^2}{4(-b + 2 c s - c \nu)} + e + \frac{1}{2}\pi(\nu + 1)\right)\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.0763.01

$$\int \sin\left(\sqrt{z}\, b + d\, z + e\right) \sin^{\nu}\left(\sqrt{z}\, c + f\, z\right) dz = \frac{1}{d^{3/2}} \left(2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2\sqrt{d} \cos\left(\sqrt{z}\, b + e + d\, z\right) - b\sqrt{2\pi} \cos\left(\frac{b^2}{4\,d} - e\right) S\left(\frac{b + 2\,d\sqrt{z}}{\sqrt{d}\,\sqrt{2\pi}}\right) + b\sqrt{2\pi}\, C\left(\frac{b + 2\,d\sqrt{z}}{\sqrt{d}\,\sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4\,d} - e\right)\right)\right) -$$

$$2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d - 2\,f\,s + f\,\nu)^{3/2}} \left(\sqrt{2\pi}\,(b + 2\,c\,s - c\,\nu) \cos\left(\frac{(-b - 2\,c\,s + c\,\nu)^2}{4\,(-d - 2\,f\,s + f\,\nu)} + e - \frac{1}{2}\pi(\nu - 1)\right)\right.\right.$$

$$C\left(\frac{-b - 2\,c\,s + c\,\nu + 2\,(-d - 2\,f\,s + f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d - 2\,f\,s + f\,\nu}}\right) - \sqrt{2\pi}\,(-b - 2\,c\,s + c\,\nu)$$

$$S\left(\frac{-b - 2\,c\,s + c\,\nu + 2\,(-d - 2\,f\,s + f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d - 2\,f\,s + f\,\nu}}\right) \sin\left(\frac{(-b - 2\,c\,s + c\,\nu)^2}{4\,(-d - 2\,f\,s + f\,\nu)} + e - \frac{1}{2}\pi(\nu - 1)\right) -$$

$$\left. 2\sqrt{-d - 2\,f\,s + f\,\nu}\, \sin\left(e - \frac{1}{2}\pi(\nu - 1) - (-d - 2\,f\,s + f\,\nu)\,z - (-b - 2\,c\,s + c\,\nu)\sqrt{z}\right)\right) +$$

$$\frac{1}{(-d + 2\,f\,s - f\,\nu)^{3/2}} \left(\sqrt{2\pi}\,(b - 2\,c\,s + c\,\nu) \cos\left(\frac{(-b + 2\,c\,s - c\,\nu)^2}{4\,(-d + 2\,f\,s - f\,\nu)} + e + \frac{1}{2}\pi(\nu + 1)\right)\right.$$

$$C\left(\frac{-b + 2\,c\,s - c\,\nu + 2\,(-d + 2\,f\,s - f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d + 2\,f\,s - f\,\nu}}\right) - \sqrt{2\pi}\,(-b + 2\,c\,s - c\,\nu)$$

$$S\left(\frac{-b + 2\,c\,s - c\,\nu + 2\,(-d + 2\,f\,s - f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d + 2\,f\,s - f\,\nu}}\right) \sin\left(\frac{(-b + 2\,c\,s - c\,\nu)^2}{4\,(-d + 2\,f\,s - f\,\nu)} + e + \frac{1}{2}\pi(\nu + 1)\right) -$$

$$\left.\left. 2\sqrt{-d + 2\,f\,s - f\,\nu}\, \sin\left(e + \frac{1}{2}\pi(\nu + 1) - (-d + 2\,f\,s - f\,\nu)\,z - (-b + 2\,c\,s - c\,\nu)\sqrt{z}\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin(d\, z) \sin^{\nu}\left(c\, z^r + f\, z + g\right)$

01.06.21.0764.01

$$\int \sin(d\,z)\sin^{v}\left(c\,z^2+f\,z+g\right)dz = \frac{2^{-v}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sin\left(\frac{1}{2}(-2\,d\,z-\pi)\right)}{d} - 2^{-v-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}$$
$$\left(\frac{1}{\sqrt{c\,v-2\,c\,s}}\left(\cos\left(\frac{(-d-2\,f\,s+f\,v)^2}{4\,(c\,v-2\,c\,s)}+\frac{1}{2}\pi\,(1-v)+g\,(2\,s-v)\right)C\left(\frac{-d-2\,f\,s+f\,v+2\,(c\,v-2\,c\,s)\,z}{\sqrt{2\,\pi}\,\sqrt{c\,v-2\,c\,s}}\right)+\right.\right.$$
$$\left.S\left(\frac{-d-2\,f\,s+f\,v+2\,(c\,v-2\,c\,s)\,z}{\sqrt{2\,\pi}\,\sqrt{c\,v-2\,c\,s}}\right)\sin\left(\frac{(-d-2\,f\,s+f\,v)^2}{4\,(c\,v-2\,c\,s)}+\frac{1}{2}\pi\,(1-v)+g\,(2\,s-v)\right)\right)+$$
$$\frac{1}{\sqrt{2\,c\,s-c\,v}}\left(\cos\left(-\frac{(-d+2\,f\,s-f\,v)^2}{4\,(2\,c\,s-c\,v)}+g\,(2\,s-v)-\frac{1}{2}\pi\,(v+1)\right)C\left(\frac{-d+2\,f\,s-f\,v+2\,(2\,c\,s-c\,v)\,z}{\sqrt{2\,\pi}\,\sqrt{2\,c\,s-c\,v}}\right)-\right.$$
$$\left.\left.S\left(\frac{-d+2\,f\,s-f\,v+2\,(2\,c\,s-c\,v)\,z}{\sqrt{2\,\pi}\,\sqrt{2\,c\,s-c\,v}}\right)\sin\left(-\frac{(-d+2\,f\,s-f\,v)^2}{4\,(2\,c\,s-c\,v)}+g\,(2\,s-v)-\frac{1}{2}\pi\,(v+1)\right)\right)\right)\;/;\; v\in\mathbb{N}^+$$

01.06.21.0765.01

$$\int \sin(d\,z)\sin^{v}\left(\sqrt{z}\;c+f\,z+g\right)dz = -\frac{2^{-v}\binom{v}{\frac{v}{2}}\cos(d\,z)\,(1-v \bmod 2)}{d} -$$
$$2^{-v-1}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\frac{1}{(-d+2\,f\,s-f\,v)^{3/2}}\left(\sqrt{2\pi}\,(c\,v-2\,c\,s)\cos\left(-\frac{(2\,c\,s-c\,v)^2}{4\,(-d+2\,f\,s-f\,v)}+2\,g\,s-g\,v-\frac{1}{2}\pi\,(v+1)\right)\right.\right.$$
$$C\left(\frac{2\,c\,s-c\,v+2\,(-d+2\,f\,s-f\,v)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d+2\,f\,s-f\,v}}\right)+\sqrt{2\pi}\,(2\,c\,s-c\,v)$$
$$S\left(\frac{2\,c\,s-c\,v+2\,(-d+2\,f\,s-f\,v)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d+2\,f\,s-f\,v}}\right)\sin\left(-\frac{(2\,c\,s-c\,v)^2}{4\,(-d+2\,f\,s-f\,v)}+2\,g\,s-g\,v-\frac{1}{2}\pi\,(v+1)\right)+$$
$$\left.2\sqrt{-d+2\,f\,s-f\,v}\,\sin\left(2\,g\,s-g\,v-\frac{1}{2}\pi\,(v+1)+(-d+2\,f\,s-f\,v)\,z+(2\,c\,s-c\,v)\sqrt{z}\right)\right)+$$
$$\frac{1}{(-d-2\,f\,s+f\,v)^{3/2}}\left(\sqrt{2\pi}\,(2\,c\,s-c\,v)\cos\left(\frac{(c\,v-2\,c\,s)^2}{4\,(-d-2\,f\,s+f\,v)}+2\,g\,s-\frac{1}{2}\pi\,(v-1)-g\,v\right)\right.$$
$$C\left(\frac{-2\,c\,s+c\,v+2\,(-d-2\,f\,s+f\,v)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d-2\,f\,s+f\,v}}\right)-\sqrt{2\pi}\,(c\,v-2\,c\,s)$$
$$S\left(\frac{-2\,c\,s+c\,v+2\,(-d-2\,f\,s+f\,v)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d-2\,f\,s+f\,v}}\right)\sin\left(\frac{(c\,v-2\,c\,s)^2}{4\,(-d-2\,f\,s+f\,v)}+2\,g\,s-\frac{1}{2}\pi\,(v-1)-g\,v\right)-$$
$$\left.\left.2\sqrt{-d-2\,f\,s+f\,v}\,\sin\left(2\,g\,s-\frac{1}{2}\pi\,(v-1)-g\,v-(-d-2\,f\,s+f\,v)\,z-(c\,v-2\,c\,s)\sqrt{z}\right)\right)\right)\;/;\;v\in\mathbb{N}^{+}$$

Involving $\sin(d\,z+e)\sin^{v}\left(c\,z^{r}+f\,z+g\right)$

01.06.21.0766.01

$$\int \sin(d z+e)\sin^{\nu}\left(c z^2+f z+g\right)dz = -\frac{2^{-\nu}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sin\left(e+\frac{1}{2}(2 d z+\pi)\right)}{d} - 2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}$$
$$\left(\frac{1}{\sqrt{c\nu-2cs}}\left(\cos\left(\frac{(-d-2fs+f\nu)^2}{4(c\nu-2cs)}+e+\frac{1}{2}\pi(1-\nu)+g(2s-\nu)\right)C\left(\frac{-d-2fs+f\nu+2(c\nu-2cs)z}{\sqrt{2\pi}\sqrt{c\nu-2cs}}\right)+\right.\right.$$
$$\left. S\left(\frac{-d-2fs+f\nu+2(c\nu-2cs)z}{\sqrt{2\pi}\sqrt{c\nu-2cs}}\right)\sin\left(\frac{(-d-2fs+f\nu)^2}{4(c\nu-2cs)}+e+\frac{1}{2}\pi(1-\nu)+g(2s-\nu)\right)\right)+$$
$$\frac{1}{\sqrt{2cs-c\nu}}\left(\cos\left(\frac{(-d+2fs-f\nu)^2}{4(2cs-c\nu)}+e-g(2s-\nu)+\frac{1}{2}\pi(\nu+1)\right)C\left(\frac{-d+2fs-f\nu+2(2cs-c\nu)z}{\sqrt{2\pi}\sqrt{2cs-c\nu}}\right)+\right.$$
$$\left.\left. S\left(\frac{-d+2fs-f\nu+2(2cs-c\nu)z}{\sqrt{2\pi}\sqrt{2cs-c\nu}}\right)\sin\left(\frac{(-d+2fs-f\nu)^2}{4(2cs-c\nu)}+e-g(2s-\nu)+\frac{1}{2}\pi(\nu+1)\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.0767.01

$$\int \sin^m(d z+e)\sin^{\nu}\left(\sqrt{z}\,c+f z+g\right)dz = 2^{-m-\nu} z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+$$
$$\frac{2^{-m-\nu+1}}{d}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(\frac{\pi m}{2}+e(m-2k)+d(m-2k)z\right)}{m-2k}+$$
$$2^{-m-\nu}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{(f(\nu-2k))^{3/2}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(-c\sqrt{2\pi}(\nu-2k)\cos\left(-\frac{(\nu-2k)c^2}{4f}+\frac{\pi\nu}{2}+g(\nu-2k)\right)\right.\right.$$
$$C\left(\frac{c(\nu-2k)+2f\sqrt{z}(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}}\right)+c\sqrt{2\pi}(\nu-2k)S\left(\frac{c(\nu-2k)+2f\sqrt{z}(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}}\right)\sin\left(-\frac{(\nu-2k)c^2}{4f}+\right.$$
$$\left.\left.\left.\frac{\pi\nu}{2}+g(\nu-2k)\right)+2\sqrt{f(\nu-2k)}\sin\left(\frac{\pi\nu}{2}+g(\nu-2k)+f(\nu-2k)z+c(\nu-2k)\sqrt{z}\right)\right)\right)+$$
$$2^{-m-\nu}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\left(\sqrt{2\pi}(2cs-c\nu)\cos\left(-\frac{(c\nu-2cs)^2}{4(2dk-dm-2fs+f\nu)}+2ek-em-\right.\right.\right.$$
$$\left.2gs+g\nu+\frac{1}{2}\pi(\nu-m)\right)C\left(\frac{-2cs+c\nu+2(2dk-dm-2fs+f\nu)\sqrt{z}}{\sqrt{2\pi}\sqrt{2dk-dm-2fs+f\nu}}\right)+\sqrt{2\pi}(c\nu-2cs)$$
$$S\left(\frac{-2cs+c\nu+2(2dk-dm-2fs+f\nu)\sqrt{z}}{\sqrt{2\pi}\sqrt{2dk-dm-2fs+f\nu}}\right)\sin\left(-\frac{(c\nu-2cs)^2}{4(2dk-dm-2fs+f\nu)}+2ek-\right.$$
$$\left.em-2gs+g\nu+\frac{1}{2}\pi(\nu-m)\right)+2\sqrt{2dk-dm-2fs+f\nu}\sin\left(2ek-em-2gs+g\nu+\right.$$

$$\left.\left.\frac{1}{2}\pi(v-m)+(2dk-dm-2fs+fv)z+(cv-2cs)\sqrt{z}\right)\right)\Big/(2dk-dm-2fs+fv)^{3/2}+$$

$$\left(\sqrt{2\pi}\,(cv-2cs)\cos\left(-\frac{(2cs-cv)^2}{4(2dk-dm+2fs-fv)}+2ek-em+2gs-gv-\frac{1}{2}\pi(m+v)\right)\right.$$

$$C\left(\frac{2cs-cv+2(2dk-dm+2fs-fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{2dk-dm+2fs-fv}}\right)+\sqrt{2\pi}\,(2cs-cv)$$

$$S\left(\frac{2cs-cv+2(2dk-dm+2fs-fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{2dk-dm+2fs-fv}}\right)\sin\left(-\frac{(2cs-cv)^2}{4(2dk-dm+2fs-fv)}+2ek-em+2g\right.$$

$$\left.s-gv-\frac{1}{2}\pi(m+v)\right)+2\sqrt{2dk-dm+2fs-fv}\,\sin\left(2ek-em+2gs-gv-\frac{1}{2}\pi(m+v)+\right.$$

$$\left.\left.(2dk-dm+2fs-fv)z+(2cs-cv)\sqrt{z}\right)\right)\Big/(2dk-dm+2fs-fv)^{3/2}\Bigg)\,/;\,m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $\sin(b\,z^r)\sin^v(c\,z^r+f\,z+g)$

01.06.21.0768.01

$$\int\sin(b z^2)\sin^v(cz^2+fz+g)\,dz==\frac{2^{-v-\frac{1}{2}}\sqrt{\pi}\binom{v}{\frac{v}{2}}S\left(\sqrt{b}\sqrt{\frac{2}{\pi}}\,z\right)(1-v\bmod 2)}{\sqrt{b}}-2^{-v-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}$$

$$\left(\frac{1}{\sqrt{-b-2cs+cv}}\left(\cos\left(\frac{(fv-2fs)^2}{4(-b-2cs+cv)}+\frac{1}{2}\pi(1-v)+g(2s-v)\right)C\left(\frac{-2fs+fv+2(-b-2cs+cv)z}{\sqrt{2\pi}\sqrt{-b-2cs+cv}}\right)+\right.\right.$$

$$\left.S\left(\frac{-2fs+fv+2(-b-2cs+cv)z}{\sqrt{2\pi}\sqrt{-b-2cs+cv}}\right)\sin\left(\frac{(fv-2fs)^2}{4(-b-2cs+cv)}+\frac{1}{2}\pi(1-v)+g(2s-v)\right)\right)+$$

$$\frac{1}{\sqrt{-b+2cs-cv}}\left(\cos\left(-\frac{(2fs-fv)^2}{4(-b+2cs-cv)}+g(2s-v)-\frac{1}{2}\pi(v+1)\right)C\left(\frac{2fs-fv+2(-b+2cs-cv)z}{\sqrt{2\pi}\sqrt{-b+2cs-cv}}\right)-\right.$$

$$\left.\left.S\left(\frac{2fs-fv+2(-b+2cs-cv)z}{\sqrt{2\pi}\sqrt{-b+2cs-cv}}\right)\sin\left(-\frac{(2fs-fv)^2}{4(-b+2cs-cv)}+g(2s-v)-\frac{1}{2}\pi(v+1)\right)\right)\right)\,/;\,v\in\mathbb{N}^+$$

01.06.21.0769.01

$$\int \sin\left(\sqrt{z}\, b\right) \sin^{v}\left(\sqrt{z}\, c + f\, z + g\right) dz = \frac{2^{1-v} \binom{v}{\frac{v}{2}} (v \bmod 2 - 1) \left(b \sqrt{z} \cos\left(b \sqrt{z}\right) - \sin\left(b \sqrt{z}\right)\right)}{b^2} -$$

$$2^{-v-1} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{s+v} \binom{v}{s} \left(\frac{1}{(2\, f\, s - f\, v)^{3/2}} \left(\sqrt{2\pi}\, (b - 2\, c\, s + c\, v) \cos\left(-\frac{(-b + 2\, c\, s - c\, v)^2}{4\, (2\, f\, s - f\, v)} + 2\, g\, s - g\, v - \frac{1}{2} \pi\, (v+1) \right) \right.\right.$$

$$C\left(\frac{-b + 2\, c\, s - c\, v + 2\, (2\, f\, s - f\, v) \sqrt{z}}{\sqrt{2\pi} \sqrt{2\, f\, s - f\, v}} \right) + \sqrt{2\pi}\, (-b + 2\, c\, s - c\, v)$$

$$S\left(\frac{-b + 2\, c\, s - c\, v + 2\, (2\, f\, s - f\, v) \sqrt{z}}{\sqrt{2\pi} \sqrt{2\, f\, s - f\, v}} \right) \sin\left(-\frac{(-b + 2\, c\, s - c\, v)^2}{4\, (2\, f\, s - f\, v)} + 2\, g\, s - g\, v - \frac{1}{2} \pi\, (v+1) \right) +$$

$$\left. 2 \sqrt{2\, f\, s - f\, v}\, \sin\left(2\, g\, s - g\, v - \frac{1}{2} \pi\, (v+1) + (2\, f\, s - f\, v)\, z + (-b + 2\, c\, s - c\, v) \sqrt{z} \right) \right) +$$

$$\frac{1}{(f\, v - 2\, f\, s)^{3/2}} \left(\sqrt{2\pi}\, (b + 2\, c\, s - c\, v) \cos\left(\frac{(-b - 2\, c\, s + c\, v)^2}{4\, (f\, v - 2\, f\, s)} + 2\, g\, s - \frac{1}{2} \pi\, (v-1) - g\, v \right) \right.$$

$$C\left(\frac{-b - 2\, c\, s + c\, v + 2\, (f\, v - 2\, f\, s) \sqrt{z}}{\sqrt{2\pi} \sqrt{f\, v - 2\, f\, s}} \right) - \sqrt{2\pi}\, (-b - 2\, c\, s + c\, v)$$

$$S\left(\frac{-b - 2\, c\, s + c\, v + 2\, (f\, v - 2\, f\, s) \sqrt{z}}{\sqrt{2\pi} \sqrt{f\, v - 2\, f\, s}} \right) \sin\left(\frac{(-b - 2\, c\, s + c\, v)^2}{4\, (f\, v - 2\, f\, s)} + 2\, g\, s - \frac{1}{2} \pi\, (v-1) - g\, v \right) -$$

$$\left.\left.\left. 2 \sqrt{f\, v - 2\, f\, s}\, \sin\left(2\, g\, s - \frac{1}{2} \pi\, (v-1) - g\, v - (f\, v - 2\, f\, s)\, z - (-b - 2\, c\, s + c\, v) \sqrt{z} \right) \right) \right) \right) /;\ v \in \mathbb{N}^+$$

Involving $\sin\left(b\, z^r + e\right) \sin^{v}\left(c\, z^r + f\, z + g\right)$

01.06.21.0770.01

$$\int \sin\left(b z^2 + e\right) \sin^{\nu}\left(c z^2 + f z + g\right) dz = -\frac{2^{-\nu-\frac{1}{2}}}{\sqrt{b}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-\cos(e) S\left(\sqrt{b} \sqrt{\frac{2}{\pi}} z\right) - C\left(\sqrt{b} \sqrt{\frac{2}{\pi}} z\right) \sin(e)\right) - 2^{-\nu-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s}$$
$$\left(\frac{1}{\sqrt{-b - 2 c s + c \nu}} \left(\cos\left(\frac{(f \nu - 2 f s)^2}{4 (-b - 2 c s + c \nu)} + e + \frac{1}{2} \pi (1 - \nu) + g (2 s - \nu)\right) C\left(\frac{-2 f s + f \nu + 2 (-b - 2 c s + c \nu) z}{\sqrt{2 \pi} \sqrt{-b - 2 c s + c \nu}}\right) + S\left(\frac{-2 f s + f \nu + 2 (-b - 2 c s + c \nu) z}{\sqrt{2 \pi} \sqrt{-b - 2 c s + c \nu}}\right) \sin\left(\frac{(f \nu - 2 f s)^2}{4 (-b - 2 c s + c \nu)} + e + \frac{1}{2} \pi (1 - \nu) + g (2 s - \nu)\right)\right) + \frac{1}{\sqrt{-b + 2 c s - c \nu}} \left(\cos\left(\frac{(2 f s - f \nu)^2}{4 (-b + 2 c s - c \nu)} + e - g (2 s - \nu) + \frac{1}{2} \pi (\nu + 1)\right) C\left(\frac{2 f s - f \nu + 2 (-b + 2 c s - c \nu) z}{\sqrt{2 \pi} \sqrt{-b + 2 c s - c \nu}}\right) + S\left(\frac{2 f s - f \nu + 2 (-b + 2 c s - c \nu) z}{\sqrt{2 \pi} \sqrt{-b + 2 c s - c \nu}}\right) \sin\left(\frac{(2 f s - f \nu)^2}{4 (-b + 2 c s - c \nu)} + e - g (2 s - \nu) + \frac{1}{2} \pi (\nu + 1)\right)\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.0771.01

$$\int \sin\left(\sqrt{z}\, b + e\right) \sin^{\nu}\left(\sqrt{z}\, c + f z + g\right) dz = \frac{2^{1-\nu} \binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2 - 1) \left(b \sqrt{z} \cos\left(\sqrt{z}\, b + e\right) - \sin\left(\sqrt{z}\, b + e\right)\right)}{b^2} -$$

$$2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(f \nu - 2 f s)^{3/2}} \left(\sqrt{2\pi}\, (b + 2 c s - c \nu) \cos\left(\frac{(-b - 2 c s + c \nu)^2}{4 (f \nu - 2 f s)} + e + 2 g s - \frac{1}{2} \pi (\nu - 1) - g \nu \right) \right.\right.$$

$$C\left(\frac{-b - 2 c s + c \nu + 2 (f \nu - 2 f s) \sqrt{z}}{\sqrt{2\pi} \sqrt{f \nu - 2 f s}} \right) - \sqrt{2\pi}\, (-b - 2 c s + c \nu)$$

$$S\left(\frac{-b - 2 c s + c \nu + 2 (f \nu - 2 f s) \sqrt{z}}{\sqrt{2\pi} \sqrt{f \nu - 2 f s}} \right) \sin\left(\frac{(-b - 2 c s + c \nu)^2}{4 (f \nu - 2 f s)} + e + 2 g s - \frac{1}{2} \pi (\nu - 1) - g \nu \right) -$$

$$\left. 2 \sqrt{f \nu - 2 f s}\, \sin\left(e + 2 g s - \frac{1}{2} \pi (\nu - 1) - g \nu - (f \nu - 2 f s) z - (-b - 2 c s + c \nu) \sqrt{z} \right) \right) +$$

$$\frac{1}{(2 f s - f \nu)^{3/2}} \left(\sqrt{2\pi}\, (b - 2 c s + c \nu) \cos\left(\frac{(-b + 2 c s - c \nu)^2}{4 (2 f s - f \nu)} + e - 2 g s + g \nu + \frac{1}{2} \pi (\nu + 1) \right) \right.$$

$$C\left(\frac{-b + 2 c s - c \nu + 2 (2 f s - f \nu) \sqrt{z}}{\sqrt{2\pi} \sqrt{2 f s - f \nu}} \right) - \sqrt{2\pi}\, (-b + 2 c s - c \nu)$$

$$S\left(\frac{-b + 2 c s - c \nu + 2 (2 f s - f \nu) \sqrt{z}}{\sqrt{2\pi} \sqrt{2 f s - f \nu}} \right) \sin\left(\frac{(-b + 2 c s - c \nu)^2}{4 (2 f s - f \nu)} + e - 2 g s + g \nu + \frac{1}{2} \pi (\nu + 1) \right) -$$

$$\left.\left.\left. 2 \sqrt{2 f s - f \nu}\, \sin\left(e - 2 g s + g \nu + \frac{1}{2} \pi (\nu + 1) - (2 f s - f \nu) z - (-b + 2 c s - c \nu) \sqrt{z} \right) \right) \right) \right) /;\ \nu \in \mathbb{N}^{+}$$

Involving $\sin\left(b z^r + d z\right) \sin^{\nu}\left(c z^r + f z + g\right)$

01.06.21.0772.01

$$\int \sin\left(b\,z^2+d\,z\right)\sin^{\nu}\left(c\,z^2+f\,z+g\right)dz ==$$

$$-\frac{2^{-\nu-\frac{1}{2}}}{\sqrt{b}}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\left(C\left(\frac{d+2\,b\,z}{\sqrt{b}\,\sqrt{2\,\pi}}\right)\sin\left(\frac{d^2}{4\,b}\right)-\cos\left(\frac{d^2}{4\,b}\right)S\left(\frac{d+2\,b\,z}{\sqrt{b}\,\sqrt{2\,\pi}}\right)\right)-$$

$$2^{-\nu-\frac{1}{2}}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{-b-2\,c\,s+c\,\nu}}\left(\cos\left(\frac{(-d-2\,f\,s+f\,\nu)^2}{4\,(-b-2\,c\,s+c\,\nu)}+\frac{1}{2}\,\pi\,(1-\nu)+g\,(2\,s-\nu)\right)\right.\right.$$

$$C\left(\frac{-d-2\,f\,s+f\,\nu+2\,(-b-2\,c\,s+c\,\nu)\,z}{\sqrt{2\,\pi}\,\sqrt{-b-2\,c\,s+c\,\nu}}\right)+S\left(\frac{-d-2\,f\,s+f\,\nu+2\,(-b-2\,c\,s+c\,\nu)\,z}{\sqrt{2\,\pi}\,\sqrt{-b-2\,c\,s+c\,\nu}}\right)$$

$$\left.\sin\left(\frac{(-d-2\,f\,s+f\,\nu)^2}{4\,(-b-2\,c\,s+c\,\nu)}+\frac{1}{2}\,\pi\,(1-\nu)+g\,(2\,s-\nu)\right)\right)+\frac{1}{\sqrt{-b+2\,c\,s-c\,\nu}}$$

$$\left(\cos\left(-\frac{(-d+2\,f\,s-f\,\nu)^2}{4\,(-b+2\,c\,s-c\,\nu)}+g\,(2\,s-\nu)-\frac{1}{2}\,\pi\,(\nu+1)\right)C\left(\frac{-d+2\,f\,s-f\,\nu+2\,(-b+2\,c\,s-c\,\nu)\,z}{\sqrt{2\,\pi}\,\sqrt{-b+2\,c\,s-c\,\nu}}\right)-\right.$$

$$\left.\left.\left.S\left(\frac{-d+2\,f\,s-f\,\nu+2\,(-b+2\,c\,s-c\,\nu)\,z}{\sqrt{2\,\pi}\,\sqrt{-b+2\,c\,s-c\,\nu}}\right)\sin\left(-\frac{(-d+2\,f\,s-f\,\nu)^2}{4\,(-b+2\,c\,s-c\,\nu)}+g\,(2\,s-\nu)-\frac{1}{2}\,\pi\,(\nu+1)\right)\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.0773.01

$$\int \sin\left(\sqrt{z}\, b + d\, z\right) \sin^{\nu}\left(\sqrt{z}\, c + f\, z + g\right) dz = \frac{1}{d^{3/2}} \left(2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2\sqrt{d}\, \cos\left(\sqrt{z}\, b + d\, z\right) - b\sqrt{2\pi}\, \cos\left(\frac{b^2}{4\,d}\right) S\left(\frac{b + 2\,d\sqrt{z}}{\sqrt{d}\,\sqrt{2\pi}}\right) + b\sqrt{2\pi}\, C\left(\frac{b + 2\,d\sqrt{z}}{\sqrt{d}\,\sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4\,d}\right)\right)\right) -$$

$$2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d + 2\,f\,s - f\,\nu)^{3/2}} \left(\sqrt{2\pi}\, (b - 2\,c\,s + c\,\nu) \cos\left(-\frac{(-b + 2\,c\,s - c\,\nu)^2}{4\,(-d + 2\,f\,s - f\,\nu)} + 2\,g\,s - g\,\nu - \frac{1}{2}\pi(\nu + 1)\right)\right.\right.$$

$$C\left(\frac{-b + 2\,c\,s - c\,\nu + 2\,(-d + 2\,f\,s - f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d + 2\,f\,s - f\,\nu}}\right) + \sqrt{2\pi}\, (-b + 2\,c\,s - c\,\nu)$$

$$S\left(\frac{-b + 2\,c\,s - c\,\nu + 2\,(-d + 2\,f\,s - f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d + 2\,f\,s - f\,\nu}}\right) \sin\left(-\frac{(-b + 2\,c\,s - c\,\nu)^2}{4\,(-d + 2\,f\,s - f\,\nu)} + 2\,g\,s - g\,\nu - \frac{1}{2}\pi(\nu + 1)\right) +$$

$$\left.2\sqrt{-d + 2\,f\,s - f\,\nu}\, \sin\left(2\,g\,s - g\,\nu - \frac{1}{2}\pi(\nu + 1) + (-d + 2\,f\,s - f\,\nu)\,z + (-b + 2\,c\,s - c\,\nu)\sqrt{z}\right)\right) +$$

$$\frac{1}{(-d - 2\,f\,s + f\,\nu)^{3/2}} \left(\sqrt{2\pi}\, (b + 2\,c\,s - c\,\nu) \cos\left(\frac{(-b - 2\,c\,s + c\,\nu)^2}{4\,(-d - 2\,f\,s + f\,\nu)} + 2\,g\,s - \frac{1}{2}\pi(\nu - 1) - g\,\nu\right)\right.$$

$$C\left(\frac{-b - 2\,c\,s + c\,\nu + 2\,(-d - 2\,f\,s + f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d - 2\,f\,s + f\,\nu}}\right) - \sqrt{2\pi}\, (-b - 2\,c\,s + c\,\nu)$$

$$S\left(\frac{-b - 2\,c\,s + c\,\nu + 2\,(-d - 2\,f\,s + f\,\nu)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{-d - 2\,f\,s + f\,\nu}}\right) \sin\left(\frac{(-b - 2\,c\,s + c\,\nu)^2}{4\,(-d - 2\,f\,s + f\,\nu)} + 2\,g\,s - \frac{1}{2}\pi(\nu - 1) - g\,\nu\right) -$$

$$\left.\left.2\sqrt{-d - 2\,f\,s + f\,\nu}\, \sin\left(2\,g\,s - \frac{1}{2}\pi(\nu - 1) - g\,\nu - (-d - 2\,f\,s + f\,\nu)\,z - (-b - 2\,c\,s + c\,\nu)\sqrt{z}\right)\right)\right) /;\ \nu \in \mathbb{N}^+$$

Involving $\sin\left(b\, z^r + d\, z + e\right) \sin^{\nu}\left(c\, z^r + f\, z + g\right)$

01.06.21.0774.01

$$\int \sin\left(b z^2 + d z + e\right) \sin^v\left(c z^2 + f z + g\right) dz = -\frac{2^{-v-\frac{1}{2}} \sqrt{\pi}}{\sqrt{b}} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \left(C\left(\frac{d + 2 b z}{\sqrt{b} \sqrt{2\pi}} \right) \sin\left(\frac{d^2}{4 b} - e \right) - \cos\left(\frac{d^2}{4 b} - e \right) S\left(\frac{d + 2 b z}{\sqrt{b} \sqrt{2\pi}} \right) \right) - 2^{-v-\frac{1}{2}} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{s+v} \binom{v}{s} \left(\frac{1}{\sqrt{-b - 2 c s + c v}} \left(\cos\left(\frac{(-d - 2 f s + f v)^2}{4 (-b - 2 c s + c v)} + e + \frac{1}{2} \pi (1 - v) + g (2 s - v) \right) C\left(\frac{-d - 2 f s + f v + 2 (-b - 2 c s + c v) z}{\sqrt{2\pi} \sqrt{-b - 2 c s + c v}} \right) + S\left(\frac{-d - 2 f s + f v + 2 (-b - 2 c s + c v) z}{\sqrt{2\pi} \sqrt{-b - 2 c s + c v}} \right) \sin\left(\frac{(-d - 2 f s + f v)^2}{4 (-b - 2 c s + c v)} + e + \frac{1}{2} \pi (1 - v) + g (2 s - v) \right) \right) + \frac{1}{\sqrt{-b + 2 c s - c v}} \left(\cos\left(\frac{(-d + 2 f s - f v)^2}{4 (-b + 2 c s - c v)} + e - g (2 s - v) + \frac{1}{2} \pi (v + 1) \right) C\left(\frac{-d + 2 f s - f v + 2 (-b + 2 c s - c v) z}{\sqrt{2\pi} \sqrt{-b + 2 c s - c v}} \right) + S\left(\frac{-d + 2 f s - f v + 2 (-b + 2 c s - c v) z}{\sqrt{2\pi} \sqrt{-b + 2 c s - c v}} \right) \sin\left(\frac{(-d + 2 f s - f v)^2}{4 (-b + 2 c s - c v)} + e - g (2 s - v) + \frac{1}{2} \pi (v + 1) \right) \right) \right) /; v \in \mathbb{N}^+$$

01.06.21.0775.01

$$\int \sin\left(\sqrt{z}\, b + d\, z + e\right) \sin^{\nu}\left(\sqrt{z}\, c + f\, z + g\right) dz = \frac{1}{d^{3/2}} 2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(-2\sqrt{d}\, \cos\left(\sqrt{z}\, b + e + d\, z\right) - b\sqrt{2\pi}\, \cos\left(\frac{b^2}{4d} - e\right) S\left(\frac{b + 2d\sqrt{z}}{\sqrt{d}\, \sqrt{2\pi}}\right) + b\sqrt{2\pi}\, C\left(\frac{b + 2d\sqrt{z}}{\sqrt{d}\, \sqrt{2\pi}}\right) \sin\left(\frac{b^2}{4d} - e\right)\right) - 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{(-d - 2fs + f\nu)^{3/2}} \left(\sqrt{2\pi}\, (b + 2cs - c\nu) \cos\left(\frac{(-b - 2cs + c\nu)^2}{4(-d - 2fs + f\nu)} + e + 2gs - \frac{1}{2}\pi(\nu - 1) - g\nu\right) C\left(\frac{-b - 2cs + c\nu + 2(-d - 2fs + f\nu)\sqrt{z}}{\sqrt{2\pi}\, \sqrt{-d - 2fs + f\nu}}\right) - \sqrt{2\pi}\, (-b - 2cs + c\nu) S\left(\frac{-b - 2cs + c\nu + 2(-d - 2fs + f\nu)\sqrt{z}}{\sqrt{2\pi}\, \sqrt{-d - 2fs + f\nu}}\right) \sin\left(\frac{(-b - 2cs + c\nu)^2}{4(-d - 2fs + f\nu)} + e + 2gs - \frac{1}{2}\pi(\nu - 1) - g\nu\right) - 2\sqrt{-d - 2fs + f\nu}\, \sin\left(e + 2gs - \frac{1}{2}\pi(\nu - 1) - g\nu - (-d - 2fs + f\nu) z - (-b - 2cs + c\nu)\sqrt{z}\right)\right) + \frac{1}{(-d + 2fs - f\nu)^{3/2}} \left(\sqrt{2\pi}\, (b - 2cs + c\nu) \cos\left(\frac{(-b + 2cs - c\nu)^2}{4(-d + 2fs - f\nu)} + e - 2gs + g\nu + \frac{1}{2}\pi(\nu + 1)\right) C\left(\frac{-b + 2cs - c\nu + 2(-d + 2fs - f\nu)\sqrt{z}}{\sqrt{2\pi}\, \sqrt{-d + 2fs - f\nu}}\right) - \sqrt{2\pi}\, (-b + 2cs - c\nu) S\left(\frac{-b + 2cs - c\nu + 2(-d + 2fs - f\nu)\sqrt{z}}{\sqrt{2\pi}\, \sqrt{-d + 2fs - f\nu}}\right) \sin\left(\frac{(-b + 2cs - c\nu)^2}{4(-d + 2fs - f\nu)} + e - 2gs + g\nu + \frac{1}{2}\pi(\nu + 1)\right) - 2\sqrt{-d + 2fs - f\nu}\, \sin\left(e - 2gs + g\nu + \frac{1}{2}\pi(\nu + 1) - (-d + 2fs - f\nu) z - (-b + 2cs - c\nu)\sqrt{z}\right)\right)\right) /; \nu \in \mathbb{N}^+$$

Involving product of powers of two direct functions

Involving $\sin^{\mu}(c\, z) \sin^{\nu}(a\, z)$

01.06.21.0776.01

$$\int \sin^{\mu}(c z)\sin^{\nu}(a z)\,dz = \frac{i\,2^{-\nu}\left(1-e^{2icz}\right)^{-\mu}\sin^{\mu}(cz)}{c\,\mu}\left(\binom{\nu}{\frac{\nu}{2}}\,{}_2F_1\left(-\frac{\mu}{2},-\mu;1-\frac{\mu}{2};e^{2icz}\right)(1-\nu\bmod 2)+\right.$$
$$c\,\mu\,i^{-\nu}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{e^{i(-az\nu+\pi\nu+2akz)}}{-2ak+a\nu+c\mu}\,{}_2F_1\left(-\frac{-2ak+a\nu+c\mu}{2c},-\mu;\frac{1}{2}\left(\frac{a(2k-\nu)}{c}-\mu+2\right);e^{2icz}\right)+\right.$$
$$\left.\left.\frac{e^{ia(\nu-2k)z}}{2ak-a\nu+c\mu}\,{}_2F_1\left(-\frac{2ak-a\nu+c\mu}{2c},-\mu;\frac{1}{2}\left(\frac{a(\nu-2k)}{c}-\mu+2\right);e^{2icz}\right)\right)\right)/;\ \nu\in\mathbb{N}^+$$

01.06.21.0777.01

$$\int \sin^{m}(c z)\sin^{\nu}(a z)\,dz = 2^{-m-\nu}\left((-1)^m z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(m\bmod 2-1)(\nu\bmod 2-1)-\right.$$
$$\frac{i^{1-m}}{c}\binom{\nu}{\frac{\nu}{2}}(\nu\bmod 2-1)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\binom{m}{k}\frac{(-1)^k e^{-ic(m-2k)z}\left(-(-1)^m+e^{2ic(m-2k)z}\right)}{2k-m}-$$
$$\frac{(-1)^m i^{1-\nu}}{a}\binom{m}{\frac{m}{2}}(m\bmod 2-1)\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\binom{\nu}{s}\frac{(-1)^s e^{-ia(\nu-2s)z}\left(-(-1)^\nu+e^{2ia(\nu-2s)z}\right)}{2s-\nu}-$$
$$i^{-m-\nu+1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{m+s}\binom{\nu}{s}\left(\frac{e^{i(\pi\nu-(2ck-2as+a\nu)z+m(cz+\pi))}}{-2ck+cm+2as-a\nu}+\frac{e^{i(\pi\nu+(2ck-cm+2as-a\nu)z)}}{2ck-cm+2as-a\nu}+\right.$$
$$\left.\left.\frac{e^{i((a(\nu-2s)-2ck)z+m(cz+\pi))}}{c(m-2k)+a(\nu-2s)}+\frac{e^{i(2ck-cm-2as+a\nu)z}}{2ck-cm-2as+a\nu}\right)\right)/;\ m\in\mathbb{N}^+\bigwedge\nu\in\mathbb{N}^+$$

01.06.21.0778.01

$$\int \sin^{\mu}(c z)\sin^{\nu}(2 c z)\,dz =$$
$$-\frac{1}{c(\nu+1)}\cos(cz)\,{}_2F_1\left(\frac{\nu+1}{2},\frac{1}{2}(-\mu-\nu+1);\frac{\nu+3}{2};\cos^2(cz)\right)\sin^{\mu+1}(cz)\sin^2(cz)^{\frac{1}{2}(-\mu-\nu-1)}\sin^{\nu}(2cz)$$

01.06.21.0779.01

$$\int \sin^{2}(c z)\sin^{\frac{1}{2}}(a z)\,dz =$$
$$\left(-4\left(a^2-16c^2\right)\sqrt{1-e^{2iaz}}\,E\left(\frac{1}{4}(\pi-2az)\,\middle|\,2\right)-i\sqrt{2}\,a\,e^{-2icz}\sqrt{-i\,e^{-iaz}\left(-1+e^{2iaz}\right)}\left((a+4c)\,e^{4icz}\right.\right.$$
$$\left.\left.{}_2F_1\left(\frac{c}{a}-\frac{1}{4},-\frac{1}{2};\frac{c}{a}+\frac{3}{4};e^{2iaz}\right)+(a-4c)\,{}_2F_1\left(-\frac{c}{a}-\frac{1}{4},-\frac{1}{2};\frac{3}{4}-\frac{c}{a};e^{2iaz}\right)\right)\right)\Big/\left(4\left(a^3-16ac^2\right)\sqrt{1-e^{2iaz}}\right)$$

01.06.21.0780.01

$$\int \sin^{2}(c z)\sin^{\frac{1}{2}}(2 c z)\,dz = -\frac{\sin^{\frac{3}{2}}(2cz)+3E\left(\frac{\pi}{4}-cz\,\middle|\,2\right)}{6c}$$

01.06.21.0781.01

$$\int \frac{\sin^2(c z)}{\sin^{\frac{1}{2}}(a z)} \, dz = \left(e^{-\frac{1}{2} i a z} \left(i a \sqrt{2 - 2 e^{2 i a z}} \left((a - 4 c) e^{\frac{1}{2} i (a+4 c) z} \, _2F_1\left(\frac{c}{a} + \frac{1}{4}, \frac{1}{2}; \frac{c}{a} + \frac{5}{4}; e^{2 i a z}\right) + (a + 4 c) e^{\frac{1}{2} i (a-4 c) z} \, _2F_1\left(\frac{1}{4} - \frac{c}{a}, \frac{1}{2}; \frac{5}{4} - \frac{c}{a}; e^{2 i a z}\right)\right) - 2 \left(a^2 - 16 c^2\right) e^{\frac{i a z}{2}} \sqrt{-i e^{-i a z} \left(-1 + e^{2 i a z}\right)} \, F\left(\frac{1}{4} (\pi - 2 a z) \,\middle|\, 2\right)\right)\right) \Big/ \left(2 \left(a^3 - 16 a c^2\right) \sqrt{-i e^{-i a z} \left(-1 + e^{2 i a z}\right)}\right)$$

01.06.21.0782.01

$$\int \frac{\sin^2(c z)}{\sin^{\frac{1}{2}}(2 c z)} \, dz = \frac{1}{4 c \sqrt{\sin(2 c z) + 1}} \left(-\sqrt{2} \, F\left(\sin^{-1}(\cos(c z) - \sin(c z)) \,\middle|\, \frac{1}{2}\right) (\cos(c z) + \sin(c z)) - 2 \sin^{\frac{1}{2}}(2 c z) \sqrt{\sin(2 c z) + 1}\right)$$

01.06.21.0783.01

$$\int \frac{\sin^7(c z)}{\sqrt{\sin^7(2 c z)}} \, dz = \frac{\sin^4(2 c z)}{120 c \sqrt[4]{\sin^2(c z)} \sqrt{\sin^7(2 c z)}} \left(3 \sec(c z) \left(\sec^2(c z) - 6\right) \sqrt[4]{\sin^2(c z)} - 5 \cos(c z) \, _2F_1\left(\frac{3}{4}, \frac{3}{4}; \frac{7}{4}; \cos^2(c z)\right)\right)$$

Involving $\sin^{\mu}(c z) \sin^{\nu}(a z + b)$

01.06.21.0784.01

$$\int \sin^{\mu}(c z) \sin^{\nu}(a z + b) \, dz = \frac{i \, 2^{-\nu} \left(1 - e^{2 i c z}\right)^{-\mu} \sin^{\mu}(c z)}{c \mu} \left(\binom{\nu}{\frac{\nu}{2}} \, _2F_1\left(-\frac{\mu}{2}, -\mu; 1 - \frac{\mu}{2}; e^{2 i c z}\right) (1 - \nu \bmod 2) + i^{-\nu} c \mu \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{i b (\nu - 2 k)} \binom{\nu}{k} \left(\frac{e^{i (4 b k + 2 a z k - 2 b \nu + \pi \nu - a \nu z)}}{-2 a k + a \nu + c \mu} \, _2F_1\left(-\frac{-2 a k + a \nu + c \mu}{2 c}, -\mu; \frac{1}{2} \left(\frac{a (2 k - \nu)}{c} - \mu + 2\right); e^{2 i c z}\right) + \frac{e^{i a (\nu - 2 k) z}}{2 a k - a \nu + c \mu} \, _2F_1\left(-\frac{2 a k - a \nu + c \mu}{2 c}, -\mu; \frac{1}{2} \left(\frac{a (\nu - 2 k)}{c} - \mu + 2\right); e^{2 i c z}\right)\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.0785.01

$$\int \sin^m(c\,z)\sin^\nu(a\,z+b)\,dz = \frac{i\,2^{-m}\left(1-e^{2\,i\,(b+a\,z)}\right)^{-\nu}\sin^\nu(b+a\,z)}{a\,\nu}\left(\binom{m}{\frac{m}{2}}\,{}_2F_1\!\left(-\frac{\nu}{2},-\nu;1-\frac{\nu}{2};e^{2\,i\,(b+a\,z)}\right)(1-m \bmod 2)+\right.$$

$$i^{-m}\,a\,\nu\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(\frac{e^{i\,(-c\,z\,m+\pi\,m+2\,c\,k\,z)}}{-2\,c\,k+c\,m+a\,\nu}\,{}_2F_1\!\left(-\frac{-2\,c\,k+c\,m+a\,\nu}{2\,a},-\nu;\frac{1}{2}\left(\frac{c\,(2\,k-m)}{a}-\nu+2\right);e^{2\,i\,(b+a\,z)}\right)+\right.$$

$$\left.\left.\frac{e^{i\,c\,(m-2\,k)\,z}}{2\,c\,k-c\,m+a\,\nu}\,{}_2F_1\!\left(-\frac{2\,c\,k-c\,m+a\,\nu}{2\,a},-\nu;\frac{1}{2}\left(\frac{c\,(m-2\,k)}{a}-\nu+2\right);e^{2\,i\,(b+a\,z)}\right)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.0786.01

$$\int \sin^m(c\,z)\sin^\nu(a\,z+b)\,dz = i\,2^{-m-\nu}\left(i\,(-1)^{m-1}\,z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(m \bmod 2-1)(\nu \bmod 2-1)-\right.$$

$$\frac{i^{-m}}{c}\binom{\nu}{\frac{\nu}{2}}(\nu \bmod 2-1)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^k\,e^{-i\,c\,(m-2\,k)\,z}\left(-(-1)^m+e^{2\,i\,c\,(m-2\,k)\,z}\right)\binom{m}{k}}{2\,k-m}-$$

$$\frac{1}{a}\left((-1)^m\,i^{-\nu}\binom{m}{\frac{m}{2}}(m \bmod 2-1)\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{(-1)^s\,e^{-i\,(b\,(2\,s+\nu)+a\,(\nu-2\,s)\,z)}\left(-(-1)^\nu\,e^{4\,i\,b\,s}+e^{2\,i\,(b\,\nu+a\,(\nu-2\,s)\,z)}\right)\binom{\nu}{s}}{2\,s-\nu}\right)+$$

$$i^{-m-\nu}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{m+s}\,e^{-i\,b\,(2\,s+\nu)}\left(\frac{e^{-i\,((-2\,c\,k+c\,m+2\,a\,s-a\,\nu)\,z-2\,b\,\nu)}}{-2\,c\,k+c\,m+2\,a\,s-a\,\nu}+\frac{e^{i\,(2\,b\,\nu+a\,z\,\nu-2\,c\,k\,z-2\,a\,s\,z+m\,(c\,z+\pi))}}{2\,c\,k-c\,m+2\,a\,s-a\,\nu}+\right.$$

$$\left.\left.\frac{e^{i\,(4\,b\,s+2\,a\,z\,s+\pi\,\nu+2\,c\,k\,z-c\,m\,z-a\,\nu\,z)}}{c\,(m-2\,k)+a\,(\nu-2\,s)}+\frac{e^{i\,(4\,b\,s+2\,a\,z\,s+\pi\,\nu-2\,c\,k\,z-a\,\nu\,z+m\,(c\,z+\pi))}}{2\,c\,k-c\,m-2\,a\,s+a\,\nu}\right)\binom{\nu}{s}\right)\;/;\;m\in\mathbb{N}^+\land\nu\in\mathbb{N}^+$$

Involving $\sin^\mu(c\,z+d)\sin^\nu(a\,z+b)$

01.06.21.0787.01

$$\int \sin^{\mu}(d+cz)\sin^{\nu}(b+az)\,dz = \frac{i\,2^{-\nu}\left(1-e^{2i(d+cz)}\right)^{-\mu}\sin^{\mu}(d+cz)}{c\,\mu}\left(\binom{\nu}{\frac{\nu}{2}}\,{}_2F_1\!\left(-\frac{\mu}{2},-\mu;1-\frac{\mu}{2};e^{2i(d+cz)}\right)(1-\nu \bmod 2)+c\,\mu\,i^{-\nu}\right.$$
$$\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k e^{ib(\nu-2k)}\binom{\nu}{k}\left(\frac{e^{i(4bk+2azk-2b\nu+\pi\nu-a\nu z)}}{-2ak+a\nu+c\mu}\,{}_2F_1\!\left(-\frac{-2ak+a\nu+c\mu}{2c},-\mu;\frac{1}{2}\left(\frac{a(2k-\nu)}{c}-\mu+2\right);e^{2i(d+cz)}\right)+\right.$$
$$\left.\left.\frac{e^{ia(\nu-2k)z}}{2ak-a\nu+c\mu}\,{}_2F_1\!\left(-\frac{2ak-a\nu+c\mu}{2c},-\mu;\frac{1}{2}\left(\frac{a(\nu-2k)}{c}-\mu+2\right);e^{2i(d+cz)}\right)\right)\right)/;\ \nu\in\mathbb{N}^+$$

01.06.21.0788.01

$$\int \sin^{m}(cz+d)\sin^{\nu}(az+b)\,dz = 2^{-m-\nu}\,i\left(i\,(-1)^{m-1}z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(m \bmod 2-1)(\nu \bmod 2-1)-\right.$$
$$\frac{i^{-m}}{c}\binom{\nu}{\frac{\nu}{2}}(\nu \bmod 2-1)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\binom{m}{k}\frac{(-1)^k e^{-i(d(2k+m)+c(m-2k)z)}\left(-(-1)^m e^{4idk}+e^{2i(dm+c(m-2k)z)}\right)}{2k-m}-\frac{(-1)^m i^{-\nu}}{a}\binom{m}{\frac{m}{2}}$$
$$(m \bmod 2-1)\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\binom{\nu}{s}\frac{(-1)^s e^{-i(b(2s+\nu)+a(\nu-2s)z)}\left(-(-1)^\nu e^{4ibs}+e^{2i(b\nu+a(\nu-2s)z)}\right)}{2s-\nu}+i^{-m-\nu}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}$$
$$\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{m+s}e^{i(d(2k+m)-b(2s+\nu))}\binom{\nu}{s}\left(\frac{e^{-i(2dm-2b\nu+(-2ck+cm+2as-a\nu)z)}}{-2ck+cm+2as-a\nu}+\frac{e^{i(-4dk-2czk+2b\nu-2asz+a\nu z+m(cz+\pi))}}{2ck-cm+2as-a\nu}+\right.$$
$$\left.\left.\frac{e^{i(-2dm-czm+4bs+\pi\nu+2ckz+2asz-a\nu z)}}{c(m-2k)+a(\nu-2s)}+\frac{e^{i(-4dk-2czk+4bs+\pi\nu+2asz-a\nu z+m(cz+\pi))}}{2ck-cm-2as+a\nu}\right)\right)/;\ m\in\mathbb{N}^+\land \nu\in\mathbb{N}^+$$

Involving $\sin^{m}(b\,z)\sin^{\nu}\left(c\,z^{r}\right)$

01.06.21.0789.01

$$\int \sin^m(b\,z)\sin^v\left(c\,z^2\right)dz = 2^{-m-v}\,z\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m \bmod 2)(1-v \bmod 2) + \frac{2^{-m-v+1}}{b}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(\frac{\pi m}{2}+b\,(m-2k)\,z\right)}{m-2k} + 2^{-m-v+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}\frac{(-1)^{k+v}}{\sqrt{c\,(v-2k)}}\binom{v}{k}\left(\cos\left(\frac{\pi v}{2}\right)C\left(\frac{c\sqrt{\frac{2}{\pi}}\,(v-2k)\,z}{\sqrt{c\,(v-2k)}}\right) - S\left(\frac{c\sqrt{\frac{2}{\pi}}\,(v-2k)\,z}{\sqrt{c\,(v-2k)}}\right)\sin\left(\frac{\pi v}{2}\right)\right) + 2^{-m-v+\frac{1}{2}}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\frac{1}{\sqrt{c\,v-2\,c\,s}}\left(\cos\left(\frac{(2\,b\,k-b\,m)^2}{4\,(c\,v-2\,c\,s)}+\frac{1}{2}\pi\,(m-v)\right)C\left(\frac{2\,b\,k-b\,m+2\,(c\,v-2\,c\,s)\,z}{\sqrt{2\pi}\,\sqrt{c\,v-2\,c\,s}}\right) + S\left(\frac{2\,b\,k-b\,m+2\,(c\,v-2\,c\,s)\,z}{\sqrt{2\pi}\,\sqrt{c\,v-2\,c\,s}}\right)\sin\left(\frac{(2\,b\,k-b\,m)^2}{4\,(c\,v-2\,c\,s)}+\frac{1}{2}\pi\,(m-v)\right)\right) + \frac{1}{\sqrt{2\,c\,s-c\,v}}\left(\cos\left(\frac{(2\,b\,k-b\,m)^2}{4\,(2\,c\,s-c\,v)}+\frac{1}{2}\pi\,(m+v)\right)C\left(\frac{2\,b\,k-b\,m+2\,(2\,c\,s-c\,v)\,z}{\sqrt{2\pi}\,\sqrt{2\,c\,s-c\,v}}\right) + S\left(\frac{2\,b\,k-b\,m+2\,(2\,c\,s-c\,v)\,z}{\sqrt{2\pi}\,\sqrt{2\,c\,s-c\,v}}\right)\sin\left(\frac{(2\,b\,k-b\,m)^2}{4\,(2\,c\,s-c\,v)}+\frac{1}{2}\pi\,(m+v)\right)\right)\right) /;\ m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

01.06.21.0790.01

$$\int \sin^m(b\,z)\sin^v\left(c\sqrt{z}\right)dz = 2^{-m-v} z \binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m \bmod 2)(1-v \bmod 2)+ \frac{2^{-m-v+1}}{b}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(\frac{\pi m}{2}+b(m-2k)z\right)}{m-2k}+\frac{1}{c^2}\left(2^{-m-v+2}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}\frac{1}{(v-2k)^2}\left((-1)^{k+v}\binom{v}{k}\left(\cos\left(\frac{\pi v}{2}+c(v-2k)\sqrt{z}\right)+c(v-2k)\sqrt{z}\,\sin\left(\frac{\pi v}{2}+c(v-2k)\sqrt{z}\right)\right)\right)\right)+ 2^{-m-v}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s} \left(\frac{1}{(2bk-bm)^{3/2}}\left(\sqrt{2\pi}\,(2cs-cv)\cos\left(\frac{1}{2}\pi(v-m)-\frac{(cv-2cs)^2}{4(2bk-bm)}\right)C\left(\frac{2\sqrt{z}\,(2bk-bm)-2cs+cv}{\sqrt{2bk-bm}\,\sqrt{2\pi}}\right)+ \sqrt{2\pi}\,(cv-2cs)\,S\left(\frac{2\sqrt{z}\,(2bk-bm)-2cs+cv}{\sqrt{2bk-bm}\,\sqrt{2\pi}}\right)\sin\left(\frac{1}{2}\pi(v-m)-\frac{(cv-2cs)^2}{4(2bk-bm)}\right)+ 2\sqrt{2bk-bm}\,\sin\left(\frac{1}{2}\pi(v-m)+(2bk-bm)z+(cv-2cs)\sqrt{z}\right)\right)+ \frac{1}{(2bk-bm)^{3/2}}\left(\sqrt{2\pi}\,(cv-2cs)\cos\left(\frac{(2cs-cv)^2}{4(2bk-bm)}+\frac{1}{2}\pi(m+v)\right)C\left(\frac{2\sqrt{z}\,(2bk-bm)+2cs-cv}{\sqrt{2bk-bm}\,\sqrt{2\pi}}\right)- \sqrt{2\pi}\,(2cs-cv)\,S\left(\frac{2\sqrt{z}\,(2bk-bm)+2cs-cv}{\sqrt{2bk-bm}\,\sqrt{2\pi}}\right)\sin\left(\frac{(2cs-cv)^2}{4(2bk-bm)}+\frac{1}{2}\pi(m+v)\right)- 2\sqrt{2bk-bm}\,\sin\left(\frac{1}{2}\pi(m+v)-(2bk-bm)z-(2cs-cv)\sqrt{z}\right)\right)\right)\ /;\ m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving $\sin^m(d\,z+e)\sin^v\left(c\,z^r\right)$

01.06.21.0791.01

$$\int \sin^m(e+d\,z)\sin^v\left(c\,z^2\right)dz = 2^{-m-v}\,z\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m \bmod 2)\,(1-v \bmod 2) + \frac{2^{-m-v+1}\,(1-v \bmod 2)}{d}\binom{v}{\frac{v}{2}}\left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(\frac{\pi m}{2}+e\,(m-2\,k)+d\,(m-2\,k)\,z\right)}{m-2\,k}\right) + 2^{-m-v+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}\frac{(-1)^{k+v}}{\sqrt{c\,(v-2\,k)}}\binom{v}{k}\left(\cos\left(\frac{\pi\,v}{2}\right)C\left(\sqrt{\frac{2}{\pi}}\,\frac{c\,(v-2\,k)\,z}{\sqrt{c\,(v-2\,k)}}\right) - S\left(\sqrt{\frac{2}{\pi}}\,\frac{c\,(v-2\,k)\,z}{\sqrt{c\,(v-2\,k)}}\right)\sin\left(\frac{\pi\,v}{2}\right)\right) + 2^{-m-v+\frac{1}{2}}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\frac{1}{\sqrt{c\,v-2\,c\,s}}\left(\cos\left(-\frac{(2\,d\,k-d\,m)^2}{4\,(c\,v-2\,c\,s)}+e\,(2\,k-m)-\frac{1}{2}\,\pi\,(m-v)\right)C\left(\frac{2\,d\,k-d\,m+2\,(c\,v-2\,c\,s)\,z}{\sqrt{2\,\pi}\,\sqrt{c\,v-2\,c\,s}}\right) - S\left(\frac{2\,d\,k-d\,m+2\,(c\,v-2\,c\,s)\,z}{\sqrt{2\,\pi}\,\sqrt{c\,v-2\,c\,s}}\right)\sin\left(-\frac{(2\,d\,k-d\,m)^2}{4\,(c\,v-2\,c\,s)}+e\,(2\,k-m)-\frac{1}{2}\,\pi\,(m-v)\right)\right) + \frac{1}{\sqrt{2\,c\,s-c\,v}}\left(\cos\left(-\frac{(2\,d\,k-d\,m)^2}{4\,(2\,c\,s-c\,v)}+e\,(2\,k-m)-\frac{1}{2}\,\pi\,(m+v)\right)C\left(\frac{2\,d\,k-d\,m+2\,(2\,c\,s-c\,v)\,z}{\sqrt{2\,\pi}\,\sqrt{2\,c\,s-c\,v}}\right) - S\left(\frac{2\,d\,k-d\,m+2\,(2\,c\,s-c\,v)\,z}{\sqrt{2\,\pi}\,\sqrt{2\,c\,s-c\,v}}\right)\sin\left(-\frac{(2\,d\,k-d\,m)^2}{4\,(2\,c\,s-c\,v)}+e\,(2\,k-m)-\frac{1}{2}\,\pi\,(m+v)\right)\right)\right) \;/;\; m\in\mathbb{N}^+ \bigwedge v\in\mathbb{N}^+$$

01.06.21.0792.01

$$\int \sin^m(e+d\,z)\sin^v\!\left(c\sqrt{z}\right)dz = 2^{-m-v} z \binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m \bmod 2)(1-v \bmod 2) + \frac{2^{-m-v+1}(1-v \bmod 2)}{d}\binom{v}{\frac{v}{2}}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\!\left(\frac{\pi m}{2}+e(m-2k)+d(m-2k)z\right)}{m-2k} + \frac{1}{c^2}2^{-m-v+2}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}\frac{(-1)^{k+v}}{(v-2k)^2}\binom{v}{k}\left(\cos\!\left(\frac{\pi v}{2}+c(v-2k)\sqrt{z}\right)+c(v-2k)\sqrt{z}\sin\!\left(\frac{\pi v}{2}+c(v-2k)\sqrt{z}\right)\right) + 2^{-m-v}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\frac{1}{(2dk-dm)^{3/2}}\left(\sqrt{2\pi}\,(2cs-cv)\cos\!\left(-\frac{(cv-2cs)^2}{4(2dk-dm)}+2ek-em+\frac{1}{2}\pi(v-m)\right)C\!\left(\frac{2\sqrt{z}\,(2dk-dm)-2cs+cv}{\sqrt{2dk-dm}\,\sqrt{2\pi}}\right)+\sqrt{2\pi}\,(cv-2cs)\,S\!\left(\frac{2\sqrt{z}\,(2dk-dm)-2cs+cv}{\sqrt{2dk-dm}\,\sqrt{2\pi}}\right)\sin\!\left(-\frac{(cv-2cs)^2}{4(2dk-dm)}+2ek-em+\frac{1}{2}\pi(v-m)\right)+2\sqrt{2dk-dm}\,\sin\!\left(2ek-em+\frac{1}{2}\pi(v-m)+(2dk-dm)z+(cv-2cs)\sqrt{z}\right)\right)+\frac{1}{(2dk-dm)^{3/2}}\left(\sqrt{2\pi}\,(cv-2cs)\cos\!\left(-\frac{(2cs-cv)^2}{4(2dk-dm)}+2ek-em-\frac{1}{2}\pi(m+v)\right)C\!\left(\frac{2\sqrt{z}\,(2dk-dm)+2cs-cv}{\sqrt{2dk-dm}\,\sqrt{2\pi}}\right)+\sqrt{2\pi}\,(2cs-cv)\,S\!\left(\frac{2\sqrt{z}\,(2dk-dm)+2cs-cv}{\sqrt{2dk-dm}\,\sqrt{2\pi}}\right)\sin\!\left(-\frac{(2cs-cv)^2}{4(2dk-dm)}+2ek-em-\frac{1}{2}\pi(m+v)\right)+2\sqrt{2dk-dm}\,\sin\!\left(2ek-em-\frac{1}{2}\pi(m+v)+(2dk-dm)z+(2cs-cv)\sqrt{z}\right)\right)\right)\;/;\; m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving $\sin^m\left(b\,z^r\right)\sin^v\left(c\,z^r\right)$

01.06.21.0793.01

$$\int \sin^m(b z^r)\sin^\nu(c z^r)\,dz = (-1)^m 2^{-m-\nu} z \binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2) - \frac{1}{r} i^{-m} 2^{-m-\nu} z \binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k \binom{m}{k} \left((-1)^m \Gamma\left(\frac{1}{r}, (i b m - 2 i b k) z^r\right)((i b m - 2 i b k) z^r)^{-1/r} + ((2 i b k - i b m) z^r)^{-1/r}\Gamma\left(\frac{1}{r}, (2 i b k - i b m) z^r\right)\right) - \frac{1}{r}(-1)^m i^{-\nu} 2^{-m-\nu} z \binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left((-1)^\nu \Gamma\left(\frac{1}{r}, (i c \nu - 2 i c k) z^r\right)((i c \nu - 2 i c k) z^r)^{-1/r} + ((2 i c k - i c \nu) z^r)^{-1/r}\Gamma\left(\frac{1}{r}, (2 i c k - i c \nu) z^r\right)\right) - \frac{1}{r}(2 i)^{-m-\nu} z \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^{m+\nu}\Gamma\left(\frac{1}{r}, (-2 b i k + i b m - 2 i c s + i c \nu) z^r\right)((-2 b i k + i b m - 2 i c s + i c \nu) z^r)^{-1/r} + (-1)^\nu ((2 i b k - i b m - 2 i c s + i c \nu) z^r)^{-1/r}\Gamma\left(\frac{1}{r}, (2 i b k - i b m - 2 i c s + i c \nu) z^r\right) + (-1)^m ((-2 b i k + i b m + 2 i c s - i c \nu) z^r)^{-1/r}\Gamma\left(\frac{1}{r}, (-2 b i k + i b m + 2 i c s - i c \nu) z^r\right) + ((2 i b k - i b m + 2 i c s - i c \nu) z^r)^{-1/r}\Gamma\left(\frac{1}{r}, (2 i b k - i b m + 2 i c s - i c \nu) z^r\right)\right) /; m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.0794.01

$$\int \sin^m(b z^2)\sin^\nu(c z^2)\,dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2) + 2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}}{\sqrt{b(m-2k)}}\binom{m}{k}\left(\cos\left(\frac{m\pi}{2}\right) C\left(\frac{b(m-2k)}{\sqrt{b(m-2k)}}\sqrt{\frac{2}{\pi}}\, z\right) - S\left(\frac{b(m-2k)}{\sqrt{b(m-2k)}}\sqrt{\frac{2}{\pi}}\, z\right)\sin\left(\frac{m\pi}{2}\right)\right) + 2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{(-1)^{k+\nu}}{\sqrt{c(\nu-2k)}}\binom{\nu}{k}\left(\cos\left(\frac{\pi\nu}{2}\right) C\left(\sqrt{\frac{2}{\pi}}\,\frac{c\,(\nu-2k)\,z}{\sqrt{c(\nu-2k)}}\right) - S\left(\sqrt{\frac{2}{\pi}}\,\frac{c\,(\nu-2k)\,z}{\sqrt{c(\nu-2k)}}\right)\sin\left(\frac{\pi\nu}{2}\right)\right) + 2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\left(\cos\left(\frac{1}{2}\pi(m-\nu)\right) C\left(\sqrt{\frac{2}{\pi}}\sqrt{2bk-bm-2cs+c\nu}\; z\right) + S\left(\sqrt{\frac{2}{\pi}}\sqrt{2bk-bm-2cs+c\nu}\; z\right)\sin\left(\frac{1}{2}\pi(m-\nu)\right)\right)\Big/\left(\sqrt{2bk-bm-2cs+c\nu}\right) + \left(\cos\left(\frac{1}{2}\pi(m+\nu)\right) C\left(\sqrt{\frac{2}{\pi}}\sqrt{2bk-bm+2cs-c\nu}\; z\right) + S\left(\sqrt{\frac{2}{\pi}}\sqrt{2bk-bm+2cs-c\nu}\; z\right)\sin\left(\frac{1}{2}\pi(m+\nu)\right)\right)\Big/\left(\sqrt{2bk-bm+2cs-c\nu}\right)\right) /; m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.0795.01

$$\int \sin^m\left(b\sqrt{z}\right)\sin^\nu\left(c\sqrt{z}\right)dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2) + \frac{1}{b^2} 2^{-m-\nu+2}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2) \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{(m-2k)^2}\left((-1)^{k+m}\binom{m}{k}\left(\cos\left(\frac{\pi m}{2}+b(m-2k)\sqrt{z}\right)+b(m-2k)\sqrt{z}\,\sin\left(\frac{\pi m}{2}+b(m-2k)\sqrt{z}\right)\right)\right)+\frac{1}{c^2}2^{-m-\nu+2} \binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{(-1)^{k+\nu}}{(\nu-2k)^2}\binom{\nu}{k}\left(\cos\left(\frac{\pi\nu}{2}+c(\nu-2k)\sqrt{z}\right)+c(\nu-2k)\sqrt{z}\,\sin\left(\frac{\pi\nu}{2}+c(\nu-2k)\sqrt{z}\right)\right)+ 2^{-m-\nu+2}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\left(\cos\left(\frac{1}{2}\pi(\nu-m)+(2bk-bm-2cs+c\nu)\sqrt{z}\right)+(2bk-bm-2cs+c\nu)\sqrt{z}\,\sin\left(\frac{1}{2}\pi(\nu-m)+(2bk-bm-2cs+c\nu)\sqrt{z}\right)\right)\Big/(2bk-bm-2cs+c\nu)^2+\left(\cos\left(\frac{1}{2}\pi(m+\nu)-(2bk-bm+2cs-c\nu)\sqrt{z}\right)-(2bk-bm+2cs-c\nu)\sqrt{z}\,\sin\left(\frac{1}{2}\pi(m+\nu)-(2bk-bm+2cs-c\nu)\sqrt{z}\right)\right)\Big/(2bk-bm+2cs-c\nu)^2\right)\ /;\ m\in\mathbb{N}^+\land \nu\in\mathbb{N}^+$$

Involving $\sin^m(d\,z)\sin^\nu\left(c\,z^r+g\right)$

01.06.21.0796.01

$$\int \sin^m(d\,z)\sin^\nu\left(c\,z^2+g\right)dz = 2^{-m-\nu}\,z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+\frac{2^{-m-\nu+1}}{d}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(2\,d\,k\,z-\frac{1}{2}\,m\,(2\,d\,z+\pi)\right)}{2\,k-m}+$$
$$2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{\sqrt{c\,(\nu-2\,k)}}$$
$$\left((-1)^{k+\nu}\binom{\nu}{k}\left(\cos\left(\frac{\pi\,\nu}{2}+g\,(\nu-2\,k)\right)C\left(\frac{c\sqrt{\frac{2}{\pi}}\,(\nu-2\,k)\,z}{\sqrt{c\,(\nu-2\,k)}}\right)-S\left(\frac{c\sqrt{\frac{2}{\pi}}\,(\nu-2\,k)\,z}{\sqrt{c\,(\nu-2\,k)}}\right)\sin\left(\frac{\pi\,\nu}{2}+g\,(\nu-2\,k)\right)\right)\right)+$$
$$2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}$$
$$\left(\frac{1}{\sqrt{c\,\nu-2\,c\,s}}\left(\cos\left(\frac{(2\,d\,k-d\,m)^2}{4\,(c\,\nu-2\,c\,s)}+\frac{1}{2}\,\pi\,(m-\nu)+g\,(2\,s-\nu)\right)C\left(\frac{2\,d\,k-d\,m+2\,(c\,\nu-2\,c\,s)\,z}{\sqrt{2\,\pi}\,\sqrt{c\,\nu-2\,c\,s}}\right)+\right.\right.$$
$$\left.S\left(\frac{2\,d\,k-d\,m+2\,(c\,\nu-2\,c\,s)\,z}{\sqrt{2\,\pi}\,\sqrt{c\,\nu-2\,c\,s}}\right)\sin\left(\frac{(2\,d\,k-d\,m)^2}{4\,(c\,\nu-2\,c\,s)}+\frac{1}{2}\,\pi\,(m-\nu)+g\,(2\,s-\nu)\right)\right)+$$
$$\frac{1}{\sqrt{2\,c\,s-c\,\nu}}\left(\cos\left(-\frac{(2\,d\,k-d\,m)^2}{4\,(2\,c\,s-c\,\nu)}+g\,(2\,s-\nu)-\frac{1}{2}\,\pi\,(m+\nu)\right)C\left(\frac{2\,d\,k-d\,m+2\,(2\,c\,s-c\,\nu)\,z}{\sqrt{2\,\pi}\,\sqrt{2\,c\,s-c\,\nu}}\right)-\right.$$
$$\left.\left.S\left(\frac{2\,d\,k-d\,m+2\,(2\,c\,s-c\,\nu)\,z}{\sqrt{2\,\pi}\,\sqrt{2\,c\,s-c\,\nu}}\right)\sin\left(-\frac{(2\,d\,k-d\,m)^2}{4\,(2\,c\,s-c\,\nu)}+g\,(2\,s-\nu)-\frac{1}{2}\,\pi\,(m+\nu)\right)\right)\right)\;/;\;m\in\mathbb{N}^+\bigwedge \nu\in\mathbb{N}^+$$

01.06.21.0797.01

$$\int \sin^m(d\,z)\sin^\nu\left(\sqrt{z}\;c+g\right)dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2) + \frac{2^{-m-\nu+1}}{d}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(\frac{\pi m}{2}+d\,(m-2k)\,z\right)}{m-2k} +$$

$$\frac{1}{c^2}\left(2^{-m-\nu+2}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{(\nu-2k)^2}\left((-1)^{k+\nu}\binom{\nu}{k}\right.\right.$$

$$\left.\left.\left(\cos\left(2\,g\,k-g\,\nu+c\,(2k-\nu)\sqrt{z}-\frac{\pi\nu}{2}\right)+c\,(2k-\nu)\sqrt{z}\,\sin\left(2\,g\,k-g\,\nu+c\,(2k-\nu)\sqrt{z}-\frac{\pi\nu}{2}\right)\right)\right)\right)+$$

$$2^{-m-\nu}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{(2\,d\,k-d\,m)^{3/2}}\left(\sqrt{2\pi}\,(c\,\nu-2\,c\,s)\cos\left(-\frac{(2\,c\,s-c\,\nu)^2}{4\,(2\,d\,k-d\,m)}+\right.\right.\right.$$

$$\left.2\,g\,s-g\,\nu-\frac{1}{2}\pi\,(m+\nu)\right)C\left(\frac{2\sqrt{z}\,(2\,d\,k-d\,m)+2\,c\,s-c\,\nu}{\sqrt{2\,d\,k-d\,m}\,\sqrt{2\pi}}\right)+\sqrt{2\pi}\,(2\,c\,s-c\,\nu)$$

$$S\left(\frac{2\sqrt{z}\,(2\,d\,k-d\,m)+2\,c\,s-c\,\nu}{\sqrt{2\,d\,k-d\,m}\,\sqrt{2\pi}}\right)\sin\left(-\frac{(2\,c\,s-c\,\nu)^2}{4\,(2\,d\,k-d\,m)}+2\,g\,s-g\,\nu-\frac{1}{2}\pi\,(m+\nu)\right)+$$

$$\left.2\sqrt{2\,d\,k-d\,m}\,\sin\left(2\,g\,s-g\,\nu-\frac{1}{2}\pi\,(m+\nu)+(2\,d\,k-d\,m)\,z+(2\,c\,s-c\,\nu)\sqrt{z}\right)\right)+\frac{1}{(2\,d\,k-d\,m)^{3/2}}$$

$$\left(\sqrt{2\pi}\,(2\,c\,s-c\,\nu)\cos\left(\frac{(c\,\nu-2\,c\,s)^2}{4\,(2\,d\,k-d\,m)}+2\,g\,s-g\,\nu-\frac{1}{2}\pi\,(\nu-m)\right)C\left(\frac{2\sqrt{z}\,(2\,d\,k-d\,m)-2\,c\,s+c\,\nu}{\sqrt{2\,d\,k-d\,m}\,\sqrt{2\pi}}\right)-\right.$$

$$\sqrt{2\pi}\,(c\,\nu-2\,c\,s)\,S\left(\frac{2\sqrt{z}\,(2\,d\,k-d\,m)-2\,c\,s+c\,\nu}{\sqrt{2\,d\,k-d\,m}\,\sqrt{2\pi}}\right)\sin\left(\frac{(c\,\nu-2\,c\,s)^2}{4\,(2\,d\,k-d\,m)}+2\,g\,s-g\,\nu-\frac{1}{2}\pi\,(\nu-m)\right)-$$

$$\left.\left.2\sqrt{2\,d\,k-d\,m}\,\sin\left(2\,g\,s-g\,\nu-\frac{1}{2}\pi\,(\nu-m)-(2\,d\,k-d\,m)\,z-(c\,\nu-2\,c\,s)\sqrt{z}\right)\right)\right)\;/;\; m\in\mathbb{N}^+\land \nu\in\mathbb{N}^+$$

Involving $\sin^m(d\,z+e)\sin^\nu(c\,z^r+g)$

01.06.21.0798.01

$$\int \sin^m(d\,z+e)\sin^v\left(c\,z^2+g\right)dz = 2^{-m-v}\,z\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m \bmod 2)(1-v \bmod 2)+2^{-m-v+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}\frac{1}{\sqrt{c\,(v-2k)}}(-1)^{k+v}\binom{v}{k}\left(\cos\left(\frac{\pi\,v}{2}+g\,(v-2k)\right)C\left(\frac{c\sqrt{\frac{2}{\pi}}\,(v-2k)\,z}{\sqrt{c\,(v-2k)}}\right)-S\left(\frac{c\sqrt{\frac{2}{\pi}}\,(v-2k)\,z}{\sqrt{c\,(v-2k)}}\right)\sin\left(\frac{\pi\,v}{2}+g\,(v-2k)\right)\right)+$$

$$\frac{2^{-m-v+1}}{d}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(e\,(2k-m)+2\,d\,k\,z-\frac{1}{2}m\,(2\,d\,z+\pi)\right)}{2k-m}+$$

$$2^{-m-v+\frac{1}{2}}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\frac{1}{\sqrt{c\,v-2\,c\,s}}\left(\cos\left(-\frac{(2\,d\,k-d\,m)^2}{4\,(c\,v-2\,c\,s)}+e\,(2k-m)-\frac{1}{2}\pi\,(m-v)-g\,(2s-v)\right)C\left(\frac{2\,d\,k-d\,m+2\,(c\,v-2\,c\,s)\,z}{\sqrt{2\pi}\sqrt{c\,v-2\,c\,s}}\right)-S\left(\frac{2\,d\,k-d\,m+2\,(c\,v-2\,c\,s)\,z}{\sqrt{2\pi}\sqrt{c\,v-2\,c\,s}}\right)\sin\left(-\frac{(2\,d\,k-d\,m)^2}{4\,(c\,v-2\,c\,s)}+e\,(2k-m)-\frac{1}{2}\pi\,(m-v)-g\,(2s-v)\right)\right)+\frac{1}{\sqrt{2\,c\,s-c\,v}}\left(\cos\left(-\frac{(2\,d\,k-d\,m)^2}{4\,(2\,c\,s-c\,v)}+e\,(2k-m)+g\,(2s-v)-\frac{1}{2}\pi\,(m+v)\right)C\left(\frac{2\,d\,k-d\,m+2\,(2\,c\,s-c\,v)\,z}{\sqrt{2\pi}\sqrt{2\,c\,s-c\,v}}\right)-S\left(\frac{2\,d\,k-d\,m+2\,(2\,c\,s-c\,v)\,z}{\sqrt{2\pi}\sqrt{2\,c\,s-c\,v}}\right)\sin\left(-\frac{(2\,d\,k-d\,m)^2}{4\,(2\,c\,s-c\,v)}+e\,(2k-m)+g\,(2s-v)-\frac{1}{2}\pi\,(m+v)\right)\right)\right)\;/;\;m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

01.06.21.0799.01

$$\int \sin^m(d\,z+e)\sin^\nu\left(\sqrt{z}\;c+g\right)dz =$$

$$2^{-m-\nu} z \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1-m \bmod 2)(1-\nu \bmod 2) + \frac{1}{c^2}\left(2^{-m-\nu+2}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{(\nu-2k)^2}\left((-1)^{k+\nu}\binom{\nu}{k}\right.\right.$$

$$\left.\left.\left(\cos\left(2gk-g\nu+c(2k-\nu)\sqrt{z}-\frac{\pi\nu}{2}\right)+c(2k-\nu)\sqrt{z}\,\sin\left(2gk-g\nu+c(2k-\nu)\sqrt{z}-\frac{\pi\nu}{2}\right)\right)\right)\right)+$$

$$\frac{2^{-m-\nu+1}}{d}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(\frac{\pi m}{2}+e(m-2k)+d(m-2k)z\right)}{m-2k}+$$

$$2^{-m-\nu}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{(2dk-dm)^{3/2}}\left(\sqrt{2\pi}\,(2cs-c\nu)\cos\left(-\frac{(c\nu-2cs)^2}{4(2dk-dm)}+2ek-em-\right.\right.\right.$$

$$\left.2gs+g\nu+\frac{1}{2}\pi(\nu-m)\right)C\left(\frac{2\sqrt{z}\,(2dk-dm)-2cs+c\nu}{\sqrt{2dk-dm}\,\sqrt{2\pi}}\right)+\sqrt{2\pi}\,(c\nu-2cs)$$

$$S\left(\frac{2\sqrt{z}\,(2dk-dm)-2cs+c\nu}{\sqrt{2dk-dm}\,\sqrt{2\pi}}\right)\sin\left(-\frac{(c\nu-2cs)^2}{4(2dk-dm)}+2ek-em-2gs+g\nu+\frac{1}{2}\pi(\nu-m)\right)+$$

$$\left.2\sqrt{2dk-dm}\,\sin\left(2ek-em-2gs+g\nu+\frac{1}{2}\pi(\nu-m)+(2dk-dm)z+(c\nu-2cs)\sqrt{z}\right)\right)+$$

$$\frac{1}{(2dk-dm)^{3/2}}\left(\sqrt{2\pi}\,(c\nu-2cs)\cos\left(-\frac{(2cs-c\nu)^2}{4(2dk-dm)}+2ek-em+2gs-g\nu-\frac{1}{2}\pi(m+\nu)\right)\right.$$

$$C\left(\frac{2\sqrt{z}\,(2dk-dm)+2cs-c\nu}{\sqrt{2dk-dm}\,\sqrt{2\pi}}\right)+\sqrt{2\pi}\,(2cs-c\nu)\,S\left(\frac{2\sqrt{z}\,(2dk-dm)+2cs-c\nu}{\sqrt{2dk-dm}\,\sqrt{2\pi}}\right)$$

$$\sin\left(-\frac{(2cs-c\nu)^2}{4(2dk-dm)}+2ek-em+2gs-g\nu-\frac{1}{2}\pi(m+\nu)\right)+2\sqrt{2dk-dm}$$

$$\left.\left.\sin\left(2ek-em+2gs-g\nu-\frac{1}{2}\pi(m+\nu)+(2dk-dm)z+(2cs-c\nu)\sqrt{z}\right)\right)\right)\;/;\;m\in\mathbb{N}^+\land\nu\in\mathbb{N}^+$$

Involving $\sin^m(b\,z^r)\sin^\nu(c\,z^r+g)$

01.06.21.0800.01

$$\int \sin^m(b z^r) \sin^\nu(c z^r + g)\, dz = (-1)^m 2^{-m-\nu} z \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - m \bmod 2)(1 - \nu \bmod 2) - \frac{1}{r} i^{-m} 2^{-m-\nu} z \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k}$$

$$\left((-1)^m \Gamma\left(\frac{1}{r}, (i b m - 2 i b k) z^r\right) ((i b m - 2 i b k) z^r)^{-1/r} + ((2 i b k - i b m) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (2 i b k - i b m) z^r\right)\right) -$$

$$\frac{1}{r}\left((-1)^m i^{-\nu} 2^{-m-\nu} z \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^\nu e^{2 i g k - i g \nu} \Gamma\left(\frac{1}{r}, (i c \nu - 2 i c k) z^r\right) ((i c \nu - 2 i c k) z^r)^{-1/r} + \right.\right.$$

$$\left.\left. e^{i g \nu - 2 i g k} ((2 i c k - i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (2 i c k - i c \nu) z^r\right)\right)\right) - \frac{(2 i)^{-m-\nu} z}{r} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k}$$

$$\sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{m+\nu} e^{2 i g s - i g \nu} \Gamma\left(\frac{1}{r}, (-2 b i k + i b m - 2 i c s + i c \nu) z^r\right) ((-2 b i k + i b m - 2 i c s + i c \nu) z^r)^{-1/r} + \right.$$

$$(-1)^\nu e^{2 i g s - i g \nu} ((2 i b k - i b m - 2 i c s + i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (2 i b k - i b m - 2 i c s + i c \nu) z^r\right) +$$

$$(-1)^m e^{i g \nu - 2 i g s} ((-2 b i k + i b m + 2 i c s - i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-2 b i k + i b m + 2 i c s - i c \nu) z^r\right) +$$

$$\left. e^{i g \nu - 2 i g s} ((2 i b k - i b m + 2 i c s - i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (2 i b k - i b m + 2 i c s - i c \nu) z^r\right)\right) /; m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.0801.01

$$\int \sin^m(b z^2) \sin^v(c z^2 + g)\, dz = 2^{-m-v} z \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2) + 2^{-m-v+\frac{1}{2}} \sqrt{\pi} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \frac{(-1)^{k+m}}{\sqrt{b(m-2k)}} \binom{m}{k} \left(\cos\left(\frac{m\pi}{2}\right) C\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\, z}{\sqrt{b(m-2k)}}\right) - S\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\, z}{\sqrt{b(m-2k)}}\right) \sin\left(\frac{m\pi}{2}\right) \right) +$$

$$2^{-m-v+\frac{1}{2}} \sqrt{\pi} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} \frac{1}{\sqrt{c(v-2k)}}$$

$$\left((-1)^{k+v} \binom{v}{k} \left(\cos\left(\frac{\pi v}{2} + g(v-2k)\right) C\left(\frac{c\sqrt{\frac{2}{\pi}}\,(v-2k) z}{\sqrt{c(v-2k)}}\right) - S\left(\frac{c\sqrt{\frac{2}{\pi}}\,(v-2k) z}{\sqrt{c(v-2k)}}\right) \sin\left(\frac{\pi v}{2} + g(v-2k)\right) \right) \right) +$$

$$2^{-m-v+\frac{1}{2}} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{s+v} \binom{v}{s} \left(\left(\cos\left(\frac{1}{2}\pi(m-v) + g(2s-v)\right) C\left(\sqrt{\frac{2}{\pi}} \sqrt{2bk - bm - 2cs + cv}\; z\right) + \right.\right.$$

$$\left. S\left(\sqrt{\frac{2}{\pi}} \sqrt{2bk - bm - 2cs + cv}\; z\right) \sin\left(\frac{1}{2}\pi(m-v) + g(2s-v)\right)\right) \Big/ \left(\sqrt{2bk - bm - 2cs + cv}\right) +$$

$$\left(\cos\left(g(2s-v) - \frac{1}{2}\pi(m+v)\right) C\left(\sqrt{\frac{2}{\pi}} \sqrt{2bk - bm + 2cs - cv}\; z\right) - S\left(\sqrt{\frac{2}{\pi}} \sqrt{2bk - bm + 2cs - cv}\; z\right) \right.$$

$$\left.\left. \sin\left(g(2s-v) - \frac{1}{2}\pi(m+v)\right)\right) \Big/ \left(\sqrt{2bk - bm + 2cs - cv}\right)\right) /;\ m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

01.06.21.0802.01

$$\int \sin^m\left(\sqrt{z}\, b\right) \sin^v\left(\sqrt{z}\, c + g\right) dz = 2^{-m-v} z \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2) + \frac{1}{b^2} \left(2^{-m-v+2} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \frac{1}{(2k-m)^2} \left((-1)^k \binom{m}{k} \left(\cos\left(b \sqrt{z}\, (2k-m) + \frac{m\pi}{2}\right) + b(2k-m)\sqrt{z} \sin\left(b\sqrt{z}\,(2k-m) + \frac{m\pi}{2}\right)\right)\right)\right) +$$

$$\frac{1}{c^2} \left(2^{-m-v+2} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} \frac{1}{(2k-v)^2} \left((-1)^k \binom{v}{k} \left(\cos\left(c\sqrt{z}\,(2k-v) + \frac{\pi v}{2} - g(v-2k)\right) + c(2k-v)\sqrt{z} \sin\left(c\sqrt{z}\,(2k-v) + \frac{\pi v}{2} - g(v-2k)\right)\right)\right)\right) +$$

$$2^{-m-v+2} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(\left(\cos\left(\frac{1}{2}\pi(m-v) + g(v-2s) + (b(2k-m) + c(v-2s))\sqrt{z}\right) + (b(2k-m) + c(v-2s))\sqrt{z} \sin\left(\frac{1}{2}\pi(m-v) + g(v-2s) + (b(2k-m) + c(v-2s))\sqrt{z}\right)\right) \Big/ (b(2k-m) + c(v-2s))^2 + \left(\cos\left(\frac{1}{2}\pi(m+v) - g(v-2s) + (b(2k-m) - c(v-2s))\sqrt{z}\right) + (b(2k-m) - c(v-2s))\sqrt{z} \sin\left(\frac{1}{2}\pi(m+v) - g(v-2s) + (b(2k-m) - c(v-2s))\sqrt{z}\right)\right) \Big/ (b(2k-m) - c(v-2s))^2 \right) /;\ m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

Involving $\sin^m\left(a z^r + e\right) \sin^v\left(c z^r + g\right)$

01.06.21.0803.01

$$\int \sin^m(b z^r + e) \sin^v(c z^r + g)\, dz = (-1)^m 2^{-m-v} z \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2) -$$
$$\frac{1}{r} i^{-m} 2^{-m-v} z \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \Big((-1)^m e^{2 i e k - i e m} \Gamma\Big(\frac{1}{r}, (i b m - 2 i b k) z^r\Big) ((i b m - 2 i b k) z^r)^{-1/r} +$$
$$e^{i e m - 2 i e k} ((2 i b k - i b m) z^r)^{-1/r} \Gamma\Big(\frac{1}{r}, (2 i b k - i b m) z^r\Big)\Big) -$$
$$\frac{1}{r} (-1)^m i^{-v} 2^{-m-v} z \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \Big((-1)^v e^{2 i g k - i g v} \Gamma\Big(\frac{1}{r}, (i c v - 2 i c k) z^r\Big) ((i c v - 2 i c k) z^r)^{-1/r} +$$
$$e^{i g v - 2 i g k} ((2 i c k - i c v) z^r)^{-1/r} \Gamma\Big(\frac{1}{r}, (2 i c k - i c v) z^r\Big)\Big) -$$
$$\frac{(2 i)^{-m-v} z}{r} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Big((-1)^{m+v} e^{2 i e k - i e m + 2 i g s - i g v} \Gamma\Big(\frac{1}{r}, (-2 b i k + i b m - 2 i c s + i c v) z^r\Big)$$
$$((-2 b i k + i b m - 2 i c s + i c v) z^r)^{-1/r} + (-1)^v e^{-2 e i k + i e m + 2 i g s - i g v}$$
$$((2 i b k - i b m - 2 i c s + i c v) z^r)^{-1/r} \Gamma\Big(\frac{1}{r}, (2 i b k - i b m - 2 i c s + i c v) z^r\Big) + (-1)^m e^{2 i e k - i e m - 2 i g s + i g v}$$
$$((-2 b i k + i b m + 2 i c s - i c v) z^r)^{-1/r} \Gamma\Big(\frac{1}{r}, (-2 b i k + i b m + 2 i c s - i c v) z^r\Big) + e^{-2 e i k + i e m - 2 i g s + i g v}$$
$$((2 i b k - i b m + 2 i c s - i c v) z^r)^{-1/r} \Gamma\Big(\frac{1}{r}, (2 i b k - i b m + 2 i c s - i c v) z^r\Big)\Big) /; m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

01.06.21.0804.01

$$\int \sin^m\left(b z^2 + e\right) \sin^\nu\left(c z^2 + g\right) dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - m \bmod 2)(1 - \nu \bmod 2) +$$

$$2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \frac{(-1)^{k+m}}{\sqrt{b(m-2k)}} \binom{m}{k} \left(\cos\left(\frac{\pi m}{2} + e(m-2k)\right) C\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\, z}{\sqrt{b(m-2k)}}\right) - \right.$$

$$\left. S\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\, z}{\sqrt{b(m-2k)}}\right) \sin\left(\frac{\pi m}{2} + e(m-2k)\right) \right) + 2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{(-1)^{k+\nu}}{\sqrt{c(\nu-2k)}} \binom{\nu}{k} \left(\cos\left(\frac{\pi \nu}{2} + g(\nu-2k)\right) C\left(\frac{c\sqrt{\frac{2}{\pi}}\,(\nu-2k) z}{\sqrt{c(\nu-2k)}}\right) - S\left(\frac{c\sqrt{\frac{2}{\pi}}\,(\nu-2k) z}{\sqrt{c(\nu-2k)}}\right) \sin\left(\frac{\pi \nu}{2} + g(\nu-2k)\right) \right) +$$

$$2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\frac{1}{\sqrt{2bk - bm - 2cs + c\nu}} \left(\cos\left(e(2k-m) - \frac{1}{2}\pi(m-\nu) - g(2s-\nu)\right) \right. \right.$$

$$C\left(\sqrt{\frac{2}{\pi}} \sqrt{2bk - bm - 2cs + c\nu}\; z\right) - S\left(\sqrt{\frac{2}{\pi}} \sqrt{2bk - bm - 2cs + c\nu}\; z\right)$$

$$\left. \sin\left(e(2k-m) - \frac{1}{2}\pi(m-\nu) - g(2s-\nu)\right) \right) + \frac{1}{\sqrt{2bk - bm + 2cs - c\nu}}$$

$$\left(\cos\left(e(2k-m) + g(2s-\nu) - \frac{1}{2}\pi(m+\nu)\right) C\left(\sqrt{\frac{2}{\pi}} \sqrt{2bk - bm + 2cs - c\nu}\; z\right) - \right.$$

$$\left. \left. S\left(\sqrt{\frac{2}{\pi}} \sqrt{2bk - bm + 2cs - c\nu}\; z\right) \sin\left(e(2k-m) + g(2s-\nu) - \frac{1}{2}\pi(m+\nu)\right) \right) \right) /;\ m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.0805.01

$$\int \sin^m\left(\sqrt{z}\, b+e\right)\sin^v\left(\sqrt{z}\, c+g\right) dz = 2^{-m-v} z \binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m \bmod 2)(1-v \bmod 2)+\frac{1}{b^2} 2^{-m-v+2}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^k}{(2k-m)^2}\binom{m}{k} \left(\cos\left(-b\sqrt{z}\,(2k-m)+e(m-2k)-\frac{m\pi}{2}\right)-b(2k-m)\sqrt{z}\,\sin\left(-b\sqrt{z}\,(2k-m)+e(m-2k)-\frac{m\pi}{2}\right)\right)+ \frac{1}{c^2} 2^{-m-v+2}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}\frac{1}{(2k-v)^2}\left((-1)^k\binom{v}{k} \left(\cos\left(c\sqrt{z}\,(2k-v)+\frac{\pi v}{2}-g(v-2k)\right)+c(2k-v)\sqrt{z}\,\sin\left(c\sqrt{z}\,(2k-v)+\frac{\pi v}{2}-g(v-2k)\right)\right)\right)+ 2^{-m-v+2}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left(\frac{1}{(b(2k-m)+c(v-2s))^2}\left(\cos\left(e(m-2k)-\frac{1}{2}\pi(m-v)-g (v-2s)-(b(2k-m)+c(v-2s))\sqrt{z}\right)-(b(2k-m)+c(v-2s))\sqrt{z}\,\sin\left(e(m-2k)- \frac{1}{2}\pi(m-v)-g(v-2s)-(b(2k-m)+c(v-2s))\sqrt{z}\right)\right)+\frac{1}{(b(2k-m)-c(v-2s))^2} \left(\cos\left(e(m-2k)-\frac{1}{2}\pi(m+v)+g(v-2s)-(b(2k-m)-c(v-2s))\sqrt{z}\right)-(b(2k-m)-c(v-2s)) \sqrt{z}\,\sin\left(e(m-2k)-\frac{1}{2}\pi(m+v)+g(v-2s)-(b(2k-m)-c(v-2s))\sqrt{z}\right)\right)\right)\ /;\ m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving $\sin^m(d\,z)\sin^v\left(c\,z^r+f\,z\right)$

01.06.21.0806.01

$$\int \sin^m(d\,z)\sin^\nu\left(c\,z^2+f\,z\right)dz = 2^{-m-\nu}\,z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+\frac{2^{-m-\nu+1}}{d}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(2\,d\,k\,z-\frac{1}{2}\,m\,(2\,d\,z+\pi)\right)}{2\,k-m}+2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{\sqrt{c\,(\nu-2\,k)}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(\cos\left(\frac{\pi\,\nu}{2}-\frac{f^2\,(\nu-2\,k)}{4\,c}\right)C\left(\frac{f\,(\nu-2\,k)+2\,c\,z\,(\nu-2\,k)}{\sqrt{2\,\pi}\,\sqrt{c\,(\nu-2\,k)}}\right)-S\left(\frac{f\,(\nu-2\,k)+2\,c\,z\,(\nu-2\,k)}{\sqrt{2\,\pi}\,\sqrt{c\,(\nu-2\,k)}}\right)\sin\left(\frac{\pi\,\nu}{2}-\frac{f^2\,(\nu-2\,k)}{4\,c}\right)\right)\right)+2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{c\,\nu-2\,c\,s}}\left(\cos\left(\frac{(2\,d\,k-d\,m-2\,f\,s+f\,\nu)^2}{4\,(c\,\nu-2\,c\,s)}+\frac{1}{2}\,\pi\,(m-\nu)\right)C\left(\frac{2\,d\,k-d\,m-2\,f\,s+f\,\nu+2\,(c\,\nu-2\,c\,s)\,z}{\sqrt{2\,\pi}\,\sqrt{c\,\nu-2\,c\,s}}\right)+S\left(\frac{2\,d\,k-d\,m-2\,f\,s+f\,\nu+2\,(c\,\nu-2\,c\,s)\,z}{\sqrt{2\,\pi}\,\sqrt{c\,\nu-2\,c\,s}}\right)\sin\left(\frac{(2\,d\,k-d\,m-2\,f\,s+f\,\nu)^2}{4\,(c\,\nu-2\,c\,s)}+\frac{1}{2}\,\pi\,(m-\nu)\right)\right)+\frac{1}{\sqrt{2\,c\,s-c\,\nu}}\left(\cos\left(\frac{(2\,d\,k-d\,m+2\,f\,s-f\,\nu)^2}{4\,(2\,c\,s-c\,\nu)}+\frac{1}{2}\,\pi\,(m+\nu)\right)C\left(\frac{2\,d\,k-d\,m+2\,f\,s-f\,\nu+2\,(2\,c\,s-c\,\nu)\,z}{\sqrt{2\,\pi}\,\sqrt{2\,c\,s-c\,\nu}}\right)+S\left(\frac{2\,d\,k-d\,m+2\,f\,s-f\,\nu+2\,(2\,c\,s-c\,\nu)\,z}{\sqrt{2\,\pi}\,\sqrt{2\,c\,s-c\,\nu}}\right)\sin\left(\frac{(2\,d\,k-d\,m+2\,f\,s-f\,\nu)^2}{4\,(2\,c\,s-c\,\nu)}+\frac{1}{2}\,\pi\,(m+\nu)\right)\right)\right)\;/;\;m\in\mathbb{N}^+\land\nu\in\mathbb{N}^+$$

01.06.21.0807.01

$$\int \sin^m(d\,z)\sin^\nu\left(\sqrt{z}\,c+f\,z\right)dz = 2^{-m-\nu}\,z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+\frac{2^{-m-\nu+1}}{d}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(\frac{\pi\,m}{2}+d\,(m-2\,k)\,z\right)}{m-2\,k}+2^{-m-\nu}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{(f\,(\nu-2\,k))^{3/2}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(-c\sqrt{2\,\pi}\,(\nu-2\,k)\cos\left(\frac{\pi\,\nu}{2}-\frac{c^2\,(\nu-2\,k)}{4\,f}\right)C\left(\frac{c\,(\nu-2\,k)+2\,f\sqrt{z}\,(\nu-2\,k)}{\sqrt{2\,\pi}\,\sqrt{f\,(\nu-2\,k)}}\right)+c\sqrt{2\,\pi}\,(\nu-2\,k)\,S\left(\frac{c\,(\nu-2\,k)+2\,f\sqrt{z}\,(\nu-2\,k)}{\sqrt{2\,\pi}\,\sqrt{f\,(\nu-2\,k)}}\right)\sin\left(\frac{\pi\,\nu}{2}-\frac{c^2\,(\nu-2\,k)}{4\,f}\right)+2\sqrt{f\,(\nu-2\,k)}\,\sin\left(\frac{\pi\,\nu}{2}+f\,(\nu-2\,k)\,z+c\,(\nu-2\,k)\sqrt{z}\right)\right)\right)+$$

$$2^{-m-v} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{s+v} \binom{v}{s} \Bigg(\Bigg(\Bigg(\sqrt{2\pi} \, (2\,c\,s - c\,v) \cos\!\left(\frac{1}{2}\pi(v-m) - \frac{(c\,v - 2\,c\,s)^2}{4\,(2\,d\,k - d\,m - 2\,f\,s + f\,v)}\right)$$

$$C\!\left(\frac{-2\,c\,s + c\,v + 2\,(2\,d\,k - d\,m - 2\,f\,s + f\,v)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2\,d\,k - d\,m - 2\,f\,s + f\,v}}\right) + \sqrt{2\pi}\,(c\,v - 2\,c\,s)$$

$$S\!\left(\frac{-2\,c\,s + c\,v + 2\,(2\,d\,k - d\,m - 2\,f\,s + f\,v)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2\,d\,k - d\,m - 2\,f\,s + f\,v}}\right) \sin\!\left(\frac{1}{2}\pi(v-m) - \frac{(c\,v - 2\,c\,s)^2}{4\,(2\,d\,k - d\,m - 2\,f\,s + f\,v)}\right) +$$

$$2\sqrt{2\,d\,k - d\,m - 2\,f\,s + f\,v}\,\sin\!\left(\frac{1}{2}\pi(v-m) + (2\,d\,k - d\,m - 2\,f\,s + f\,v)\,z + (c\,v - 2\,c\,s)\sqrt{z}\right)\Bigg) \Bigg/$$

$$(2\,d\,k - d\,m - 2\,f\,s + f\,v)^{3/2} + \Bigg(\sqrt{2\pi}\,(c\,v - 2\,c\,s)\cos\!\left(\frac{(2\,c\,s - c\,v)^2}{4\,(2\,d\,k - d\,m + 2\,f\,s - f\,v)} + \frac{1}{2}\pi(m+v)\right)$$

$$C\!\left(\frac{2\,c\,s - c\,v + 2\,(2\,d\,k - d\,m + 2\,f\,s - f\,v)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2\,d\,k - d\,m + 2\,f\,s - f\,v}}\right) - \sqrt{2\pi}\,(2\,c\,s - c\,v)$$

$$S\!\left(\frac{2\,c\,s - c\,v + 2\,(2\,d\,k - d\,m + 2\,f\,s - f\,v)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2\,d\,k - d\,m + 2\,f\,s - f\,v}}\right) \sin\!\left(\frac{(2\,c\,s - c\,v)^2}{4\,(2\,d\,k - d\,m + 2\,f\,s - f\,v)} + \frac{1}{2}\pi(m+v)\right) -$$

$$2\sqrt{2\,d\,k - d\,m + 2\,f\,s - f\,v}\,\sin\!\left(\frac{1}{2}\pi(m+v) - (2\,d\,k - d\,m + 2\,f\,s - f\,v)\,z - (2\,c\,s - c\,v)\sqrt{z}\right)\Bigg) \Bigg/$$

$$(2\,d\,k - d\,m + 2\,f\,s - f\,v)^{3/2}\Bigg) /;\ m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

Involving $\sin^m(d\,z + e)\sin^v(c\,z^r + f\,z)$

01.06.21.0808.01

$$\int \sin^m(d\,z+e)\sin^\nu\left(c\,z^2+f\,z\right)dz = 2^{-m-\nu}\,z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+ 2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{\sqrt{c(\nu-2k)}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(\cos\left(\frac{\pi\nu}{2}-\frac{f^2(\nu-2k)}{4c}\right)C\left(\frac{f(\nu-2k)+2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right)- S\left(\frac{f(\nu-2k)+2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right)\sin\left(\frac{\pi\nu}{2}-\frac{f^2(\nu-2k)}{4c}\right)\right)\right)+ \frac{2^{-m-\nu+1}}{d}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(e(2k-m)+2dkz-\frac{1}{2}m(2dz+\pi)\right)}{2k-m}+2^{-m-\nu+\frac{1}{2}}\sqrt{\pi} \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{c\nu-2cs}}\left(\cos\left(-\frac{(2dk-dm-2fs+f\nu)^2}{4(c\nu-2cs)}+e(2k-m)-\frac{1}{2}\pi(m-\nu)\right)\right.\right. C\left(\frac{2dk-dm-2fs+f\nu+2(c\nu-2cs)z}{\sqrt{2\pi}\sqrt{c\nu-2cs}}\right)-S\left(\frac{2dk-dm-2fs+f\nu+2(c\nu-2cs)z}{\sqrt{2\pi}\sqrt{c\nu-2cs}}\right) \left.\sin\left(-\frac{(2dk-dm-2fs+f\nu)^2}{4(c\nu-2cs)}+e(2k-m)-\frac{1}{2}\pi(m-\nu)\right)\right)+ \frac{1}{\sqrt{2cs-c\nu}}\left(\cos\left(-\frac{(2dk-dm+2fs-f\nu)^2}{4(2cs-c\nu)}+e(2k-m)-\frac{1}{2}\pi(m+\nu)\right)\right. C\left(\frac{2dk-dm+2fs-f\nu+2(2cs-c\nu)z}{\sqrt{2\pi}\sqrt{2cs-c\nu}}\right)-S\left(\frac{2dk-dm+2fs-f\nu+2(2cs-c\nu)z}{\sqrt{2\pi}\sqrt{2cs-c\nu}}\right) \left.\left.\sin\left(-\frac{(2dk-dm+2fs-f\nu)^2}{4(2cs-c\nu)}+e(2k-m)-\frac{1}{2}\pi(m+\nu)\right)\right)\right)\;/;\; m\in\mathbb{N}^+\land \nu\in\mathbb{N}^+$$

01.06.21.0809.01

$$\int \sin^m(e+d\,z)\sin^\nu\left(\sqrt{z}\,c+f\,z\right)dz = 2^{-m-\nu}\,z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+2^{-m-\nu}\binom{m}{\frac{m}{2}}(1-m \bmod 2) \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{(f(\nu-2k))^{3/2}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(-c\sqrt{2\pi}(\nu-2k)\cos\left(\frac{\pi\nu}{2}-\frac{c^2(\nu-2k)}{4f}\right)C\left(\frac{c(\nu-2k)+2f\sqrt{z}(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}}\right)+\right.\right. c\sqrt{2\pi}(\nu-2k)S\left(\frac{c(\nu-2k)+2f\sqrt{z}(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}}\right)\sin\left(\frac{\pi\nu}{2}-\frac{c^2(\nu-2k)}{4f}\right)+ \left.\left.2\sqrt{f(\nu-2k)}\sin\left(\frac{\pi\nu}{2}+f(\nu-2k)z+c(\nu-2k)\sqrt{z}\right)\right)\right)+ \frac{2^{-m-\nu+1}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(\frac{\pi m}{2}+e(m-2k)+d(m-2k)z\right)}{m-2k}}{d}+2^{-m-\nu}$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\left(\left(\sqrt{2\pi}\,(2cs-cv)\cos\left(-\frac{(cv-2cs)^2}{4(2dk-dm-2fs+fv)}+2ek-em+\frac{1}{2}\pi(v-m)\right)\right.\right.\right.$$
$$C\left(\frac{-2cs+cv+2(2dk-dm-2fs+fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2dk-dm-2fs+fv}}\right)+$$
$$\sqrt{2\pi}\,(cv-2cs)\,S\left(\frac{-2cs+cv+2(2dk-dm-2fs+fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2dk-dm-2fs+fv}}\right)$$
$$\sin\left(-\frac{(cv-2cs)^2}{4(2dk-dm-2fs+fv)}+2ek-em+\frac{1}{2}\pi(v-m)\right)+2\sqrt{2dk-dm-2fs+fv}$$
$$\left.\left.\sin\left(2ek-em+\frac{1}{2}\pi(v-m)+(2dk-dm-2fs+fv)z+(cv-2cs)\sqrt{z}\right)\right)\right/$$
$$(2dk-dm-2fs+fv)^{3/2}+\left(\sqrt{2\pi}\,(cv-2cs)\cos\left(-\frac{(2cs-cv)^2}{4(2dk-dm+2fs-fv)}+\right.\right.$$
$$\left.2ek-em-\frac{1}{2}\pi(m+v)\right)C\left(\frac{2cs-cv+2(2dk-dm+2fs-fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2dk-dm+2fs-fv}}\right)+$$
$$\sqrt{2\pi}\,(2cs-cv)\,S\left(\frac{2cs-cv+2(2dk-dm+2fs-fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2dk-dm+2fs-fv}}\right)\sin\left(-\frac{(2cs-cv)^2}{4(2dk-dm+2fs-fv)}+\right.$$
$$\left.2ek-em-\frac{1}{2}\pi(m+v)\right)+2\sqrt{2dk-dm+2fs-fv}\,\sin\left(2ek-em-\frac{1}{2}\pi(m+v)+\right.$$
$$\left.\left.\left.(2dk-dm+2fs-fv)z+(2cs-cv)\sqrt{z}\right)\right)\right/(2dk-dm+2fs-fv)^{3/2}\right)\ /;\ m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $\sin^m(b\,z^r)\sin^v(c\,z^r+f\,z)$

01.06.21.0810.01

$$\int \sin^m(b z^2)\sin^\nu(c z^2+f z)\,dz = 2^{-m-\nu} z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)$$
$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}}{\sqrt{b(m-2k)}}\binom{m}{k}\left(\cos\left(\frac{m\pi}{2}\right)C\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\,z}{\sqrt{b(m-2k)}}\right)-S\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\,z}{\sqrt{b(m-2k)}}\right)\sin\left(\frac{m\pi}{2}\right)\right)+$$
$$2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{\sqrt{c(\nu-2k)}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(\cos\left(\frac{\pi\nu}{2}-\frac{f^2(\nu-2k)}{4c}\right)C\left(\frac{f(\nu-2k)+2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right)-\right.\right.$$
$$\left.\left.S\left(\frac{f(\nu-2k)+2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right)\sin\left(\frac{\pi\nu}{2}-\frac{f^2(\nu-2k)}{4c}\right)\right)\right)+2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}$$
$$\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\left(\left(\cos\left(\frac{(f\nu-2fs)^2}{4(2bk-bm-2cs+c\nu)}+\frac{1}{2}\pi(m-\nu)\right)C\left(\frac{-2fs+f\nu+2(2bk-bm-2cs+c\nu)z}{\sqrt{2\pi}\sqrt{2bk-bm-2cs+c\nu}}\right)+\right.\right.\right.$$
$$\left.\left.S\left(\frac{-2fs+f\nu+2(2bk-bm-2cs+c\nu)z}{\sqrt{2\pi}\sqrt{2bk-bm-2cs+c\nu}}\right)\sin\left(\frac{(f\nu-2fs)^2}{4(2bk-bm-2cs+c\nu)}+\frac{1}{2}\pi(m-\nu)\right)\right)\right/$$
$$\left(\sqrt{2bk-bm-2cs+c\nu}\right)+\left(\cos\left(\frac{(2fs-f\nu)^2}{4(2bk-bm+2cs-c\nu)}+\frac{1}{2}\pi(m+\nu)\right)\right.$$
$$C\left(\frac{2fs-f\nu+2(2bk-bm+2cs-c\nu)z}{\sqrt{2\pi}\sqrt{2bk-bm+2cs-c\nu}}\right)+S\left(\frac{2fs-f\nu+2(2bk-bm+2cs-c\nu)z}{\sqrt{2\pi}\sqrt{2bk-bm+2cs-c\nu}}\right)$$
$$\left.\left.\sin\left(\frac{(2fs-f\nu)^2}{4(2bk-bm+2cs-c\nu)}+\frac{1}{2}\pi(m+\nu)\right)\right)\right/\left(\sqrt{2bk-bm+2cs-c\nu}\right)\right)\;/;\; m\in\mathbb{N}^+\land \nu\in\mathbb{N}^+$$

01.06.21.0811.01

$$\int \sin^m(b\sqrt{z})\sin^\nu(\sqrt{z}\,c+f z)\,dz = 2^{-m-\nu} z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+2^{-m-\nu}\binom{m}{\frac{m}{2}}(1-m \bmod 2)$$
$$\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{(f(\nu-2k))^{3/2}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(-c\sqrt{2\pi}(\nu-2k)\cos\left(\frac{\pi\nu}{2}-\frac{c^2(\nu-2k)}{4f}\right)C\left(\frac{c(\nu-2k)+2f\sqrt{z}(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}}\right)+\right.\right.$$
$$c\sqrt{2\pi}(\nu-2k)S\left(\frac{c(\nu-2k)+2f\sqrt{z}(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}}\right)\sin\left(\frac{\pi\nu}{2}-\frac{c^2(\nu-2k)}{4f}\right)+$$
$$\left.\left.2\sqrt{f(\nu-2k)}\sin\left(\frac{\pi\nu}{2}+f(\nu-2k)z+c(\nu-2k)\sqrt{z}\right)\right)\right)+\frac{1}{b^2}\left(2^{-m-\nu+2}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\right.$$
$$\left.\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{(m-2k)^2}\left((-1)^{k+m}\binom{m}{k}\left(\cos\left(\frac{m\pi}{2}-b(2k-m)\sqrt{z}\right)-b(2k-m)\sqrt{z}\sin\left(\frac{m\pi}{2}-b(2k-m)\sqrt{z}\right)\right)\right)\right)+$$

$$2^{-m-v} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{s+v} \binom{v}{s}$$

$$\left(\frac{1}{(f\,v-2\,f\,s)^{3/2}} \left(\sqrt{2\pi}\, (-2\,b\,k+b\,m+2\,c\,s-c\,v) \cos\left(\frac{1}{2}\pi\,(v-m) - \frac{(2\,b\,k-b\,m-2\,c\,s+c\,v)^2}{4\,(f\,v-2\,f\,s)} \right) \right.\right.$$

$$C\left(\frac{2\,b\,k-b\,m-2\,c\,s+c\,v+2\,(f\,v-2\,f\,s)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{f\,v-2\,f\,s}} \right) + \sqrt{2\pi}\,(2\,b\,k-b\,m-2\,c\,s+c\,v)$$

$$S\left(\frac{2\,b\,k-b\,m-2\,c\,s+c\,v+2\,(f\,v-2\,f\,s)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{f\,v-2\,f\,s}} \right) \sin\left(\frac{1}{2}\pi\,(v-m) - \frac{(2\,b\,k-b\,m-2\,c\,s+c\,v)^2}{4\,(f\,v-2\,f\,s)} \right) +$$

$$\left.2\sqrt{f\,v-2\,f\,s}\, \sin\left(\frac{1}{2}\pi\,(v-m) + (f\,v-2\,f\,s)\,z + (2\,b\,k-b\,m-2\,c\,s+c\,v)\sqrt{z} \right) \right) +$$

$$\frac{1}{(2\,f\,s-f\,v)^{3/2}} \left(\sqrt{2\pi}\, (-2\,b\,k+b\,m-2\,c\,s+c\,v) \cos\left(\frac{(2\,b\,k-b\,m+2\,c\,s-c\,v)^2}{4\,(2\,f\,s-f\,v)} + \frac{1}{2}\pi\,(m+v) \right) \right.$$

$$C\left(\frac{2\,b\,k-b\,m+2\,c\,s-c\,v+2\,(2\,f\,s-f\,v)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2\,f\,s-f\,v}} \right) - \sqrt{2\pi}\,(2\,b\,k-b\,m+2\,c\,s-c\,v)$$

$$S\left(\frac{2\,b\,k-b\,m+2\,c\,s-c\,v+2\,(2\,f\,s-f\,v)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2\,f\,s-f\,v}} \right) \sin\left(\frac{(2\,b\,k-b\,m+2\,c\,s-c\,v)^2}{4\,(2\,f\,s-f\,v)} + \frac{1}{2}\pi\,(m+v) \right) -$$

$$\left.\left. 2\sqrt{2\,f\,s-f\,v}\, \sin\left(\frac{1}{2}\pi\,(m+v) - (2\,f\,s-f\,v)\,z - (2\,b\,k-b\,m+2\,c\,s-c\,v)\sqrt{z} \right) \right) \right) /;\; m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

Involving $\sin^m(b\,z^r + e)\sin^v(c\,z^r + f\,z)$

01.06.21.0812.01

$$\int \sin^m\left(b z^2 + e\right) \sin^\nu\left(c z^2 + f z\right) dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - m \bmod 2)(1 - \nu \bmod 2) + 2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \left(\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \frac{1}{\sqrt{b(m-2k)}} \left((-1)^{k+m} \binom{m}{k} \left(\cos\left(\frac{\pi m}{2} + e(m-2k) \right) C\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\, z}{\sqrt{b(m-2k)}} \right) - S\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\, z}{\sqrt{b(m-2k)}} \right) \sin\left(\frac{\pi m}{2} + e(m-2k) \right) \right) \right) \right)$$

$$(1 - \nu \bmod 2) + 2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{\sqrt{c(\nu-2k)}} \left((-1)^{k+\nu} \binom{\nu}{k} \left(\cos\left(\frac{\pi \nu}{2} - \frac{f^2(\nu-2k)}{4c} \right) C\left(\frac{f(\nu-2k) + 2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}} \right) - S\left(\frac{f(\nu-2k) + 2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}} \right) \sin\left(\frac{\pi \nu}{2} - \frac{f^2(\nu-2k)}{4c} \right) \right) \right) +$$

$$2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\left(\cos\left(-\frac{(f\nu - 2fs)^2}{4(2bk - bm - 2cs + c\nu)} + e(2k-m) - \frac{1}{2}\pi(m-\nu) \right) C\left(\frac{-2fs + f\nu + 2(2bk - bm - 2cs + c\nu)z}{\sqrt{2\pi}\sqrt{2bk - bm - 2cs + c\nu}} \right) - S\left(\frac{-2fs + f\nu + 2(2bk - bm - 2cs + c\nu)z}{\sqrt{2\pi}\sqrt{2bk - bm - 2cs + c\nu}} \right) \sin\left(-\frac{(f\nu - 2fs)^2}{4(2bk - bm - 2cs + c\nu)} + e(2k-m) - \frac{1}{2}\pi(m-\nu) \right) \right) \Big/ \left(\sqrt{2bk - bm - 2cs + c\nu} \right) + \left(\cos\left(-\frac{(2fs - f\nu)^2}{4(2bk - bm + 2cs - c\nu)} + e(2k-m) - \frac{1}{2}\pi(m+\nu) \right) C\left(\frac{2fs - f\nu + 2(2bk - bm + 2cs - c\nu)z}{\sqrt{2\pi}\sqrt{2bk - bm + 2cs - c\nu}} \right) - S\left(\frac{2fs - f\nu + 2(2bk - bm + 2cs - c\nu)z}{\sqrt{2\pi}\sqrt{2bk - bm + 2cs - c\nu}} \right) \sin\left(-\frac{(2fs - f\nu)^2}{4(2bk - bm + 2cs - c\nu)} + e(2k-m) - \frac{1}{2}\pi(m+\nu) \right) \right) \Big/ \left(\sqrt{2bk - bm + 2cs - c\nu} \right) \right) /;\ m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.0813.01

$$\int \sin^m\left(\sqrt{z}\, b + e\right) \sin^\nu\left(\sqrt{z}\, c + f z\right) dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - m \bmod 2)(1 - \nu \bmod 2) + 2^{-m-\nu} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{(f(\nu-2k))^{3/2}} \left((-1)^{k+\nu} \binom{\nu}{k} \left(-c\sqrt{2\pi}\, (\nu-2k) \cos\left(\frac{\pi \nu}{2} - \frac{c^2(\nu-2k)}{4f} \right) C\left(\frac{c(\nu-2k) + 2f\sqrt{z}\,(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}} \right) + \right.\right.$$

$$c\sqrt{2\pi}\, (\nu-2k) S\left(\frac{c(\nu-2k) + 2f\sqrt{z}\,(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}} \right) \sin\left(\frac{\pi \nu}{2} - \frac{c^2(\nu-2k)}{4f} \right) +$$

$$2\sqrt{f(v-2k)}\,\sin\left(\frac{\pi v}{2}+f(v-2k)z+c(v-2k)\sqrt{z}\right)\Bigg)\Bigg)\Bigg)+$$

$$\frac{1}{b^2}\Bigg(2^{-m-v+2}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{(m-2k)^2}\Big((-1)^{k+m}\binom{m}{k}\Big(\cos\Big(2ek-em+b(2k-m)\sqrt{z}-\frac{m\pi}{2}\Big)+$$

$$b(2k-m)\sqrt{z}\,\sin\Big(2ek-em+b(2k-m)\sqrt{z}-\frac{m\pi}{2}\Big)\Big)\Big)\Bigg)+2^{-m-v}$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\Bigg(\frac{1}{(fv-2fs)^{3/2}}\Bigg(\sqrt{2\pi}\,(-2bk+bm+2cs-cv)\cos\Bigg(-\frac{(2bk-bm-2cs+cv)^2}{4(fv-2fs)}+$$

$$2ek-em+\frac{1}{2}\pi(v-m)\Bigg)C\left(\frac{2bk-bm-2cs+cv+2(fv-2fs)\sqrt{z}}{\sqrt{2\pi}\sqrt{fv-2fs}}\right)+$$

$$\sqrt{2\pi}\,(2bk-bm-2cs+cv)S\left(\frac{2bk-bm-2cs+cv+2(fv-2fs)\sqrt{z}}{\sqrt{2\pi}\sqrt{fv-2fs}}\right)$$

$$\sin\left(-\frac{(2bk-bm-2cs+cv)^2}{4(fv-2fs)}+2ek-em+\frac{1}{2}\pi(v-m)\right)+$$

$$2\sqrt{fv-2fs}\,\sin\left(2ek-em+\frac{1}{2}\pi(v-m)+(fv-2fs)z+(2bk-bm-2cs+cv)\sqrt{z}\right)\Bigg)+$$

$$\frac{1}{(2fs-fv)^{3/2}}\Bigg(\sqrt{2\pi}\,(-2bk+bm-2cs+cv)\cos\Bigg(-\frac{(2bk-bm+2cs-cv)^2}{4(2fs-fv)}+2ek-$$

$$em-\frac{1}{2}\pi(m+v)\Bigg)C\left(\frac{2bk-bm+2cs-cv+2(2fs-fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{2fs-fv}}\right)+$$

$$\sqrt{2\pi}\,(2bk-bm+2cs-cv)S\left(\frac{2bk-bm+2cs-cv+2(2fs-fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{2fs-fv}}\right)$$

$$\sin\left(-\frac{(2bk-bm+2cs-cv)^2}{4(2fs-fv)}+2ek-em-\frac{1}{2}\pi(m+v)\right)+2\sqrt{2fs-fv}$$

$$\sin\left(2ek-em-\frac{1}{2}\pi(m+v)+(2fs-fv)z+(2bk-bm+2cs-cv)\sqrt{z}\right)\Bigg)\Bigg)\ /;\ m\in\mathbb{N}^+\wedge v\in\mathbb{N}^+$$

Involving $\sin^m(b\,z^r+d\,z)\sin^v(c\,z^r+f\,z)$

01.06.21.0814.01

$$\int \sin^m(b z^2 + d z)\sin^\nu(c z^2 + f z)\,dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1 - m \bmod 2)(1 - \nu \bmod 2) + 2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}\left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{\sqrt{b(m-2k)}}\left((-1)^{k+m}\binom{m}{k}\left(\cos\left(\frac{d^2(m-2k)}{4b} - \frac{m\pi}{2}\right)C\left(\frac{d(m-2k) + 2bz(m-2k)}{\sqrt{b(m-2k)}\sqrt{2\pi}}\right) + S\left(\frac{d(m-2k) + 2bz(m-2k)}{\sqrt{b(m-2k)}\sqrt{2\pi}}\right)\sin\left(\frac{d^2(m-2k)}{4b} - \frac{m\pi}{2}\right)\right)\right)\right)(1 - \nu \bmod 2) + 2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1 - m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{\sqrt{c(\nu-2k)}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(\cos\left(\frac{\pi\nu}{2} - \frac{f^2(\nu-2k)}{4c}\right)C\left(\frac{f(\nu-2k) + 2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right) - S\left(\frac{f(\nu-2k) + 2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right)\sin\left(\frac{\pi\nu}{2} - \frac{f^2(\nu-2k)}{4c}\right)\right)\right) + 2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\left(\cos\left(\frac{(2dk - dm - 2fs + f\nu)^2}{4(2bk - bm - 2cs + c\nu)} + \frac{1}{2}\pi(m-\nu)\right)C\left(\frac{2dk - dm - 2fs + f\nu + 2(2bk - bm - 2cs + c\nu)z}{\sqrt{2\pi}\sqrt{2bk - bm - 2cs + c\nu}}\right) + S\left(\frac{2dk - dm - 2fs + f\nu + 2(2bk - bm - 2cs + c\nu)z}{\sqrt{2\pi}\sqrt{2bk - bm - 2cs + c\nu}}\right)\sin\left(\frac{(2dk - dm - 2fs + f\nu)^2}{4(2bk - bm - 2cs + c\nu)} + \frac{1}{2}\pi(m-\nu)\right)\right)\Big/\left(\sqrt{2bk - bm - 2cs + c\nu}\right) + \left(\cos\left(\frac{(2dk - dm + 2fs - f\nu)^2}{4(2bk - bm + 2cs - c\nu)} + \frac{1}{2}\pi(m+\nu)\right)C\left(\frac{2dk - dm + 2fs - f\nu + 2(2bk - bm + 2cs - c\nu)z}{\sqrt{2\pi}\sqrt{2bk - bm + 2cs - c\nu}}\right) + S\left(\frac{2dk - dm + 2fs - f\nu + 2(2bk - bm + 2cs - c\nu)z}{\sqrt{2\pi}\sqrt{2bk - bm + 2cs - c\nu}}\right)\sin\left(\frac{(2dk - dm + 2fs - f\nu)^2}{4(2bk - bm + 2cs - c\nu)} + \frac{1}{2}\pi(m+\nu)\right)\right)\Big/\left(\sqrt{2bk - bm + 2cs - c\nu}\right)\right) /; m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.0815.01

$$\int \sin^m(\sqrt{z}\, b + d z)\sin^\nu(\sqrt{z}\, c + f z)\,dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1 - m \bmod 2)(1 - \nu \bmod 2) + 2^{-m-\nu}\binom{\nu}{\frac{\nu}{2}}\left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{(d(m-2k))^{3/2}}\left((-1)^{k+m}\binom{m}{k}\left(-b(m-2k)\sqrt{2\pi}\cos\left(\frac{b^2(m-2k)}{4d} - \frac{m\pi}{2}\right)C\left(\frac{b(m-2k) + 2d\sqrt{z}(m-2k)}{\sqrt{d(m-2k)}\sqrt{2\pi}}\right) - b(m-2k)\sqrt{2\pi}\, S\left(\frac{b(m-2k) + 2d\sqrt{z}(m-2k)}{\sqrt{d(m-2k)}\sqrt{2\pi}}\right)\sin\left(\frac{b^2(m-2k)}{4d} - \frac{m\pi}{2}\right) + 2\sqrt{d(m-2k)}\sin\left(\frac{\pi m}{2} + d(m-2k)z + b(m-2k)\sqrt{z}\right)\right)\right)\right)(1 - \nu \bmod 2) + 2^{-m-\nu}\binom{m}{\frac{m}{2}}(1 - m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor} \frac{1}{(f\,(v-2\,k))^{3/2}} \left((-1)^{k+v} \binom{v}{k} \left(-c\,\sqrt{2\,\pi}\,(v-2\,k)\cos\left(\frac{\pi\,v}{2}-\frac{c^2\,(v-2\,k)}{4\,f}\right) C\left(\frac{c\,(v-2\,k)+2\,f\,\sqrt{z}\,(v-2\,k)}{\sqrt{2\,\pi}\,\sqrt{f\,(v-2\,k)}}\right) + c\,\sqrt{2\,\pi}\,(v-2\,k)\, S\left(\frac{c\,(v-2\,k)+2\,f\,\sqrt{z}\,(v-2\,k)}{\sqrt{2\,\pi}\,\sqrt{f\,(v-2\,k)}}\right)\sin\left(\frac{\pi\,v}{2}-\frac{c^2\,(v-2\,k)}{4\,f}\right) + 2\,\sqrt{f\,(v-2\,k)}\,\sin\left(\frac{\pi\,v}{2}+f\,(v-2\,k)\,z+c\,(v-2\,k)\,\sqrt{z}\right)\right)\right) +$$

$$2^{-m-v} \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor} (-1)^{s+v} \binom{v}{s} \left(\left(\sqrt{2\,\pi}\,(-2\,b\,k+b\,m+2\,c\,s-c\,v)\cos\left(\frac{1}{2}\,\pi\,(v-m)-\frac{(2\,b\,k-b\,m-2\,c\,s+c\,v)^2}{4\,(2\,d\,k-d\,m-2\,f\,s+f\,v)}\right) C\left(\frac{2\,b\,k-b\,m-2\,c\,s+c\,v+2\,(2\,d\,k-d\,m-2\,f\,s+f\,v)\,\sqrt{z}}{\sqrt{2\,\pi}\,\sqrt{2\,d\,k-d\,m-2\,f\,s+f\,v}}\right) + \sqrt{2\,\pi}\,(2\,b\,k-b\,m-2\,c\,s+c\,v)\, S\left(\frac{2\,b\,k-b\,m-2\,c\,s+c\,v+2\,(2\,d\,k-d\,m-2\,f\,s+f\,v)\,\sqrt{z}}{\sqrt{2\,\pi}\,\sqrt{2\,d\,k-d\,m-2\,f\,s+f\,v}}\right) \sin\left(\frac{1}{2}\,\pi\,(v-m)-\frac{(2\,b\,k-b\,m-2\,c\,s+c\,v)^2}{4\,(2\,d\,k-d\,m-2\,f\,s+f\,v)}\right) + 2\,\sqrt{2\,d\,k-d\,m-2\,f\,s+f\,v}\,\sin\left(\frac{1}{2}\,\pi\,(v-m)+(2\,d\,k-d\,m-2\,f\,s+f\,v)\,z+(2\,b\,k-b\,m-2\,c\,s+c\,v)\,\sqrt{z}\right)\right) \Big/ (2\,d\,k-d\,m-2\,f\,s+f\,v)^{3/2} +$$

$$\left(\sqrt{2\,\pi}\,(-2\,b\,k+b\,m-2\,c\,s+c\,v)\cos\left(\frac{(2\,b\,k-b\,m+2\,c\,s-c\,v)^2}{4\,(2\,d\,k-d\,m+2\,f\,s-f\,v)}+\frac{1}{2}\,\pi\,(m+v)\right) C\left(\frac{2\,b\,k-b\,m+2\,c\,s-c\,v+2\,(2\,d\,k-d\,m+2\,f\,s-f\,v)\,\sqrt{z}}{\sqrt{2\,\pi}\,\sqrt{2\,d\,k-d\,m+2\,f\,s-f\,v}}\right) - \sqrt{2\,\pi}\,(2\,b\,k-b\,m+2\,c\,s-c\,v)\, S\left(\frac{2\,b\,k-b\,m+2\,c\,s-c\,v+2\,(2\,d\,k-d\,m+2\,f\,s-f\,v)\,\sqrt{z}}{\sqrt{2\,\pi}\,\sqrt{2\,d\,k-d\,m+2\,f\,s-f\,v}}\right) \sin\left(\frac{(2\,b\,k-b\,m+2\,c\,s-c\,v)^2}{4\,(2\,d\,k-d\,m+2\,f\,s-f\,v)}+\frac{1}{2}\,\pi\,(m+v)\right) - 2\,\sqrt{2\,d\,k-d\,m+2\,f\,s-f\,v}\,\sin\left(\frac{1}{2}\,\pi\,(m+v)-(2\,d\,k-d\,m+2\,f\,s-f\,v)\,z-(2\,b\,k-b\,m+2\,c\,s-c\,v)\,\sqrt{z}\right)\right) \Big/ (2\,d\,k-d\,m+2\,f\,s-f\,v)^{3/2}\right) /;\, m\in\mathbb{N}^+ \bigwedge v\in\mathbb{N}^+$$

Involving $\sin^m(d\,z)\,\sin^v\left(c\,z^r+f\,z+g\right)$

01.06.21.0816.01

$$\int \sin^m(d\,z)\sin^\nu\left(c\,z^2+f\,z+g\right)dz = 2^{-m-\nu}\,z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+ \frac{2^{-m-\nu+1}}{d}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(2\,d\,k\,z-\frac{1}{2}\,m\,(2\,d\,z+\pi)\right)}{2\,k-m}+2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{\sqrt{c\,(\nu-2\,k)}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(\cos\left(-\frac{(\nu-2\,k)\,f^2}{4\,c}+\frac{\pi\,\nu}{2}+g\,(\nu-2\,k)\right)C\left(\frac{f\,(\nu-2\,k)+2\,c\,z\,(\nu-2\,k)}{\sqrt{2\,\pi}\,\sqrt{c\,(\nu-2\,k)}}\right)- S\left(\frac{f\,(\nu-2\,k)+2\,c\,z\,(\nu-2\,k)}{\sqrt{2\,\pi}\,\sqrt{c\,(\nu-2\,k)}}\right)\sin\left(-\frac{(\nu-2\,k)\,f^2}{4\,c}+\frac{\pi\,\nu}{2}+g\,(\nu-2\,k)\right)\right)\right)+2^{-m-\nu+\frac{1}{2}}\sqrt{\pi} \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{c\,\nu-2\,c\,s}}\left(\cos\left(\frac{(2\,d\,k-d\,m-2\,f\,s+f\,\nu)^2}{4\,(c\,\nu-2\,c\,s)}+\frac{1}{2}\,\pi\,(m-\nu)+g\,(2\,s-\nu)\right) C\left(\frac{2\,d\,k-d\,m-2\,f\,s+f\,\nu+2\,(c\,\nu-2\,c\,s)\,z}{\sqrt{2\,\pi}\,\sqrt{c\,\nu-2\,c\,s}}\right)+S\left(\frac{2\,d\,k-d\,m-2\,f\,s+f\,\nu+2\,(c\,\nu-2\,c\,s)\,z}{\sqrt{2\,\pi}\,\sqrt{c\,\nu-2\,c\,s}}\right) \sin\left(\frac{(2\,d\,k-d\,m-2\,f\,s+f\,\nu)^2}{4\,(c\,\nu-2\,c\,s)}+\frac{1}{2}\,\pi\,(m-\nu)+g\,(2\,s-\nu)\right)\right)+ \frac{1}{\sqrt{2\,c\,s-c\,\nu}}\left(\cos\left(-\frac{(2\,d\,k-d\,m+2\,f\,s-f\,\nu)^2}{4\,(2\,c\,s-c\,\nu)}+g\,(2\,s-\nu)-\frac{1}{2}\,\pi\,(m+\nu)\right) C\left(\frac{2\,d\,k-d\,m+2\,f\,s-f\,\nu+2\,(2\,c\,s-c\,\nu)\,z}{\sqrt{2\,\pi}\,\sqrt{2\,c\,s-c\,\nu}}\right)-S\left(\frac{2\,d\,k-d\,m+2\,f\,s-f\,\nu+2\,(2\,c\,s-c\,\nu)\,z}{\sqrt{2\,\pi}\,\sqrt{2\,c\,s-c\,\nu}}\right) \sin\left(-\frac{(2\,d\,k-d\,m+2\,f\,s-f\,\nu)^2}{4\,(2\,c\,s-c\,\nu)}+g\,(2\,s-\nu)-\frac{1}{2}\,\pi\,(m+\nu)\right)\right)\right)\;/;\; m\in\mathbb{N}^+\land\nu\in\mathbb{N}^+$$

01.06.21.0817.01

$$\int \sin^m(d\,z)\sin^\nu\left(\sqrt{z}\;c+f\,z+g\right)dz = 2^{-m-\nu}\,z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+ \frac{2^{-m-\nu+1}\,(1-\nu \bmod 2)}{d}\binom{\nu}{\frac{\nu}{2}}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(\frac{\pi\,m}{2}+d\,(m-2\,k)\,z\right)}{m-2\,k}+2^{-m-\nu}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{(f\,(\nu-2\,k))^{3/2}} \left((-1)^{k+\nu}\binom{\nu}{k}\left(-c\,\sqrt{2\,\pi}\,(\nu-2\,k)\cos\left(-\frac{(\nu-2\,k)\,c^2}{4\,f}+\frac{\pi\,\nu}{2}+g\,(\nu-2\,k)\right)C\left(\frac{c\,(\nu-2\,k)+2\,f\,\sqrt{z}\,(\nu-2\,k)}{\sqrt{2\,\pi}\,\sqrt{f\,(\nu-2\,k)}}\right)+ c\,\sqrt{2\,\pi}\,(\nu-2\,k)\,S\left(\frac{c\,(\nu-2\,k)+2\,f\,\sqrt{z}\,(\nu-2\,k)}{\sqrt{2\,\pi}\,\sqrt{f\,(\nu-2\,k)}}\right)\sin\left(-\frac{(\nu-2\,k)\,c^2}{4\,f}+\frac{\pi\,\nu}{2}+g\,(\nu-2\,k)\right)+ 2\,\sqrt{f\,(\nu-2\,k)}\,\sin\left(\frac{\pi\,\nu}{2}+g\,(\nu-2\,k)+f\,(\nu-2\,k)\,z+c\,(\nu-2\,k)\,\sqrt{z}\right)\right)\right)+$$

$$2^{-m-v} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{s+v} \binom{v}{s} \Bigg(\Bigg(\Bigg(\sqrt{2\pi}\, (c v - 2 c s) \cos\Bigg(-\frac{(2 c s - c v)^2}{4 (2 d k - d m + 2 f s - f v)} + 2 g s - g v - \frac{1}{2} \pi (m + v) \Bigg) C\Bigg(\frac{2 c s - c v + 2 (2 d k - d m + 2 f s - f v) \sqrt{z}}{\sqrt{2\pi} \sqrt{2 d k - d m + 2 f s - f v}} \Bigg) + \sqrt{2\pi}\, (2 c s - c v) S\Bigg(\frac{2 c s - c v + 2 (2 d k - d m + 2 f s - f v) \sqrt{z}}{\sqrt{2\pi} \sqrt{2 d k - d m + 2 f s - f v}} \Bigg) \sin\Bigg(-\frac{(2 c s - c v)^2}{4 (2 d k - d m + 2 f s - f v)} + 2 g s - g v - \frac{1}{2} \pi (m + v) \Bigg) + 2 \sqrt{2 d k - d m + 2 f s - f v} \sin\Bigg(2 g s - g v - \frac{1}{2} \pi (m + v) + (2 d k - d m + 2 f s - f v) z + (2 c s - c v) \sqrt{z} \Bigg) \Bigg) \Bigg/ (2 d k - d m + 2 f s - f v)^{3/2} + \Bigg(\sqrt{2\pi}\, (2 c s - c v) \cos\Bigg(\frac{(c v - 2 c s)^2}{4 (2 d k - d m - 2 f s + f v)} + 2 g s - g v - \frac{1}{2} \pi (v - m) \Bigg) C\Bigg(\frac{-2 c s + c v + 2 (2 d k - d m - 2 f s + f v) \sqrt{z}}{\sqrt{2\pi} \sqrt{2 d k - d m - 2 f s + f v}} \Bigg) - \sqrt{2\pi}\, (c v - 2 c s) S\Bigg(\frac{-2 c s + c v + 2 (2 d k - d m - 2 f s + f v) \sqrt{z}}{\sqrt{2\pi} \sqrt{2 d k - d m - 2 f s + f v}} \Bigg) \sin\Bigg(\frac{(c v - 2 c s)^2}{4 (2 d k - d m - 2 f s + f v)} + 2 g s - g v - \frac{1}{2} \pi (v - m) \Bigg) - 2 \sqrt{2 d k - d m - 2 f s + f v} \sin\Bigg(2 g s - g v - \frac{1}{2} \pi (v - m) - (2 d k - d m - 2 f s + f v) z - (c v - 2 c s) \sqrt{z} \Bigg) \Bigg) \Bigg/ (2 d k - d m - 2 f s + f v)^{3/2} \Bigg) /; m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

Involving $\sin^m(d\, z + e) \sin^v(c\, z^r + f\, z + g)$

01.06.21.0818.01

$$\int \sin^m(d\,z+e)\sin^\nu\left(c\,z^2+f\,z+g\right)dz = 2^{-m-\nu}\,z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+$$

$$2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{\sqrt{c\,(\nu-2k)}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(\cos\left(-\frac{(\nu-2k)f^2}{4c}+\frac{\pi\nu}{2}+g(\nu-2k)\right)\right.\right.$$

$$\left.\left.C\left(\frac{f(\nu-2k)+2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right)-S\left(\frac{f(\nu-2k)+2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right)\sin\left(-\frac{(\nu-2k)f^2}{4c}+\frac{\pi\nu}{2}+g(\nu-2k)\right)\right)\right)+$$

$$\frac{2^{-m-\nu+1}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(e(2k-m)+2dkz-\frac{1}{2}m(2dz+\pi)\right)}{2k-m}}{d}+2^{-m-\nu+\frac{1}{2}}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}$$

$$\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s+\nu}\binom{\nu}{s}\left(\frac{1}{\sqrt{c\nu-2cs}}\left(\cos\left(-\frac{(2dk-dm-2fs+f\nu)^2}{4(c\nu-2cs)}+e(2k-m)-\frac{1}{2}\pi(m-\nu)-g(2s-\nu)\right)\right.\right.$$

$$C\left(\frac{2dk-dm-2fs+f\nu+2(c\nu-2cs)z}{\sqrt{2\pi}\sqrt{c\nu-2cs}}\right)-S\left(\frac{2dk-dm-2fs+f\nu+2(c\nu-2cs)z}{\sqrt{2\pi}\sqrt{c\nu-2cs}}\right)$$

$$\left.\left.\sin\left(-\frac{(2dk-dm-2fs+f\nu)^2}{4(c\nu-2cs)}+e(2k-m)-\frac{1}{2}\pi(m-\nu)-g(2s-\nu)\right)\right)\right)+$$

$$\frac{1}{\sqrt{2cs-c\nu}}\left(\cos\left(-\frac{(2dk-dm+2fs-f\nu)^2}{4(2cs-c\nu)}+e(2k-m)+g(2s-\nu)-\frac{1}{2}\pi(m+\nu)\right)\right.$$

$$C\left(\frac{2dk-dm+2fs-f\nu+2(2cs-c\nu)z}{\sqrt{2\pi}\sqrt{2cs-c\nu}}\right)-S\left(\frac{2dk-dm+2fs-f\nu+2(2cs-c\nu)z}{\sqrt{2\pi}\sqrt{2cs-c\nu}}\right)$$

$$\left.\left.\left.\sin\left(-\frac{(2dk-dm+2fs-f\nu)^2}{4(2cs-c\nu)}+e(2k-m)+g(2s-\nu)-\frac{1}{2}\pi(m+\nu)\right)\right)\right)\right)\;/;\;m\in\mathbb{N}^+\land\nu\in\mathbb{N}^+$$

01.06.21.0819.01

$$\int \sin^m(d\,z+e)\sin^\nu\left(\sqrt{z}\;c+f\,z+g\right)dz = 2^{-m-\nu}\,z\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+$$

$$\frac{2^{-m-\nu+1}}{d}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{(-1)^{k+m}\binom{m}{k}\sin\left(\frac{\pi m}{2}+e(m-2k)+d(m-2k)z\right)}{m-2k}+$$

$$2^{-m-\nu}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{(f(\nu-2k))^{3/2}}\left((-1)^{k+\nu}\binom{\nu}{k}\left(-c\sqrt{2\pi}\,(\nu-2k)\cos\left(-\frac{(\nu-2k)c^2}{4f}+\frac{\pi\nu}{2}+g(\nu-2k)\right)\right.\right.$$

$$C\left(\frac{c(\nu-2k)+2f\sqrt{z}\,(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}}\right)+c\sqrt{2\pi}\,(\nu-2k)\,S\left(\frac{c(\nu-2k)+2f\sqrt{z}\,(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}}\right)\sin\left(-\frac{(\nu-2k)c^2}{4f}+\right.$$

$$\frac{\pi v}{2} + g(v-2k)\Bigg) + 2\sqrt{f(v-2k)}\,\sin\!\left(\frac{\pi v}{2} + g(v-2k) + f(v-2k)z + c(v-2k)\sqrt{z}\right)\Bigg)\Bigg) +$$

$$2^{-m-v}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\Bigg(\Bigg(\Bigg(\sqrt{2\pi}\,(2cs-cv)\cos\!\left(-\frac{(cv-2cs)^2}{4(2dk-dm-2fs+fv)} + 2ek - em -\right.$$

$$\left.2gs + gv + \frac{1}{2}\pi(v-m)\right) C\!\left(\frac{-2cs+cv+2(2dk-dm-2fs+fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2dk-dm-2fs+fv}}\right) + \sqrt{2\pi}\,(cv-2cs)$$

$$S\!\left(\frac{-2cs+cv+2(2dk-dm-2fs+fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2dk-dm-2fs+fv}}\right)\sin\!\left(-\frac{(cv-2cs)^2}{4(2dk-dm-2fs+fv)} + 2ek -\right.$$

$$\left.em - 2gs + gv + \frac{1}{2}\pi(v-m)\right) + 2\sqrt{2dk-dm-2fs+fv}\,\sin\!\Bigg(2ek - em - 2gs + gv +$$

$$\frac{1}{2}\pi(v-m) + (2dk-dm-2fs+fv)z + (cv-2cs)\sqrt{z}\Bigg)\Bigg)\Bigg/(2dk-dm-2fs+fv)^{3/2} +$$

$$\Bigg(\sqrt{2\pi}\,(cv-2cs)\cos\!\left(-\frac{(2cs-cv)^2}{4(2dk-dm+2fs-fv)} + 2ek - em + 2gs - gv - \frac{1}{2}\pi(m+v)\right)$$

$$C\!\left(\frac{2cs-cv+2(2dk-dm+2fs-fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2dk-dm+2fs-fv}}\right) + \sqrt{2\pi}\,(2cs-cv)$$

$$S\!\left(\frac{2cs-cv+2(2dk-dm+2fs-fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2dk-dm+2fs-fv}}\right)\sin\!\left(-\frac{(2cs-cv)^2}{4(2dk-dm+2fs-fv)} + 2ek - em + 2g\right.$$

$$\left.s - gv - \frac{1}{2}\pi(m+v)\right) + 2\sqrt{2dk-dm+2fs-fv}\,\sin\!\Bigg(2ek - em + 2gs - gv - \frac{1}{2}\pi(m+v) +$$

$$(2dk-dm+2fs-fv)z + (2cs-cv)\sqrt{z}\Bigg)\Bigg)\Bigg/(2dk-dm+2fs-fv)^{3/2}\Bigg)\ /;\ m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

Involving $\sin^m(b z^r)\sin^v(c z^r + f z + g)$

01.06.21.0820.01

$$\int \sin^m(b z^2) \sin^\nu(c z^2 + f z + g)\, dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - m \bmod 2)(1 - \nu \bmod 2) + 2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \frac{(-1)^{k+m}}{\sqrt{b(m-2k)}} \binom{m}{k} \left(\cos\left(\frac{m\pi}{2}\right) C\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\, z}{\sqrt{b(m-2k)}}\right) - S\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\, z}{\sqrt{b(m-2k)}}\right) \sin\left(\frac{m\pi}{2}\right) \right) +$$

$$2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{\sqrt{c(\nu-2k)}} \left((-1)^{k+\nu} \binom{\nu}{k} \left(\cos\left(-\frac{(\nu-2k) f^2}{4c} + \frac{\pi\nu}{2} + g(\nu-2k)\right) C\left(\frac{f(\nu-2k) + 2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right) - S\left(\frac{f(\nu-2k) + 2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right) \sin\left(-\frac{(\nu-2k) f^2}{4c} + \frac{\pi\nu}{2} + g(\nu-2k)\right) \right) \right) +$$

$$2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\left(\cos\left(\frac{(f\nu - 2fs)^2}{4(2bk - bm - 2cs + c\nu)} + \frac{1}{2}\pi(m-\nu) + g(2s-\nu)\right) C\left(\frac{-2fs + f\nu + 2(2bk - bm - 2cs + c\nu) z}{\sqrt{2\pi}\sqrt{2bk - bm - 2cs + c\nu}}\right) + S\left(\frac{-2fs + f\nu + 2(2bk - bm - 2cs + c\nu) z}{\sqrt{2\pi}\sqrt{2bk - bm - 2cs + c\nu}}\right) \sin\left(\frac{(f\nu - 2fs)^2}{4(2bk - bm - 2cs + c\nu)} + \frac{1}{2}\pi(m-\nu) + g(2s-\nu)\right) \right) \Big/ \left(\sqrt{2bk - bm - 2cs + c\nu}\right) + \left(\cos\left(-\frac{(2fs - f\nu)^2}{4(2bk - bm + 2cs - c\nu)} + g(2s-\nu) - \frac{1}{2}\pi(m+\nu)\right) C\left(\frac{2fs - f\nu + 2(2bk - bm + 2cs - c\nu) z}{\sqrt{2\pi}\sqrt{2bk - bm + 2cs - c\nu}}\right) - S\left(\frac{2fs - f\nu + 2(2bk - bm + 2cs - c\nu) z}{\sqrt{2\pi}\sqrt{2bk - bm + 2cs - c\nu}}\right) \sin\left(-\frac{(2fs - f\nu)^2}{4(2bk - bm + 2cs - c\nu)} + g(2s-\nu) - \frac{1}{2}\pi(m+\nu)\right) \right) \Big/ \left(\sqrt{2bk - bm + 2cs - c\nu}\right) \right) /;\, m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.0821.01

$$\int \sin^m(b\sqrt{z}) \sin^\nu(\sqrt{z}\, c + f z + g)\, dz =$$

$$2^{-m-\nu} z \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - m \bmod 2)(1 - \nu \bmod 2) + 2^{-m-\nu} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{(f(\nu-2k))^{3/2}} \left((-1)^{k+\nu} \binom{\nu}{k} \left(-c\sqrt{2\pi}\,(\nu-2k) \cos\left(-\frac{(\nu-2k)c^2}{4f} + \frac{\pi\nu}{2} + g(\nu-2k)\right) C\left(\frac{c(\nu-2k) + 2f\sqrt{z}\,(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}}\right) + c\sqrt{2\pi}\,(\nu-2k) S\left(\frac{c(\nu-2k) + 2f\sqrt{z}\,(\nu-2k)}{\sqrt{2\pi}\sqrt{f(\nu-2k)}}\right) \sin\left(-\frac{(\nu-2k)c^2}{4f} + \frac{\pi\nu}{2} + g(\nu-2k)\right) + \right.\right.$$

$$2\sqrt{f(v-2k)}\,\sin\left(\frac{\pi v}{2}+g(v-2k)+f(v-2k)z+c(v-2k)\sqrt{z}\right)\Bigg)\Bigg)+\frac{1}{b^2}\left(2^{-m-v+2}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\right.$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{(m-2k)^2}\left((-1)^{k+m}\binom{m}{k}\left(\cos\left(\frac{m\pi}{2}-b(2k-m)\sqrt{z}\right)-b(2k-m)\sqrt{z}\,\sin\left(\frac{m\pi}{2}-b(2k-m)\sqrt{z}\right)\right)\right)+2^{-m-v}$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\frac{1}{(2fs-fv)^{3/2}}\left(\sqrt{2\pi}\,(-2bk+bm-2cs+cv)\cos\left(-\frac{(2bk-bm+2cs-cv)^2}{4(2fs-fv)}+\right.\right.\right.$$

$$\left.2gs-gv-\frac{1}{2}\pi(m+v)\right)C\left(\frac{2bk-bm+2cs-cv+2(2fs-fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{2fs-fv}}\right)+$$

$$\sqrt{2\pi}\,(2bk-bm+2cs-cv)S\left(\frac{2bk-bm+2cs-cv+2(2fs-fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{2fs-fv}}\right)$$

$$\sin\left(-\frac{(2bk-bm+2cs-cv)^2}{4(2fs-fv)}+2gs-gv-\frac{1}{2}\pi(m+v)\right)+$$

$$\left.2\sqrt{2fs-fv}\,\sin\left(2gs-gv-\frac{1}{2}\pi(m+v)+(2fs-fv)z+(2bk-bm+2cs-cv)\sqrt{z}\right)\right)+$$

$$\frac{1}{(fv-2fs)^{3/2}}\left(\sqrt{2\pi}\,(-2bk+bm+2cs-cv)\cos\left(\frac{(2bk-bm-2cs+cv)^2}{4(fv-2fs)}+2gs-\right.\right.$$

$$\left.gv-\frac{1}{2}\pi(v-m)\right)C\left(\frac{2bk-bm-2cs+cv+2(fv-2fs)\sqrt{z}}{\sqrt{2\pi}\sqrt{fv-2fs}}\right)-$$

$$\sqrt{2\pi}\,(2bk-bm-2cs+cv)S\left(\frac{2bk-bm-2cs+cv+2(fv-2fs)\sqrt{z}}{\sqrt{2\pi}\sqrt{fv-2fs}}\right)$$

$$\sin\left(\frac{(2bk-bm-2cs+cv)^2}{4(fv-2fs)}+2gs-gv-\frac{1}{2}\pi(v-m)\right)-2\sqrt{fv-2fs}$$

$$\left.\left.\sin\left(2gs-gv-\frac{1}{2}\pi(v-m)-(fv-2fs)z-(2bk-bm-2cs+cv)\sqrt{z}\right)\right)\right)\Bigg)\ /;\ m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving $\sin^m(b z^r+e)\sin^v(c z^r+f z+g)$

01.06.21.0822.01

$$\int \sin^m\left(b z^2+e\right) \sin^\nu\left(c z^2+f z+g\right) dz = 2^{-m-\nu} z \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1-m \bmod 2)(1-\nu \bmod 2) + 2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \left(\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \frac{1}{\sqrt{b(m-2k)}} \left((-1)^{k+m} \binom{m}{k} \left(\cos\left(\frac{\pi m}{2}+e(m-2k)\right) C\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\, z}{\sqrt{b(m-2k)}}\right) - S\left(\frac{b(m-2k)\sqrt{\frac{2}{\pi}}\, z}{\sqrt{b(m-2k)}}\right) \sin\left(\frac{\pi m}{2}+e(m-2k)\right)\right)\right)\right)(1-\nu \bmod 2) + 2^{-m-\nu+\frac{1}{2}} \sqrt{\pi} \binom{m}{\frac{m}{2}} (1-m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{\sqrt{c(\nu-2k)}} \left((-1)^{k+\nu} \binom{\nu}{k} \left(\cos\left(-\frac{(\nu-2k) f^2}{4c} + \frac{\pi \nu}{2} + g(\nu-2k)\right) C\left(\frac{f(\nu-2k)+2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right) - S\left(\frac{f(\nu-2k)+2cz(\nu-2k)}{\sqrt{2\pi}\sqrt{c(\nu-2k)}}\right) \sin\left(-\frac{(\nu-2k) f^2}{4c} + \frac{\pi \nu}{2} + g(\nu-2k)\right)\right)\right) + 2^{-m-\nu+\frac{1}{2}} \sqrt{\pi}$$

$$\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s+\nu} \binom{\nu}{s} \left(\left(\cos\left(-\frac{(f\nu-2fs)^2}{4(2bk-bm-2cs+c\nu)} + e(2k-m) - \frac{1}{2}\pi(m-\nu) - g(2s-\nu)\right) C\left(\frac{-2fs+f\nu+2(2bk-bm-2cs+c\nu)z}{\sqrt{2\pi}\sqrt{2bk-bm-2cs+c\nu}}\right) - S\left(\frac{-2fs+f\nu+2(2bk-bm-2cs+c\nu)z}{\sqrt{2\pi}\sqrt{2bk-bm-2cs+c\nu}}\right) \sin\left(-\frac{(f\nu-2fs)^2}{4(2bk-bm-2cs+c\nu)} + e(2k-m) - \frac{1}{2}\pi(m-\nu) - g(2s-\nu)\right)\right) \Big/ \left(\sqrt{2bk-bm-2cs+c\nu}\right) + \left(\cos\left(-\frac{(2fs-f\nu)^2}{4(2bk-bm+2cs-c\nu)} + e(2k-m) + g(2s-\nu) - \frac{1}{2}\pi(m+\nu)\right) C\left(\frac{2fs-f\nu+2(2bk-bm+2cs-c\nu)z}{\sqrt{2\pi}\sqrt{2bk-bm+2cs-c\nu}}\right) - S\left(\frac{2fs-f\nu+2(2bk-bm+2cs-c\nu)z}{\sqrt{2\pi}\sqrt{2bk-bm+2cs-c\nu}}\right) \sin\left(-\frac{(2fs-f\nu)^2}{4(2bk-bm+2cs-c\nu)} + e(2k-m) + g(2s-\nu) - \frac{1}{2}\pi(m+\nu)\right)\right) \Big/ \left(\sqrt{2bk-bm+2cs-c\nu}\right)\right) /;\ m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.0823.01

$$\int \sin^m\left(\sqrt{z}\, b+e\right) \sin^\nu\left(\sqrt{z}\, c+f z+g\right) dz =$$

$$2^{-m-\nu} z \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1-m \bmod 2)(1-\nu \bmod 2) + 2^{-m-\nu} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{(f(\nu-2k))^{3/2}}$$

$$\left((-1)^{k+v}\binom{v}{k}\left(-c\sqrt{2\pi}\,(v-2k)\cos\left(-\frac{(v-2k)c^2}{4f}+\frac{\pi v}{2}+g(v-2k)\right)C\left(\frac{c(v-2k)+2f\sqrt{z}\,(v-2k)}{\sqrt{2\pi}\,\sqrt{f(v-2k)}}\right)+\right.\right.$$

$$c\sqrt{2\pi}\,(v-2k)\,S\left(\frac{c(v-2k)+2f\sqrt{z}\,(v-2k)}{\sqrt{2\pi}\,\sqrt{f(v-2k)}}\right)\sin\left(-\frac{(v-2k)c^2}{4f}+\frac{\pi v}{2}+g(v-2k)\right)+$$

$$\left.\left.2\sqrt{f(v-2k)}\,\sin\left(\frac{\pi v}{2}+g(v-2k)+f(v-2k)z+c(v-2k)\sqrt{z}\right)\right)\right)+$$

$$\frac{1}{b^2}\left(2^{-m-v+2}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{(m-2k)^2}\left((-1)^{k+m}\binom{m}{k}\left(\cos\left(2ek-em+b(2k-m)\sqrt{z}-\frac{m\pi}{2}\right)+\right.\right.\right.$$

$$\left.\left.\left.b(2k-m)\sqrt{z}\,\sin\left(2ek-em+b(2k-m)\sqrt{z}-\frac{m\pi}{2}\right)\right)\right)\right)+2^{-m-v}$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\frac{1}{(fv-2fs)^{3/2}}\left(\sqrt{2\pi}\,(-2bk+bm+2cs-cv)\cos\left(-\frac{(2bk-bm-2cs+cv)^2}{4(fv-2fs)}+\right.\right.\right.$$

$$\left.2ek-em-2gs+gv+\frac{1}{2}\pi(v-m)\right)C\left(\frac{2bk-bm-2cs+cv+2(fv-2fs)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{fv-2fs}}\right)+$$

$$\sqrt{2\pi}\,(2bk-bm-2cs+cv)\,S\left(\frac{2bk-bm-2cs+cv+2(fv-2fs)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{fv-2fs}}\right)$$

$$\sin\left(-\frac{(2bk-bm-2cs+cv)^2}{4(fv-2fs)}+2ek-em-2gs+gv+\frac{1}{2}\pi(v-m)\right)+2\sqrt{fv-2fs}$$

$$\left.\sin\left(2ek-em-2gs+gv+\frac{1}{2}\pi(v-m)+(fv-2fs)z+(2bk-bm-2cs+cv)\sqrt{z}\right)\right)+$$

$$\frac{1}{(2fs-fv)^{3/2}}\left(\sqrt{2\pi}\,(-2bk+bm-2cs+cv)\cos\left(-\frac{(2bk-bm+2cs-cv)^2}{4(2fs-fv)}+2ek-em+2gs-gv-\right.\right.$$

$$\left.\frac{1}{2}\pi(m+v)\right)C\left(\frac{2bk-bm+2cs-cv+2(2fs-fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2fs-fv}}\right)+\sqrt{2\pi}\,(2bk-bm+2cs-cv)$$

$$S\left(\frac{2bk-bm+2cs-cv+2(2fs-fv)\sqrt{z}}{\sqrt{2\pi}\,\sqrt{2fs-fv}}\right)\sin\left(-\frac{(2bk-bm+2cs-cv)^2}{4(2fs-fv)}+\right.$$

$$\left.2ek-em+2gs-gv-\frac{1}{2}\pi(m+v)\right)+2\sqrt{2fs-fv}\,\sin\left(2ek-em+2gs-gv-\right.$$

Involving $\sin^m(b z^r + d z)\sin^v(c z^r + f z + g)$

01.06.21.0824.01

$$\int \sin^m(b z^2 + d z)\sin^v(c z^2 + f z + g)\,dz = 2^{-m-v} z \binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1 - m \bmod 2)(1 - v \bmod 2) + 2^{-m-v+\frac{1}{2}}\sqrt{\pi}\binom{v}{\frac{v}{2}}\left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{\sqrt{b(m-2k)}}\left((-1)^{k+m}\binom{m}{k}\left(\cos\left(\frac{d^2(m-2k)}{4b}-\frac{m\pi}{2}\right)C\left(\frac{d(m-2k)+2bz(m-2k)}{\sqrt{b(m-2k)}\sqrt{2\pi}}\right)+ S\left(\frac{d(m-2k)+2bz(m-2k)}{\sqrt{b(m-2k)}\sqrt{2\pi}}\right)\sin\left(\frac{d^2(m-2k)}{4b}-\frac{m\pi}{2}\right)\right)\right)\right)(1 - v \bmod 2) + 2^{-m-v+\frac{1}{2}}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1 - m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}\frac{1}{\sqrt{c(v-2k)}}\left((-1)^{k+v}\binom{v}{k}\left(\cos\left(-\frac{(v-2k)f^2}{4c}+\frac{\pi v}{2}+g(v-2k)\right) C\left(\frac{f(v-2k)+2cz(v-2k)}{\sqrt{2\pi}\sqrt{c(v-2k)}}\right) - S\left(\frac{f(v-2k)+2cz(v-2k)}{\sqrt{2\pi}\sqrt{c(v-2k)}}\right)\sin\left(-\frac{(v-2k)f^2}{4c}+\frac{\pi v}{2}+g(v-2k)\right)\right)\right) + 2^{-m-v+\frac{1}{2}}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\left(\cos\left(\frac{(2dk-dm-2fs+fv)^2}{4(2bk-bm-2cs+cv)}+\frac{1}{2}\pi(m-v)+g(2s-v)\right) C\left(\frac{2dk-dm-2fs+fv+2(2bk-bm-2cs+cv)z}{\sqrt{2\pi}\sqrt{2bk-bm-2cs+cv}}\right)+ S\left(\frac{2dk-dm-2fs+fv+2(2bk-bm-2cs+cv)z}{\sqrt{2\pi}\sqrt{2bk-bm-2cs+cv}}\right)\sin\left(\frac{(2dk-dm-2fs+fv)^2}{4(2bk-bm-2cs+cv)}+ \frac{1}{2}\pi(m-v)+g(2s-v)\right)\right)\Big/\left(\sqrt{2bk-bm-2cs+cv}\right)+\left(\cos\left(-\frac{(2dk-dm+2fs-fv)^2}{4(2bk-bm+2cs-cv)}+ g(2s-v)-\frac{1}{2}\pi(m+v)\right)C\left(\frac{2dk-dm+2fs-fv+2(2bk-bm+2cs-cv)z}{\sqrt{2\pi}\sqrt{2bk-bm+2cs-cv}}\right)- S\left(\frac{2dk-dm+2fs-fv+2(2bk-bm+2cs-cv)z}{\sqrt{2\pi}\sqrt{2bk-bm+2cs-cv}}\right)\sin\left(-\frac{(2dk-dm+2fs-fv)^2}{4(2bk-bm+2cs-cv)}+ g(2s-v)-\frac{1}{2}\pi(m+v)\right)\right)\Big/\left(\sqrt{2bk-bm+2cs-cv}\right)\right) /;\, m\in\mathbb{N}^+\wedge v\in\mathbb{N}^+$$

01.06.21.0825.01

$$\int \sin^m(\sqrt{z}\,b + d z)\sin^v(\sqrt{z}\,c + f z + g)\,dz = 2^{-m-v} z\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1 - m \bmod 2)(1 - v \bmod 2) + 2^{-m-v}\binom{v}{\frac{v}{2}} \left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{(d(m-2k))^{3/2}}\left((-1)^{k+m}\binom{m}{k}\left(-b(m-2k)\sqrt{2\pi}\cos\left(\frac{b^2(m-2k)}{4d}-\frac{m\pi}{2}\right)C\left(\frac{b(m-2k)+2d\sqrt{z}\,(m-2k)}{\sqrt{d(m-2k)}\sqrt{2\pi}}\right)-\right.\right.\right.$$

$$b\,(m-2\,k)\,\sqrt{2\,\pi}\;S\!\left(\frac{b\,(m-2\,k)+2\,d\,\sqrt{z}\;(m-2\,k)}{\sqrt{d\,(m-2\,k)}\;\sqrt{2\,\pi}}\right)\sin\!\left(\frac{b^2\,(m-2\,k)}{4\,d}-\frac{m\,\pi}{2}\right)+$$

$$2\,\sqrt{d\,(m-2\,k)}\;\sin\!\left(\frac{\pi\,m}{2}+d\,(m-2\,k)\,z+b\,(m-2\,k)\,\sqrt{z}\right)\Bigg)\Bigg)\Bigg)$$

$$(1-v \bmod 2)+2^{-m-v}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}\frac{1}{(f\,(v-2\,k))^{3/2}}\left((-1)^{k+v}\binom{v}{k}\right.$$

$$\left(-c\,\sqrt{2\,\pi}\;(v-2\,k)\cos\!\left(-\frac{(v-2\,k)\,c^2}{4\,f}+\frac{\pi\,v}{2}+g\,(v-2\,k)\right)C\!\left(\frac{c\,(v-2\,k)+2\,f\,\sqrt{z}\;(v-2\,k)}{\sqrt{2\,\pi}\;\sqrt{f\,(v-2\,k)}}\right)+\right.$$

$$c\,\sqrt{2\,\pi}\;(v-2\,k)\,S\!\left(\frac{c\,(v-2\,k)+2\,f\,\sqrt{z}\;(v-2\,k)}{\sqrt{2\,\pi}\;\sqrt{f\,(v-2\,k)}}\right)\sin\!\left(-\frac{(v-2\,k)\,c^2}{4\,f}+\frac{\pi\,v}{2}+g\,(v-2\,k)\right)+$$

$$\left.\left.2\,\sqrt{f\,(v-2\,k)}\;\sin\!\left(\frac{\pi\,v}{2}+g\,(v-2\,k)+f\,(v-2\,k)\,z+c\,(v-2\,k)\,\sqrt{z}\right)\right)\right)+$$

$$2^{-m-v}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\left(\left(\sqrt{2\,\pi}\;(-2\,b\,k+b\,m-2\,c\,s+c\,v)\cos\!\left(-\frac{(2\,b\,k-b\,m+2\,c\,s-c\,v)^2}{4\,(2\,d\,k-d\,m+2\,f\,s-f\,v)}+\right.\right.\right.\right.$$

$$\left.2\,g\,s-g\,v-\frac{1}{2}\,\pi\,(m+v)\right)C\!\left(\frac{2\,b\,k-b\,m+2\,c\,s-c\,v+2\,(2\,d\,k-d\,m+2\,f\,s-f\,v)\,\sqrt{z}}{\sqrt{2\,\pi}\;\sqrt{2\,d\,k-d\,m+2\,f\,s-f\,v}}\right)+$$

$$\sqrt{2\,\pi}\;(2\,b\,k-b\,m+2\,c\,s-c\,v)\,S\!\left(\frac{2\,b\,k-b\,m+2\,c\,s-c\,v+2\,(2\,d\,k-d\,m+2\,f\,s-f\,v)\,\sqrt{z}}{\sqrt{2\,\pi}\;\sqrt{2\,d\,k-d\,m+2\,f\,s-f\,v}}\right)$$

$$\sin\!\left(-\frac{(2\,b\,k-b\,m+2\,c\,s-c\,v)^2}{4\,(2\,d\,k-d\,m+2\,f\,s-f\,v)}+2\,g\,s-g\,v-\frac{1}{2}\,\pi\,(m+v)\right)+2\,\sqrt{2\,d\,k-d\,m+2\,f\,s-f\,v}$$

$$\left.\sin\!\left(2\,g\,s-g\,v-\frac{1}{2}\,\pi\,(m+v)+(2\,d\,k-d\,m+2\,f\,s-f\,v)\,z+(2\,b\,k-b\,m+2\,c\,s-c\,v)\,\sqrt{z}\right)\right)\Big/$$

$$(2\,d\,k-d\,m+2\,f\,s-f\,v)^{3/2}+\left(\sqrt{2\,\pi}\;(-2\,b\,k+b\,m+2\,c\,s-c\,v)\cos\!\left(\frac{(2\,b\,k-b\,m-2\,c\,s+c\,v)^2}{4\,(2\,d\,k-d\,m-2\,f\,s+f\,v)}+\right.\right.$$

$$\left.2\,g\,s-g\,v-\frac{1}{2}\,\pi\,(v-m)\right)C\!\left(\frac{2\,b\,k-b\,m-2\,c\,s+c\,v+2\,(2\,d\,k-d\,m-2\,f\,s+f\,v)\,\sqrt{z}}{\sqrt{2\,\pi}\;\sqrt{2\,d\,k-d\,m-2\,f\,s+f\,v}}\right)-$$

$$\sqrt{2\,\pi}\;(2\,b\,k-b\,m-2\,c\,s+c\,v)\,S\!\left(\frac{2\,b\,k-b\,m-2\,c\,s+c\,v+2\,(2\,d\,k-d\,m-2\,f\,s+f\,v)\,\sqrt{z}}{\sqrt{2\,\pi}\;\sqrt{2\,d\,k-d\,m-2\,f\,s+f\,v}}\right)$$

$$\sin\left(\frac{(2\,b\,k-b\,m-2\,c\,s+c\,v)^2}{4\,(2\,d\,k-d\,m-2\,f\,s+f\,v)}+2\,g\,s-g\,v-\frac{1}{2}\,\pi\,(v-m)\right)-$$
$$2\,\sqrt{2\,d\,k-d\,m-2\,f\,s+f\,v}\,\sin\left(2\,g\,s-g\,v-\frac{1}{2}\,\pi\,(v-m)-(2\,d\,k-d\,m-2\,f\,s+f\,v)\,z-\right.$$
$$\left.\left.(2\,b\,k-b\,m-2\,c\,s+c\,v)\,\sqrt{z}\right)\right)\Big/(2\,d\,k-d\,m-2\,f\,s+f\,v)^{3/2}\Bigg)\;/;\;m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $\sin^m(b\,z^r+d\,z+e)\,\sin^v(c\,z^r+f\,z+g)$

01.06.21.0826.01

$$\int \sin^m\left(b z^2 + d z + e\right) \sin^v\left(c z^2 + f z + g\right) dz = 2^{-m-v} z \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2) + 2^{-m-v+\frac{1}{2}} \sqrt{\pi} \binom{v}{\frac{v}{2}} \left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor} \frac{1}{\sqrt{b(m-2k)}} \left((-1)^{k+m} \binom{m}{k} \left(\cos\left(\frac{(m-2k)d^2}{4b} - e(m-2k) - \frac{m\pi}{2}\right) C\left(\frac{d(m-2k) + 2bz(m-2k)}{\sqrt{b(m-2k)}\sqrt{2\pi}}\right) + S\left(\frac{d(m-2k) + 2bz(m-2k)}{\sqrt{b(m-2k)}\sqrt{2\pi}}\right) \sin\left(\frac{(m-2k)d^2}{4b} - e(m-2k) - \frac{m\pi}{2}\right)\right)\right)\right)(1 - v \bmod 2) +$$

$$2^{-m-v+\frac{1}{2}} \sqrt{\pi} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor} \frac{1}{\sqrt{c(v-2k)}} \left((-1)^{k+v} \binom{v}{k} \left(\cos\left(-\frac{(v-2k)f^2}{4c} + \frac{\pi v}{2} + g(v-2k)\right) C\left(\frac{f(v-2k) + 2cz(v-2k)}{\sqrt{2\pi}\sqrt{c(v-2k)}}\right) - S\left(\frac{f(v-2k) + 2cz(v-2k)}{\sqrt{2\pi}\sqrt{c(v-2k)}}\right) \sin\left(-\frac{(v-2k)f^2}{4c} + \frac{\pi v}{2} + g(v-2k)\right)\right)\right) +$$

$$2^{-m-v+\frac{1}{2}} \sqrt{\pi} \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor} (-1)^{k+m} \binom{m}{k} \sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor} (-1)^{s+v} \binom{v}{s} \left(\left(\left(\cos\left(-\frac{(2dk - dm - 2fs + fv)^2}{4(2bk - bm - 2cs + cv)} + e(2k - m) - \frac{1}{2}\pi(m - v) - g(2s - v)\right) C\left(\frac{2dk - dm - 2fs + fv + 2(2bk - bm - 2cs + cv)z}{\sqrt{2\pi}\sqrt{2bk - bm - 2cs + cv}}\right) - S\left(\frac{2dk - dm - 2fs + fv + 2(2bk - bm - 2cs + cv)z}{\sqrt{2\pi}\sqrt{2bk - bm - 2cs + cv}}\right) \sin\left(-\frac{(2dk - dm - 2fs + fv)^2}{4(2bk - bm - 2cs + cv)} + e(2k - m) - \frac{1}{2}\pi(m - v) - g(2s - v)\right)\right)\right) \Big/ \left(\sqrt{2bk - bm - 2cs + cv}\right) +$$

$$\left(\cos\left(-\frac{(2dk - dm + 2fs - fv)^2}{4(2bk - bm + 2cs - cv)} + e(2k - m) + g(2s - v) - \frac{1}{2}\pi(m + v)\right) C\left(\frac{2dk - dm + 2fs - fv + 2(2bk - bm + 2cs - cv)z}{\sqrt{2\pi}\sqrt{2bk - bm + 2cs - cv}}\right) - S\left(\frac{2dk - dm + 2fs - fv + 2(2bk - bm + 2cs - cv)z}{\sqrt{2\pi}\sqrt{2bk - bm + 2cs - cv}}\right) \sin\left(-\frac{(2dk - dm + 2fs - fv)^2}{4(2bk - bm + 2cs - cv)} + e(2k - m) + g(2s - v) - \frac{1}{2}\pi(m + v)\right)\right)\right) \Big/ \left(\sqrt{2bk - bm + 2cs - cv}\right)\right) /; m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

01.06.21.0827.01

$$\int \sin^m\left(\sqrt{z}\, b + d z + e\right) \sin^v\left(\sqrt{z}\, c + f z + g\right) dz =$$

$$2^{-m-v} z \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2) + 2^{-m-v} \binom{v}{\frac{v}{2}} \left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor} \frac{1}{(d(m-2k))^{3/2}}\right.$$

$$\left((-1)^{k+m}\binom{m}{k}\left(-b(m-2k)\sqrt{2\pi}\cos\left(\frac{(m-2k)b^2}{4d}-e(m-2k)-\frac{m\pi}{2}\right)C\left(\frac{b(m-2k)+2d\sqrt{z}(m-2k)}{\sqrt{d(m-2k)}\sqrt{2\pi}}\right)-\right.\right.$$

$$b(m-2k)\sqrt{2\pi}\,S\left(\frac{b(m-2k)+2d\sqrt{z}(m-2k)}{\sqrt{d(m-2k)}\sqrt{2\pi}}\right)\sin\left(\frac{(m-2k)b^2}{4d}-e(m-2k)-\frac{m\pi}{2}\right)+$$

$$\left.\left.2\sqrt{d(m-2k)}\sin\left(\frac{\pi m}{2}+e(m-2k)+d(m-2k)z+b(m-2k)\sqrt{z}\right)\right)\right)\right)$$

$$(1-v\bmod 2)+2^{-m-v}\binom{m}{\frac{m}{2}}(1-m\bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}\frac{1}{(f(v-2k))^{3/2}}\left((-1)^{k+v}\binom{v}{k}\right.$$

$$\left(-c\sqrt{2\pi}(v-2k)\cos\left(-\frac{(v-2k)c^2}{4f}+\frac{\pi v}{2}+g(v-2k)\right)C\left(\frac{c(v-2k)+2f\sqrt{z}(v-2k)}{\sqrt{2\pi}\sqrt{f(v-2k)}}\right)+\right.$$

$$c\sqrt{2\pi}(v-2k)S\left(\frac{c(v-2k)+2f\sqrt{z}(v-2k)}{\sqrt{2\pi}\sqrt{f(v-2k)}}\right)\sin\left(-\frac{(v-2k)c^2}{4f}+\frac{\pi v}{2}+g(v-2k)\right)+$$

$$\left.\left.2\sqrt{f(v-2k)}\sin\left(\frac{\pi v}{2}+g(v-2k)+f(v-2k)z+c(v-2k)\sqrt{z}\right)\right)\right)+$$

$$2^{-m-v}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k+m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{s+v}\binom{v}{s}\left(\left(\left(\sqrt{2\pi}(-2bk+bm+2cs-cv)\cos\left(-\frac{(2bk-bm-2cs+cv)^2}{4(2dk-dm-2fs+fv)}+2ek-\right.\right.\right.\right.$$

$$\left.em-2gs+gv+\frac{1}{2}\pi(v-m)\right)C\left(\frac{2bk-bm-2cs+cv+2(2dk-dm-2fs+fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{2dk-dm-2fs+fv}}\right)+$$

$$\sqrt{2\pi}(2bk-bm-2cs+cv)S\left(\frac{2bk-bm-2cs+cv+2(2dk-dm-2fs+fv)\sqrt{z}}{\sqrt{2\pi}\sqrt{2dk-dm-2fs+fv}}\right)$$

$$\sin\left(-\frac{(2bk-bm-2cs+cv)^2}{4(2dk-dm-2fs+fv)}+2ek-em-2gs+gv+\frac{1}{2}\pi(v-m)\right)+$$

$$2\sqrt{2dk-dm-2fs+fv}\sin\left(2ek-em-2gs+gv+\frac{1}{2}\pi(v-m)+\right.$$

$$\left.\left.(2dk-dm-2fs+fv)z+(2bk-bm-2cs+cv)\sqrt{z}\right)\right)\Big/(2dk-dm-2fs+fv)^{3/2}+$$

$$\left(\sqrt{2\pi}(-2bk+bm-2cs+cv)\cos\left(-\frac{(2bk-bm+2cs-cv)^2}{4(2dk-dm+2fs-fv)}+2ek-em+2gs-\right.\right.$$

$$g\,v-\frac{1}{2}\,\pi\,(m+v)\Bigg)\,C\!\left(\frac{2\,b\,k-b\,m+2\,c\,s-c\,v+2\,(2\,d\,k-d\,m+2\,f\,s-f\,v)\sqrt{z}}{\sqrt{2\,\pi}\,\sqrt{2\,d\,k-d\,m+2\,f\,s-f\,v}}\right)+$$

$$\sqrt{2\,\pi}\,(2\,b\,k-b\,m+2\,c\,s-c\,v)\,S\!\left(\frac{2\,b\,k-b\,m+2\,c\,s-c\,v+2\,(2\,d\,k-d\,m+2\,f\,s-f\,v)\sqrt{z}}{\sqrt{2\,\pi}\,\sqrt{2\,d\,k-d\,m+2\,f\,s-f\,v}}\right)$$

$$\sin\!\left(-\frac{(2\,b\,k-b\,m+2\,c\,s-c\,v)^2}{4\,(2\,d\,k-d\,m+2\,f\,s-f\,v)}+2\,e\,k-e\,m+2\,g\,s-g\,v-\frac{1}{2}\,\pi\,(m+v)\right)+$$

$$2\sqrt{2\,d\,k-d\,m+2\,f\,s-f\,v}\,\sin\!\Bigg(2\,e\,k-e\,m+2\,g\,s-g\,v-\frac{1}{2}\,\pi\,(m+v)+(2\,d\,k-d\,m+2\,f\,s-f\,v)\,z+$$

$$(2\,b\,k-b\,m+2\,c\,s-c\,v)\sqrt{z}\Bigg)\Bigg)\Bigg/(2\,d\,k-d\,m+2\,f\,s-f\,v)^{3/2}\Bigg)\;/;\;m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving rational functions of the direct function

Involving $\frac{1}{a+b\sin(c\,z)}$

01.06.21.0828.01

$$\int\frac{1}{a+b\sin(c\,z)}\,dz=\frac{2}{\sqrt{a^2-b^2}\,c}\tan^{-1}\!\left(\frac{b+a\tan\left(\frac{c\,z}{2}\right)}{\sqrt{a^2-b^2}}\right)$$

01.06.21.0829.01

$$\int\frac{1}{\sin(z)+1}\,dz=\frac{2\sin\left(\frac{z}{2}\right)}{\cos\left(\frac{z}{2}\right)+\sin\left(\frac{z}{2}\right)}$$

01.06.21.0830.01

$$\int\frac{1}{1-\sin(z)}\,dz=\frac{2\sin\left(\frac{z}{2}\right)}{\cos\left(\frac{z}{2}\right)-\sin\left(\frac{z}{2}\right)}$$

Involving $(a+b\sin(c\,z))^{-n}$

01.06.21.0831.01

$$\int\frac{1}{(a+b\sin(c\,z))^2}\,dz=\frac{b\sqrt{a^2-b^2}\,\cos(c\,z)+2\,a\tan^{-1}\!\left(\frac{b+a\tan\left(\frac{c\,z}{2}\right)}{\sqrt{a^2-b^2}}\right)(a+b\sin(c\,z))}{\left(a^2-b^2\right)^{3/2}\,c\,(a+b\sin(c\,z))}$$

01.06.21.0832.01

$$\int\frac{1}{(\sin(z)+1)^2}\,dz=-\frac{4\cos(z)+\cos(2\,z)-4\sin(z)+\sin(2\,z)-3}{6\,(\sin(z)+1)^2}$$

01.06.21.0833.01

$$\int\frac{1}{(1-\sin(z))^2}\,dz=\frac{4\cos(z)+\cos(2\,z)+4\sin(z)-\sin(2\,z)-3}{6\,(\sin(z)-1)^2}$$

01.06.21.0834.01

$$\int \frac{1}{(a+b\sin(c z))^3}\,dz = \frac{1}{2c}\left(\frac{2\left(2a^2+b^2\right)}{\left(a^2-b^2\right)^{5/2}}\tan^{-1}\left(\frac{b+a\tan\left(\frac{c z}{2}\right)}{\sqrt{a^2-b^2}}\right)+\frac{b\cos(c z)\left(4a^2+3b\sin(c z)\,a-b^2\right)}{\left(a^2-b^2\right)^2(a+b\sin(c z))^2}\right)$$

01.06.21.0835.01

$$\int \frac{1}{(a+b\sin(c z))^4}\,dz = \frac{1}{6c}\left(\frac{6a\left(2a^2+3b^2\right)}{\left(a^2-b^2\right)^{7/2}}\tan^{-1}\left(\frac{b+a\tan\left(\frac{c z}{2}\right)}{\sqrt{a^2-b^2}}\right)+\right.$$
$$\left.\left(b\cos(c z)\left(18a^4-5b^2a^2+3b\left(9a^2+b^2\right)\sin(c z)\,a+2b^4+b^2\left(11a^2+4b^2\right)\sin^2(c z)\right)\right)\Big/\left(\left(a^2-b^2\right)^3(a+b\sin(c z))^3\right)\right)$$

Involving $\frac{1}{a+b\sin^n(c z)}$

01.06.21.0836.01

$$\int \frac{1}{a+b\sin^2(c z)}\,dz = \frac{\tan^{-1}\left(\frac{\sqrt{a+b}\,\tan(c z)}{\sqrt{a}}\right)}{\sqrt{a}\,\sqrt{a+b}\,c}$$

01.06.21.0837.01

$$\int \frac{1}{\sin^2(z)+1}\,dz = \frac{\tan^{-1}\left(\sqrt{2}\,\tan(z)\right)}{\sqrt{2}}$$

01.06.21.0838.01

$$\int \frac{1}{1-\sin^2(z)}\,dz = \tan(z)$$

01.06.21.0839.01

$$\int \frac{1}{1+\sin^3(c z)}\,dz = \frac{1}{3c}\left(\frac{(-1)^{3/4}\left(i+\sqrt{3}\right)}{\sqrt{\frac{1}{2}\left(-3i+\sqrt{3}\right)}}\tan^{-1}\left(\frac{\sqrt[4]{-1}\left(\left(i+\sqrt{3}\right)i\tan\left(\frac{c z}{2}\right)+2\right)}{\sqrt{2\left(-3i+\sqrt{3}\right)}}\right)+\right.$$
$$\left.\frac{\sqrt[4]{-1}\,\sqrt{2}\left(-i+\sqrt{3}\right)}{\sqrt{3i+\sqrt{3}}}\tan^{-1}\left(\frac{\sqrt[4]{-1}\left(2i+\left(-i+\sqrt{3}\right)\tan\left(\frac{c z}{2}\right)\right)}{\sqrt{2\left(3i+\sqrt{3}\right)}}\right)+\frac{2\sin\left(\frac{c z}{2}\right)}{\cos\left(\frac{c z}{2}\right)+\sin\left(\frac{c z}{2}\right)}\right)$$

01.06.21.0840.01

$$\int \frac{1}{a+b\sin^4(c z)}\,dz =$$
$$\frac{1}{2\sqrt{a}\,c}\left(\frac{1}{\sqrt{a+i\sqrt{b}\,\sqrt{a}}}\tan^{-1}\left(\frac{\left(\sqrt{a}+i\sqrt{b}\right)\tan(c z)}{\sqrt{a+i\sqrt{b}\,\sqrt{a}}}\right)+\frac{1}{\sqrt{a-i\sqrt{a}\,\sqrt{b}}}\tan^{-1}\left(\frac{\left(\sqrt{a}-i\sqrt{b}\right)\tan(c z)}{\sqrt{a-i\sqrt{a}\,\sqrt{b}}}\right)\right)$$

01.06.21.0841.01

$$\int \frac{1}{1-\sin^4(c\,z)}\,dz = \frac{\sqrt{2}\,\tan^{-1}\left(\sqrt{2}\,\tan(c\,z)\right)+2\tan(c\,z)}{4\,c}$$

Involving $\left(a+b\sin^2(c\,z)\right)^{-n}$

01.06.21.0842.01

$$\int \frac{1}{\left(a+b\sin^2(c\,z)\right)^2}\,dz = \frac{1}{2\,a^{3/2}\,c}\left(\frac{2\,a+b}{(a+b)^{3/2}}\tan^{-1}\left(\frac{\sqrt{a+b}\,\tan(c\,z)}{\sqrt{a}}\right)+\frac{\sqrt{a}\,b\sin(2\,c\,z)}{(a+b)\,(2\,a+b-b\cos(2\,c\,z))}\right)$$

01.06.21.0843.01

$$\int \frac{1}{\left(1+\sin^2(c\,z)\right)^2}\,dz = \frac{1}{8\,c}\left(3\sqrt{2}\,\tan^{-1}\left(\sqrt{2}\,\tan(c\,z)\right)-\frac{2\sin(2\,c\,z)}{\cos(2\,c\,z)-3}\right)$$

01.06.21.0844.01

$$\int \frac{1}{\left(a+b\sin^2(c\,z)\right)^3}\,dz = \\ \frac{1}{8\,a^{5/2}\,c}\left(\frac{8\,a^2+8\,b\,a+3\,b^2}{(a+b)^{5/2}}\tan^{-1}\left(\frac{\sqrt{a+b}\,\tan(c\,z)}{\sqrt{a}}\right)+\frac{\sqrt{a}\,b\left(16\,a^2+16\,b\,a+3\,b^2-3\,b\,(2\,a+b)\cos(2\,c\,z)\right)\sin(2\,c\,z)}{(a+b)^2\,(2\,a+b-b\cos(2\,c\,z))^2}\right)$$

Involving $\frac{\sin(d\,z)}{a+b\sin(c\,z)}$

01.06.21.0845.01

$$\int \frac{\sin(d\,z)}{a+b\sin(c\,z)}\,dz = \\ \frac{1}{2\,b\sqrt{a^2-b^2}}\left(\frac{1}{i\,c-i\,d}\left(e^{(i\,c-i\,d)\,z}\left(\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(1-\frac{d}{c},1;2-\frac{d}{c};-\frac{i\,b\,e^{i\,c\,z}}{\sqrt{a^2-b^2}-a}\right)+\left(\sqrt{a^2-b^2}-a\right)\right.\right.\right. \\ \left.\left.\left. {}_2F_1\left(1-\frac{d}{c},1;2-\frac{d}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)\right)\right)- \right. \\ \frac{1}{i\,c+i\,d}\left(e^{(i\,c+i\,d)\,z}\left(\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(-\frac{i\,(i\,c+i\,d)}{c},1;\frac{d}{c}+2;-\frac{i\,b\,e^{i\,c\,z}}{\sqrt{a^2-b^2}-a}\right)+\right.\right. \\ \left.\left.\left.\left(\sqrt{a^2-b^2}-a\right){}_2F_1\left(-\frac{i\,(i\,c+i\,d)}{c},1;\frac{d}{c}+2;\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)\right)\right)\right)$$

01.06.21.0846.01

$$\int \frac{\sin(c\,z)}{a+b\sin(c\,z)}\,dz = \frac{1}{b}\left(z-\frac{2\,a}{\sqrt{a^2-b^2}\,c}\tan^{-1}\left(\frac{b+a\tan\left(\frac{c\,z}{2}\right)}{\sqrt{a^2-b^2}}\right)\right)$$

01.06.21.0847.01

$$\int \frac{\sin(z)}{\sin(z)+1}\,dz = \frac{\left(\cos\left(\frac{z}{2}\right)+\sin\left(\frac{z}{2}\right)\right)\left(z\cos\left(\frac{z}{2}\right)+(z-2)\sin\left(\frac{z}{2}\right)\right)}{\sin(z)+1}$$

01.06.21.0848.01

$$\int \frac{\sin(z)}{1-\sin(z)}\,dz = \frac{\left(\cos\left(\frac{z}{2}\right)-\sin\left(\frac{z}{2}\right)\right)\left(z\cos\left(\frac{z}{2}\right)-(z+2)\sin\left(\frac{z}{2}\right)\right)}{\sin(z)-1}$$

01.06.21.0849.01

$$\int \frac{A+B\sin(c\,z)}{a+b\sin(c\,z)}\,dz = \frac{\sqrt{a^2-b^2}\;B\,c\,z+2\,(A\,b-a\,B)\tan^{-1}\left(\frac{b+a\tan\left(\frac{c\,z}{2}\right)}{\sqrt{a^2-b^2}}\right)}{b\sqrt{a^2-b^2}\;c}$$

01.06.21.0850.01

$$\int \frac{A+B\sin(c\,z)}{\sin(c\,z)+1}\,dz = \frac{\left(\cos\left(\frac{c\,z}{2}\right)+\sin\left(\frac{c\,z}{2}\right)\right)\left(B\,c\,z\cos\left(\frac{c\,z}{2}\right)+(2\,A+B\,(c\,z-2))\sin\left(\frac{c\,z}{2}\right)\right)}{c\,(\sin(c\,z)+1)}$$

01.06.21.0851.01

$$\int \frac{A+B\sin(c\,z)}{1-\sin(c\,z)}\,dz = \frac{\left(\cos\left(\frac{c\,z}{2}\right)-\sin\left(\frac{c\,z}{2}\right)\right)\left(B\,c\,z\cos\left(\frac{c\,z}{2}\right)-(2\,A+B\,(c\,z+2))\sin\left(\frac{c\,z}{2}\right)\right)}{c\,(\sin(c\,z)-1)}$$

Involving $\sin(d\,z)\,(a+b\sin(c\,z))^{-n}$

01.06.21.0852.01

$$\int \frac{\sin(d\,z)}{(a+b\sin(c\,z))^2}\,dz =$$

$$\frac{1}{2\,b\left(a^2-b^2\right)^{3/2}}\left(\frac{1}{c-d}\left(i\,e^{i\,(c-d)\,z}\left(-a\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(1-\frac{d}{c},1;2-\frac{d}{c};\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)+a\left(a-\sqrt{a^2-b^2}\right)\right.\right.\right.$$

$${}_2F_1\left(1-\frac{d}{c},1;2-\frac{d}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)+\left(a^2+\sqrt{a^2-b^2}\;a-b^2\right){}_2F_1\left(1-\frac{d}{c},2;2-\frac{d}{c};\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)+$$

$$\left.\left.\left(-a^2+\sqrt{a^2-b^2}\;a+b^2\right){}_2F_1\left(1-\frac{d}{c},2;2-\frac{d}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)\right)\right)-$$

$$\frac{1}{c+d}\left(i\,e^{i\,(c+d)\,z}\left(-a\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(\frac{c+d}{c},1;\frac{d}{c}+2;\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)+a\left(a-\sqrt{a^2-b^2}\right)\right.\right.$$

$${}_2F_1\left(\frac{c+d}{c},1;\frac{d}{c}+2;\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)+\left(a^2+\sqrt{a^2-b^2}\;a-b^2\right){}_2F_1\left(\frac{c+d}{c},2;\frac{d}{c}+2;\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)+$$

$$\left.\left.\left.\left(-a^2+\sqrt{a^2-b^2}\;a+b^2\right){}_2F_1\left(\frac{c+d}{c},2;\frac{d}{c}+2;\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)\right)\right)\right)$$

01.06.21.0853.01

$$\int \frac{A+B\sin(c\,z)}{(a+b\sin(c\,z))^2}\,dz = \frac{1}{c}\left(\frac{2\,(a\,A-b\,B)}{\left(a^2-b^2\right)^{3/2}}\tan^{-1}\left(\frac{b+a\tan\left(\frac{c\,z}{2}\right)}{\sqrt{a^2-b^2}}\right)+\frac{(A\,b-a\,B)\cos(c\,z)}{\left(a^2-b^2\right)(a+b\sin(c\,z))}\right)$$

01.06.21.0854.01

$$\int \frac{A+B\sin(c\,z)}{(\sin(c\,z)+1)^2}\,dz = \frac{\left(\cos\left(\frac{c\,z}{2}\right)+\sin\left(\frac{c\,z}{2}\right)\right)\left(3\,B\cos\left(\frac{c\,z}{2}\right)-(A+2\,B)\cos\left(\frac{3\,c\,z}{2}\right)+3\,(A+B)\sin\left(\frac{c\,z}{2}\right)\right)}{3\,c\,(\sin(c\,z)+1)^2}$$

01.06.21.0855.01

$$\int \frac{A+B\sin(c\,z)}{(1-\sin(c\,z))^2}\,dz = \frac{\left(\cos\left(\frac{c\,z}{2}\right)-\sin\left(\frac{c\,z}{2}\right)\right)\left(3\,B\cos\left(\frac{c\,z}{2}\right)+(A-2\,B)\cos\left(\frac{3\,c\,z}{2}\right)+3\,(A-B)\sin\left(\frac{c\,z}{2}\right)\right)}{3\,c\,(\sin(c\,z)-1)^2}$$

01.06.21.0856.01

$$\int \frac{A+B\sin(c\,z)}{(a+b\sin(c\,z))^3}\,dz = \frac{1}{2\,c}\left(\frac{2\left(2\,A\,a^2-3\,b\,B\,a+A\,b^2\right)}{\left(a^2-b^2\right)^{5/2}}\tan^{-1}\left(\frac{b+a\tan\left(\frac{c\,z}{2}\right)}{\sqrt{a^2-b^2}}\right)-\frac{\left(B\,a^2-3\,A\,b\,a+2\,b^2\,B\right)\cos(c\,z)}{\left(a^2-b^2\right)^2(a+b\sin(c\,z))}+\frac{(A\,b-a\,B)\cos(c\,z)}{\left(a^2-b^2\right)(a+b\sin(c\,z))^2}\right)$$

01.06.21.0857.01

$$\int \frac{A+B\sin(c\,z)}{(\sin(c\,z)+1)^3}\,dz = \frac{1}{30\,c\,(\sin(c\,z)+1)^3}\left(\left(\cos\left(\frac{c\,z}{2}\right)+\sin\left(\frac{c\,z}{2}\right)\right)\left(15\,B\cos\left(\frac{c\,z}{2}\right)-5\,(2\,A+3\,B)\cos\left(\frac{3\,c\,z}{2}\right)+20\,A\sin\left(\frac{c\,z}{2}\right)+15\,B\sin\left(\frac{c\,z}{2}\right)-2\,A\sin\left(\frac{5\,c\,z}{2}\right)-3\,B\sin\left(\frac{5\,c\,z}{2}\right)\right)\right)$$

01.06.21.0858.01

$$\int \frac{A+B\sin(c\,z)}{(1-\sin(c\,z))^3}\,dz = \left(15\,B\cos\left(\frac{c\,z}{2}\right)+5\,(2\,A-3\,B)\cos\left(\frac{3\,c\,z}{2}\right)+20\,A\sin\left(\frac{c\,z}{2}\right)-15\,B\sin\left(\frac{c\,z}{2}\right)-2\,A\sin\left(\frac{5\,c\,z}{2}\right)+3\,B\sin\left(\frac{5\,c\,z}{2}\right)\right)\Big/\left(30\,c\left(\cos\left(\frac{c\,z}{2}\right)-\sin\left(\frac{c\,z}{2}\right)\right)^5\right)$$

01.06.21.0859.01

$$\int \frac{A+B\sin(z)+C\sin^2(z)}{(a+b\sin(z))^3}\,dz = \frac{1}{2}\left(\frac{2\left((2\,A+C)\,a^2-3\,b\,B\,a+b^2\,(A+2\,C)\right)}{\left(a^2-b^2\right)^{5/2}}\tan^{-1}\left(\frac{b+a\tan\left(\frac{z}{2}\right)}{\sqrt{a^2-b^2}}\right)-\frac{\left(C\,a^3+b\,B\,a^2-b^2\,(3\,A+4\,C)\,a+2\,b^3\,B\right)\cos(z)}{b\left(a^2-b^2\right)^2(a+b\sin(z))}+\frac{\left(C\,a^2-b\,B\,a+A\,b^2\right)\cos(z)}{\left(a^2\,b-b^3\right)(a+b\sin(z))^2}\right)$$

Involving $\frac{\sin(d\,z)}{a+b\sin^2(c\,z)}$

01.06.21.0860.01

$$\int \frac{\sin(d z)}{a + b \sin^2(c z)} \, dz = -\frac{1}{2 \sqrt{a} \, b \sqrt{a+b}} \left(\frac{1}{2c - d} \left(e^{i d z - 2 i c z} \left(\left(-2a + 2\sqrt{a+b} \, \sqrt{a} - b \right) {}_2F_1\left(1 - \frac{d}{2c}, 1; 2 - \frac{d}{2c}; \frac{b e^{-2 i c z}}{2a + 2\sqrt{a+b} \, \sqrt{a} + b}\right) + \left(2a + 2\sqrt{a+b} \, \sqrt{a} + b \right) {}_2F_1\left(1 - \frac{d}{2c}, 1; 2 - \frac{d}{2c}; \frac{b e^{-2 i c z}}{2a - 2\sqrt{a+b} \, \sqrt{a} + b}\right) \right) \right) - \frac{1}{2c + d} \left(e^{-i (2c + d) z} \left(\left(-2a + 2\sqrt{a+b} \, \sqrt{a} - b \right) {}_2F_1\left(\frac{d}{2c} + 1, 1; \frac{d}{2c} + 2; \frac{b e^{-2 i c z}}{2a + 2\sqrt{a+b} \, \sqrt{a} + b}\right) + \left(2a + 2\sqrt{a+b} \, \sqrt{a} + b \right) {}_2F_1\left(\frac{d}{2c} + 1, 1; \frac{d}{2c} + 2; \frac{b e^{-2 i c z}}{2a - 2\sqrt{a+b} \, \sqrt{a} + b}\right) \right) \right) \right)$$

01.06.21.0861.01

$$\int \frac{\sin(c z)}{a + b \sin^2(c z)} \, dz = -\frac{1}{\sqrt{b} \, \sqrt{a+b} \, c} \tanh^{-1}\left(\frac{\sqrt{b} \, \cos(c z)}{\sqrt{a+b}} \right)$$

01.06.21.0862.01

$$\int \frac{\sin(2 c z)}{a + b \sin^2(c z)} \, dz = \frac{\log(2a + b - b\cos(2 c z))}{b c}$$

Involving $\frac{\sin^m(c z)}{a + b \sin^n(c z)}$

01.06.21.0863.01

$$\int \frac{\sin^m(c z)}{a + b \sin^2(c z)} \, dz = \frac{\sqrt{\cos^2(c z)} \, \sec(c z) \sin^{m+1}(c z)}{a c (m+1)} F_1\left(\frac{m+1}{2}; \frac{1}{2}, 1; \frac{m+3}{2}; \sin^2(c z), -\frac{b \sin^2(c z)}{a} \right)$$

01.06.21.0864.01

$$\int \frac{\sin^2(c z)}{a + b \sin^2(c z)} \, dz = \frac{1}{b} \left(z - \frac{\sqrt{a}}{\sqrt{a+b} \, c} \tan^{-1}\left(\frac{\sqrt{a+b} \, \tan(c z)}{\sqrt{a}} \right) \right)$$

01.06.21.0865.01

$$\int \frac{\sin^2(c z)}{a + b \sin^4(c z)} \, dz = -\frac{i}{2 \sqrt{b} \, c} \left(\frac{\tan^{-1}\left(\frac{\left(\sqrt{a} - i \sqrt{b}\right) \tan(c z)}{\sqrt{a - i \sqrt{a} \, \sqrt{b}}} \right)}{\sqrt{a - i \sqrt{a} \, \sqrt{b}}} - \frac{\tan^{-1}\left(\frac{\left(\sqrt{a} + i \sqrt{b}\right) \tan(c z)}{\sqrt{a + i \sqrt{b} \, \sqrt{a}}} \right)}{\sqrt{a + i \sqrt{b} \, \sqrt{a}}} \right)$$

Involving $\sin(d z) \left(a + b \sin^2(c z)\right)^{-n}$

01.06.21.0866.01

$$\int \frac{\sin(d z)}{\left(a+b\sin^2(c z)\right)^2}\, dz = -\frac{1}{4 a^{3/2} b (a+b)^{3/2}} \left(\frac{1}{2c-d}\left(e^{i(2c-d)z}\left((2a+b)\left(-2a+2\sqrt{a+b}\sqrt{a}-b\right) {}_2F_1\left(1-\frac{d}{2c}, 1; 2-\frac{d}{2c}; \frac{b e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right)+\right.\right.\right.$$
$$(2a+b)\left(2a+2\sqrt{a+b}\sqrt{a}+b\right) {}_2F_1\left(1-\frac{d}{2c}, 1; 2-\frac{d}{2c}; \frac{b e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)+$$
$$2\sqrt{a}\left(\left(2a^{3/2}-2\sqrt{a+b}\, a+2b\sqrt{a}-b\sqrt{a+b}\right) {}_2F_1\left(1-\frac{d}{2c}, 2; 2-\frac{d}{2c}; \frac{b e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right)-\right.$$
$$\left.\left.\left.\left(2a^{3/2}+2\sqrt{a+b}\, a+2b\sqrt{a}+b\sqrt{a+b}\right) {}_2F_1\left(1-\frac{d}{2c}, 2; 2-\frac{d}{2c}; \frac{b e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)\right)\right)\right)-$$
$$\frac{1}{2c+d}\left(e^{i(2c+d)z}\left((2a+b)\left(-2a+2\sqrt{a+b}\sqrt{a}-b\right) {}_2F_1\left(\frac{d}{2c}+1, 1; \frac{d}{2c}+2; \frac{b e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right)+\right.\right.$$
$$(2a+b)\left(2a+2\sqrt{a+b}\sqrt{a}+b\right) {}_2F_1\left(\frac{d}{2c}+1, 1; \frac{d}{2c}+2; \frac{b e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)+$$
$$2\sqrt{a}\left(\left(2a^{3/2}-2\sqrt{a+b}\, a+2b\sqrt{a}-b\sqrt{a+b}\right) {}_2F_1\left(\frac{d}{2c}+1, 2; \frac{d}{2c}+2; \frac{b e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right)-\right.$$
$$\left.\left.\left.\left.\left(2a^{3/2}+2\sqrt{a+b}\, a+2b\sqrt{a}+b\sqrt{a+b}\right) {}_2F_1\left(\frac{d}{2c}+1, 2; \frac{d}{2c}+2; \frac{b e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)\right)\right)\right)\right)$$

Involving $\sin^m(c z)\left(a+b\sin^2(c z)\right)^{-n}$

01.06.21.0867.01

$$\int \frac{\sin^m(c z)}{\left(a+b\sin^2(c z)\right)^n}\, dz = \frac{\sqrt{\cos^2(c z)}\ \sec(c z)\sin^{m+1}(c z)}{c(m+1)a^n} F_1\left(\frac{m+1}{2}; \frac{1}{2}, n; \frac{m+3}{2}; \sin^2(c z), -\frac{b\sin^2(c z)}{a}\right) /; v \in \mathbb{N}^+$$

01.06.21.0868.01

$$\int \frac{\sin^2(c z)}{\left(a+b\sin^2(c z)\right)^2}\, dz = \frac{1}{2c}\left(\frac{1}{\sqrt{a}\ (a+b)^{3/2}} \tan^{-1}\left(\frac{\sqrt{a+b}\ \tan(c z)}{\sqrt{a}}\right) - \frac{\sin(2 c z)}{(a+b)(2a+b-b\cos(2 c z))}\right)$$

Involving $\frac{\sin(e z)\sin(d z)}{a+b\sin(c z)}$

01.06.21.0869.01

$$\int \frac{\sin(e\,z)\sin(d\,z)}{a+b\sin(c\,z)}\,dz = -\frac{1}{4\,b\sqrt{a^2-b^2}}\left(\frac{1}{c+d-e}\left(e^{i(c+d-e)z}\left(\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(\frac{c+d-e}{c},1;\frac{2c+d-e}{c};\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)+\left(\sqrt{a^2-b^2}-a\right){}_2F_1\left(\frac{c+d-e}{c},1;\frac{2c+d-e}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)\right)\right)+\frac{1}{c-d+e}\left(e^{i(c-d+e)z}\left(\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(\frac{c-d+e}{c},1;\frac{2c-d+e}{c};\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)+\left(\sqrt{a^2-b^2}-a\right){}_2F_1\left(\frac{c-d+e}{c},1;\frac{2c-d+e}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)\right)\right)-\frac{1}{c+d+e}\left(e^{i(c+d+e)z}\left(\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(\frac{c+d+e}{c},1;\frac{2c+d+e}{c};\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)+\left(\sqrt{a^2-b^2}-a\right){}_2F_1\left(\frac{c+d+e}{c},1;\frac{2c+d+e}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)\right)\right)-\frac{1}{c-d-e}\left(e^{i(c-d-e)z}\left(\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(-\frac{-c+d+e}{c},1;-\frac{-2c+d+e}{c};\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)+\left(\sqrt{a^2-b^2}-a\right){}_2F_1\left(-\frac{-c+d+e}{c},1;-\frac{-2c+d+e}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)\right)\right)\right)$$

Involving $\sin(e\,z)\sin(d\,z)\,(a+b\sin(c\,z))^{-n}$

01.06.21.0870.01

$$\int \frac{\sin(e\,z)\sin(d\,z)}{(a+b\sin(c\,z))^2}\,dz = \frac{1}{4\,b\,(a^2-b^2)^{3/2}}\left(\frac{1}{c+d-e}\left(e^{i(c+d-e)z}\left(-a\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(\frac{c+d-e}{c},1;\frac{2c+d-e}{c};\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)+a\left(a-\sqrt{a^2-b^2}\right){}_2F_1\left(\frac{c+d-e}{c},1;\frac{2c+d-e}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)+\left(a^2+\sqrt{a^2-b^2}\,a-b^2\right){}_2F_1\left(\frac{c+d-e}{c},2;\frac{2c+d-e}{c};\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)+\right.\right.\right.$$

$$\left(-a^2+\sqrt{a^2-b^2}\;a+b^2\right){}_2F_1\left(\frac{c+d-e}{c},2;\frac{2c+d-e}{c};\frac{i\,b\,e^{icz}}{a+\sqrt{a^2-b^2}}\right)\Bigg)\Bigg)\Bigg)+$$

$$\frac{1}{c-d+e}\left(e^{i(c-d+e)z}\left(-a\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(\frac{c-d+e}{c},1;\frac{2c-d+e}{c};\frac{i\,b\,e^{icz}}{a-\sqrt{a^2-b^2}}\right)+\right.\right.$$

$$a\left(a-\sqrt{a^2-b^2}\right){}_2F_1\left(\frac{c-d+e}{c},1;\frac{2c-d+e}{c};\frac{i\,b\,e^{icz}}{a+\sqrt{a^2-b^2}}\right)+$$

$$\left(a^2+\sqrt{a^2-b^2}\;a-b^2\right){}_2F_1\left(\frac{c-d+e}{c},2;\frac{2c-d+e}{c};\frac{i\,b\,e^{icz}}{a-\sqrt{a^2-b^2}}\right)+$$

$$\left.\left.\left(-a^2+\sqrt{a^2-b^2}\;a+b^2\right){}_2F_1\left(\frac{c-d+e}{c},2;\frac{2c-d+e}{c};\frac{i\,b\,e^{icz}}{a+\sqrt{a^2-b^2}}\right)\right)\right)-$$

$$\frac{1}{c+d+e}\left(e^{i(c+d+e)z}\left(-a\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(\frac{c+d+e}{c},1;\frac{2c+d+e}{c};\frac{i\,b\,e^{icz}}{a-\sqrt{a^2-b^2}}\right)+\right.\right.$$

$$a\left(a-\sqrt{a^2-b^2}\right){}_2F_1\left(\frac{c+d+e}{c},1;\frac{2c+d+e}{c};\frac{i\,b\,e^{icz}}{a+\sqrt{a^2-b^2}}\right)+$$

$$\left(a^2+\sqrt{a^2-b^2}\;a-b^2\right){}_2F_1\left(\frac{c+d+e}{c},2;\frac{2c+d+e}{c};\frac{i\,b\,e^{icz}}{a-\sqrt{a^2-b^2}}\right)+$$

$$\left.\left.\left(-a^2+\sqrt{a^2-b^2}\;a+b^2\right){}_2F_1\left(\frac{c+d+e}{c},2;\frac{2c+d+e}{c};\frac{i\,b\,e^{icz}}{a+\sqrt{a^2-b^2}}\right)\right)\right)-$$

$$\frac{1}{c-d-e}\left(e^{i(c-d-e)z}\left(-a\left(a+\sqrt{a^2-b^2}\right){}_2F_1\left(-\frac{-c+d+e}{c},1;-\frac{-2c+d+e}{c};\frac{i\,b\,e^{icz}}{a-\sqrt{a^2-b^2}}\right)+\right.\right.$$

$$a\left(a-\sqrt{a^2-b^2}\right){}_2F_1\left(-\frac{-c+d+e}{c},1;-\frac{-2c+d+e}{c};\frac{i\,b\,e^{icz}}{a+\sqrt{a^2-b^2}}\right)+$$

$$\left(a^2+\sqrt{a^2-b^2}\;a-b^2\right){}_2F_1\left(-\frac{-c+d+e}{c},2;-\frac{-2c+d+e}{c};\frac{i\,b\,e^{icz}}{a-\sqrt{a^2-b^2}}\right)+$$

$$\left.\left.\left(-a^2+\sqrt{a^2-b^2}\;a+b^2\right){}_2F_1\left(-\frac{-c+d+e}{c},2;-\frac{-2c+d+e}{c};\frac{i\,b\,e^{icz}}{a+\sqrt{a^2-b^2}}\right)\right)\right)\Bigg)\Bigg)$$

Involving $\frac{\sin(e z)\sin(d z)}{a+b\sin^2(c z)}$

01.06.21.0871.01

$$\int \frac{\sin(e z)\sin(d z)}{a+b\sin^2(c z)}\,dz = -\frac{1}{4\sqrt{a}\,b\sqrt{a+b}} \Bigg(i\Bigg(\frac{1}{2c+d-e}\Bigg(e^{-i(2c+d-e)z}\Bigg(\Big(-2a+2\sqrt{a+b}\,\sqrt{a}-b\Big)\,{}_2F_1\Big(\frac{2c+d-e}{2c},1;\frac{4c+d-e}{2c};\frac{b\,e^{-2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\Big)+$$
$$\Big(2a+2\sqrt{a+b}\,\sqrt{a}+b\Big)\,{}_2F_1\Big(\frac{2c+d-e}{2c},1;\frac{4c+d-e}{2c};\frac{b\,e^{-2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\Big)\Bigg)\Bigg)+$$
$$\frac{1}{2c-d+e}\Bigg(e^{-i(2c-d+e)z}\Bigg(\Big(-2a+2\sqrt{a+b}\,\sqrt{a}-b\Big)\,{}_2F_1\Big(\frac{2c-d+e}{2c},1;\frac{4c-d+e}{2c};\frac{b\,e^{-2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\Big)+$$
$$\Big(2a+2\sqrt{a+b}\,\sqrt{a}+b\Big)\,{}_2F_1\Big(\frac{2c-d+e}{2c},1;\frac{4c-d+e}{2c};\frac{b\,e^{-2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\Big)\Bigg)\Bigg)-$$
$$\frac{1}{2c+d+e}\Bigg(e^{-i(2c+d+e)z}\Bigg(\Big(-2a+2\sqrt{a+b}\,\sqrt{a}-b\Big)\,{}_2F_1\Big(\frac{2c+d+e}{2c},1;\frac{4c+d+e}{2c};\frac{b\,e^{-2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\Big)+$$
$$\Big(2a+2\sqrt{a+b}\,\sqrt{a}+b\Big)\,{}_2F_1\Big(\frac{2c+d+e}{2c},1;\frac{4c+d+e}{2c};\frac{b\,e^{-2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\Big)\Bigg)\Bigg)+\frac{1}{-2c+d+e}$$
$$\Bigg(e^{-i(2c-d-e)z}\Bigg(\Big(-2a+2\sqrt{a+b}\,\sqrt{a}-b\Big)\,{}_2F_1\Big(-\frac{-2c+d+e}{2c},1;-\frac{-4c+d+e}{2c};\frac{b\,e^{-2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\Big)+$$
$$\Big(2a+2\sqrt{a+b}\,\sqrt{a}+b\Big)\,{}_2F_1\Big(-\frac{-2c+d+e}{2c},1;-\frac{-4c+d+e}{2c};\frac{b\,e^{-2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\Big)\Bigg)\Bigg)\Bigg)\Bigg)$$

Involving $\sin(e z)\sin(d z)\left(a+b\sin^2(c z)\right)^{-n}$

01.06.21.0872.01

$$\int \frac{\sin(e z)\sin(d z)}{\left(a+b\sin^2(c z)\right)^2}\,dz = \frac{i}{8a^{3/2}\,b\,(a+b)^{3/2}}$$
$$\Bigg(\frac{1}{2c+d-e}\Bigg(e^{i(2c+d-e)z}\Bigg((2a+b)\Big(-2a+2\sqrt{a+b}\,\sqrt{a}-b\Big)\,{}_2F_1\Big(\frac{2c+d-e}{2c},1;\frac{4c+d-e}{2c};\frac{b\,e^{2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\Big)+$$
$$(2a+b)\Big(2a+2\sqrt{a+b}\,\sqrt{a}+b\Big)\,{}_2F_1\Big(\frac{2c+d-e}{2c},1;\frac{4c+d-e}{2c};\frac{b\,e^{2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\Big)+2\sqrt{a}$$
$$\Bigg(\Big(2a^{3/2}-2\sqrt{a+b}\,a+2b\sqrt{a}-b\sqrt{a+b}\Big)\,{}_2F_1\Big(\frac{2c+d-e}{2c},2;\frac{4c+d-e}{2c};\frac{b\,e^{2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\Big)-$$
$$\Big(2a^{3/2}+2\sqrt{a+b}\,a+2b\sqrt{a}+b\sqrt{a+b}\Big)$$
$${}_2F_1\Big(\frac{2c+d-e}{2c},2;\frac{4c+d-e}{2c};\frac{b\,e^{2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\Big)\Bigg)\Bigg)\Bigg)+\frac{1}{2c-d+e}$$

$$\Bigg(e^{i(2c-d+e)z}\bigg((2a+b)\Big(-2a+2\sqrt{a+b}\,\sqrt{a}-b\Big)\,{}_2F_1\!\bigg(\frac{2c-d+e}{2c},1;\frac{4c-d+e}{2c};\frac{b\,e^{2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\bigg)+$$

$$(2a+b)\Big(2a+2\sqrt{a+b}\,\sqrt{a}+b\Big)\,{}_2F_1\!\bigg(\frac{2c-d+e}{2c},1;\frac{4c-d+e}{2c};\frac{b\,e^{2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\bigg)+2\sqrt{a}$$

$$\bigg(\Big(2a^{3/2}-2\sqrt{a+b}\,a+2b\sqrt{a}-b\sqrt{a+b}\Big)\,{}_2F_1\!\bigg(\frac{2c-d+e}{2c},2;\frac{4c-d+e}{2c};\frac{b\,e^{2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\bigg)-$$

$$\Big(2a^{3/2}+2\sqrt{a+b}\,a+2b\sqrt{a}+b\sqrt{a+b}\Big)$$

$${}_2F_1\!\bigg(\frac{2c-d+e}{2c},2;\frac{4c-d+e}{2c};\frac{b\,e^{2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\bigg)\bigg)\bigg)\Bigg)-\frac{1}{2c+d+e}$$

$$\Bigg(e^{i(2c+d+e)z}\bigg((2a+b)\Big(-2a+2\sqrt{a+b}\,\sqrt{a}-b\Big)\,{}_2F_1\!\bigg(\frac{2c+d+e}{2c},1;\frac{4c+d+e}{2c};\frac{b\,e^{2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\bigg)+$$

$$(2a+b)\Big(2a+2\sqrt{a+b}\,\sqrt{a}+b\Big)\,{}_2F_1\!\bigg(\frac{2c+d+e}{2c},1;\frac{4c+d+e}{2c};\frac{b\,e^{2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\bigg)+2\sqrt{a}$$

$$\bigg(\Big(2a^{3/2}-2\sqrt{a+b}\,a+2b\sqrt{a}-b\sqrt{a+b}\Big)\,{}_2F_1\!\bigg(\frac{2c+d+e}{2c},2;\frac{4c+d+e}{2c};\frac{b\,e^{2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\bigg)-$$

$$\Big(2a^{3/2}+2\sqrt{a+b}\,a+2b\sqrt{a}+b\sqrt{a+b}\Big)$$

$${}_2F_1\!\bigg(\frac{2c+d+e}{2c},2;\frac{4c+d+e}{2c};\frac{b\,e^{2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\bigg)\bigg)\bigg)\Bigg)+\frac{1}{-2c+d+e}$$

$$\Bigg(e^{i(2c-d-e)z}\bigg((2a+b)\Big(-2a+2\sqrt{a+b}\,\sqrt{a}-b\Big)\,{}_2F_1\!\bigg(-\frac{-2c+d+e}{2c},1;-\frac{-4c+d+e}{2c};\frac{b\,e^{2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\bigg)+$$

$$(2a+b)\Big(2a+2\sqrt{a+b}\,\sqrt{a}+b\Big)\,{}_2F_1\!\bigg(-\frac{-2c+d+e}{2c},1;-\frac{-4c+d+e}{2c};\frac{b\,e^{2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\bigg)+$$

$$2\sqrt{a}\,\bigg(\Big(2a^{3/2}-2\sqrt{a+b}\,a+2b\sqrt{a}-b\sqrt{a+b}\Big)\,{}_2F_1\!\bigg(-\frac{-2c+d+e}{2c},2;-\frac{-4c+d+e}{2c};$$

$$\frac{b\,e^{2icz}}{2a+2\sqrt{a+b}\,\sqrt{a}+b}\bigg)-\Big(2a^{3/2}+2\sqrt{a+b}\,a+2b\sqrt{a}+b\sqrt{a+b}\Big)$$

$${}_2F_1\!\bigg(-\frac{-2c+d+e}{2c},2;-\frac{-4c+d+e}{2c};\frac{b\,e^{2icz}}{2a-2\sqrt{a+b}\,\sqrt{a}+b}\bigg)\bigg)\bigg)\Bigg)\Bigg)$$

Involving algebraic functions of the direct function

Involving $(a+b\sin(c\,z))^{\beta}$

01.06.21.0873.01

$$\int (a+b\sin(c z))^{\beta}\, dz = \frac{\sec(c z)}{b\, c\, (\beta+1)} \sqrt{\frac{b\,(\sin(c z)+1)}{b-a}} \sqrt{\frac{b-b\sin(c z)}{a+b}}\, (a+b\sin(c z))^{\beta+1}\, F_1\!\left(\beta+1; \frac{1}{2}, \frac{1}{2}; \beta+2; \frac{a+b\sin(c z)}{a-b}, \frac{a+b\sin(c z)}{a+b}\right)$$

01.06.21.0874.01

$$\int (a+a\sin(c z))^{\beta}\, dz = \frac{\sqrt{2}\, \cos(c z)\, (a\,(\sin(c z)+1))^{\beta}}{(2\,\beta\, c+c)\sqrt{1-\sin(c z)}}\, {}_2F_1\!\left(\beta+\frac{1}{2}, \frac{1}{2}; \beta+\frac{3}{2}; \frac{1}{2}(\sin(c z)+1)\right)$$

01.06.21.0875.01

$$\int (a+b\sin(c z))^{5/2}\, dz = \frac{1}{30\, c\sqrt{a+b\sin(c z)}} \left(-4\sqrt{\frac{a+b\sin(c z)}{a+b}}\, \left(23\, a^3+23\, b\, a^2+9\, b^2\, a+9\, b^3\right) E\!\left(\frac{1}{4}(\pi-2\, c\, z) \,\middle|\, \frac{2\, b}{a+b}\right) + 32\, a\sqrt{\frac{a+b\sin(c z)}{a+b}}\, \left(a^2-b^2\right) F\!\left(\frac{1}{4}(\pi-2\, c\, z) \,\middle|\, \frac{2\, b}{a+b}\right) + 2\, b\cos(c z)\left(-22\, a^2-28\, b\sin(c z)\, a-3\, b^2+3\, b^2\cos(2\, c\, z)\right)\right)$$

01.06.21.0876.01

$$\int (a+b\sin(c z))^{3/2}\, dz = -\frac{1}{3\, c\sqrt{a+b\sin(c z)}} \left(2\left(4\, a\sqrt{\frac{a+b\sin(c z)}{a+b}}\, (a+b)\, E\!\left(\frac{1}{4}(\pi-2\, c\, z) \,\middle|\, \frac{2\, b}{a+b}\right) + b\cos(c z)\,(a+b\sin(c z)) - \left(a^2-b^2\right) F\!\left(\frac{1}{4}(\pi-2\, c\, z) \,\middle|\, \frac{2\, b}{a+b}\right) \sqrt{\frac{a+b\sin(c z)}{a+b}}\right)\right)$$

01.06.21.0877.01

$$\int \sqrt{a+b\sin(c z)}\, dz = -\frac{2}{c\sqrt{\frac{a+b\sin(c z)}{a+b}}}\, E\!\left(\frac{1}{4}(\pi-2\, c\, z) \,\middle|\, \frac{2\, b}{a+b}\right) \sqrt{a+b\sin(c z)}$$

01.06.21.0878.01

$$\int \sqrt{a+a\sin(c z)}\, dz = \frac{2\left(\sin\left(\frac{c z}{2}\right)-\cos\left(\frac{c z}{2}\right)\right)\sqrt{a\,(\sin(c z)+1)}}{c\left(\cos\left(\frac{c z}{2}\right)+\sin\left(\frac{c z}{2}\right)\right)}$$

01.06.21.0879.01

$$\int \sqrt{a-a\sin(c z)}\, dz = \frac{2\left(\cos\left(\frac{c z}{2}\right)+\sin\left(\frac{c z}{2}\right)\right)\sqrt{a-a\sin(c z)}}{c\left(\cos\left(\frac{c z}{2}\right)-\sin\left(\frac{c z}{2}\right)\right)}$$

01.06.21.0880.01

$$\int \frac{1}{\sqrt{a+b\sin(c z)}}\, dz = -\frac{2}{c\sqrt{a+b\sin(c z)}}\, F\!\left(\frac{1}{4}(\pi-2\, c\, z) \,\middle|\, \frac{2\, b}{a+b}\right) \sqrt{\frac{a+b\sin(c z)}{a+b}}$$

01.06.21.0881.01

$$\int \frac{1}{\sqrt{a+a\sin(c z)}}\,dz = -\frac{(2+2 i)\,(-1)^{3/4}\tanh^{-1}\left(\frac{\tan\left(\frac{c z}{4}\right)-1}{\sqrt{2}}\right)\left(\cos\left(\frac{c z}{2}\right)+\sin\left(\frac{c z}{2}\right)\right)}{c\sqrt{a\,(\sin(c z)+1)}}$$

01.06.21.0882.01

$$\int \frac{1}{\sqrt{a-a\sin(c z)}}\,dz = \frac{(2-2 i)\,\sqrt[4]{-1}\,\tanh^{-1}\left(\frac{\tan\left(\frac{c z}{4}\right)+1}{\sqrt{2}}\right)\left(\cos\left(\frac{c z}{2}\right)-\sin\left(\frac{c z}{2}\right)\right)}{c\sqrt{a-a\sin(c z)}}$$

01.06.21.0883.01

$$\int \frac{1}{(a+b\sin(c z))^{3/2}}\,dz = -\frac{2}{(a-b)\,(a+b)\,c\sqrt{a+b\sin(c z)}}\left((a+b)\,E\left(\frac{1}{4}(\pi-2 c z)\,\middle|\,\frac{2 b}{a+b}\right)\sqrt{\frac{a+b\sin(c z)}{a+b}} - b\cos(c z)\right)$$

01.06.21.0884.01

$$\int \frac{1}{(a+b\sin(c z))^{5/2}}\,dz = \left(2\left(-4 a\,(a+b)^2 E\left(\frac{1}{4}(\pi-2 c z)\,\middle|\,\frac{2 b}{a+b}\right)\left(\frac{a+b\sin(c z)}{a+b}\right)^{3/2} + (a-b)\,(a+b)^2 F\left(\frac{1}{4}(\pi-2 c z)\,\middle|\,\frac{2 b}{a+b}\right)\left(\frac{a+b\sin(c z)}{a+b}\right)^{3/2} + b\cos(c z)\left(5 a^2+4 b\sin(c z)\,a-b^2\right)\right)\right)\Big/\left(3\,(a-b)^2\,(a+b)^2\,c\,(a+b\sin(c z))^{3/2}\right)$$

Involving $((a+b\sin(c z))^{\nu})^{\beta}$

01.06.21.0885.01

$$\int \left((a+b\sin(c z))^{\nu}\right)^{\beta}\,dz = \frac{1}{b\,c\,(\beta\nu+1)}\left(F_1\left(\beta\nu+1;\frac{1}{2},\frac{1}{2};\beta\nu+2;\frac{a+b\sin(c z)}{a-b},\frac{a+b\sin(c z)}{a+b}\right)\sec(c z)\sqrt{\frac{b\,(\sin(c z)+1)}{b-a}}\sqrt{\frac{b-b\sin(c z)}{a+b}}\,(a+b\sin(c z))\left((a+b\sin(c z))^{\nu}\right)^{\beta}\right)$$

01.06.21.0886.01

$$\int \sqrt{(a+b\sin(c z))^5}\,dz = -\frac{1}{30\,c\,(a+b\sin(c z))^3}\left(\sqrt{(a+b\sin(c z))^5}\left(4\sqrt{\frac{a+b\sin(c z)}{a+b}}\left(23 a^3+23 b a^2+9 b^2 a+9 b^3\right)E\left(\frac{1}{4}(\pi-2 c z)\,\middle|\,\frac{2 b}{a+b}\right) + 2 b\cos(c z)\left(22 a^2+28 b\sin(c z)\,a+3 b^2-3 b^2\cos(2 c z)\right) - 32 a\left(a^2-b^2\right)F\left(\frac{1}{4}(\pi-2 c z)\,\middle|\,\frac{2 b}{a+b}\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}\right)\right)$$

01.06.21.0887.01

$$\int \sqrt{(a+b\sin(c z))^3}\, dz = \frac{1}{3c(a+b\sin(cz))^2}\left(\sqrt{(a+b\sin(cz))^3}\left(-8a(a+b)\sqrt{\frac{a+b\sin(cz)}{a+b}}\, E\!\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)+2\sqrt{\frac{a+b\sin(cz)}{a+b}}\left(a^2-b^2\right)F\!\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)-2b\cos(cz)(a+b\sin(cz))\right)\right)$$

01.06.21.0888.01

$$\int \frac{1}{\sqrt{(a+b\sin(cz))^3}}\, dz = -\frac{2(a+b\sin(cz))}{(a-b)(a+b)c\sqrt{(a+b\sin(cz))^3}}\left((a+b)E\!\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)\sqrt{\frac{a+b\sin(cz)}{a+b}}-b\cos(cz)\right)$$

01.06.21.0889.01

$$\int \frac{1}{\sqrt{(a+b\sin(cz))^5}}\, dz = \frac{1}{3c\sqrt{(a+b\sin(cz))^5}}\left(\frac{2b\cos(cz)(a+b\sin(cz))\left(5a^2+4b\sin(cz)a-b^2\right)}{\left(a^2-b^2\right)^2}-\frac{2(a+b)}{(a-b)^2}\left(4aE\!\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)+(b-a)F\!\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)\right)\left(\frac{a+b\sin(cz)}{a+b}\right)^{5/2}\right)$$

Involving $(a+b\sin(cz))^\beta \sin(dz)$

01.06.21.0890.01

$$\int (a+b\sin(cz))^\beta \sin(dz)\, dz = -\frac{1}{2(d-c\beta)(d+c\beta)}\left(e^{-idz}\left(1+\frac{i b e^{icz}}{\sqrt{a^2-b^2}-a}\right)^{-\beta}\left(1-\frac{i b e^{icz}}{a+\sqrt{a^2-b^2}}\right)^{-\beta}\left(a-\frac{1}{2} i b e^{-icz}\left(-1+e^{2icz}\right)\right)^\beta \left((d-c\beta)F_1\!\left(-\frac{d+c\beta}{c};-\beta,-\beta;-\frac{d}{c}-\beta+1;\frac{i b e^{icz}}{a+\sqrt{a^2-b^2}},\frac{i b e^{icz}}{a-\sqrt{a^2-b^2}}\right)+e^{2idz}(d+c\beta)F_1\!\left(\frac{d}{c}-\beta;-\beta,-\beta;\frac{d}{c}-\beta+1;\frac{i b e^{icz}}{a+\sqrt{a^2-b^2}},\frac{i b e^{icz}}{a-\sqrt{a^2-b^2}}\right)\right)\right)$$

01.06.21.0891.01

$$\int (a+b\sin(c z))^{\beta}\sin(c z)\,dz = \frac{1}{b^2 c(\beta+1)(\beta+2)}\left(\sec(c z)\sqrt{\frac{b(\sin(c z)+1)}{b-a}}\sqrt{\frac{b-b\sin(c z)}{a+b}}(a+b\sin(c z))^{\beta+1}\left((\beta+1)F_1\left(\beta+2;\frac{1}{2},\frac{1}{2};\beta+3;\frac{a+b\sin(c z)}{a-b},\frac{a+b\sin(c z)}{a+b}\right)(a+b\sin(c z))-a(\beta+2)F_1\left(\beta+1;\frac{1}{2},\frac{1}{2};\beta+2;\frac{a+b\sin(c z)}{a-b},\frac{a+b\sin(c z)}{a+b}\right)\right)\right)$$

01.06.21.0892.01

$$\int \sqrt{a+b\sin(c z)}\,\sin(c z)\,dz = -\frac{1}{3bc\sqrt{a+b\sin(c z)}}\left(2\left(a\sqrt{\frac{a+b\sin(c z)}{a+b}}(a+b)E\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)+b\cos(c z)(a+b\sin(c z))-\left(a^2-b^2\right)F\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}\right)\right)$$

01.06.21.0893.01

$$\int \frac{\sin(c z)}{\sqrt{a+b\sin(c z)}}\,dz = -\frac{2}{bc\sqrt{a+b\sin(c z)}}\left((a+b)E\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)-aF\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}$$

01.06.21.0894.01

$$\int \frac{\sin(c z)}{(a+b\sin(c z))^{3/2}}\,dz = \left(2\left(-ab\cos(c z)+a\sqrt{\frac{a+b\sin(c z)}{a+b}}(a+b)E\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)-\left(a^2-b^2\right)F\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}\right)\right)\Big/\left((a-b)b(a+b)c\sqrt{a+b\sin(c z)}\right)$$

01.06.21.0895.01

$$\int \frac{\sin(c z)}{(a+b\sin(c z))^{5/2}}\,dz = \frac{2}{3c(a+b\sin(c z))^{3/2}}\left(\frac{1}{(a-b)^2 b}\left(\left(a^2+3b^2\right)E\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)+a(b-a)F\left(\frac{1}{4}(\pi-2cz)\,\middle|\,\frac{2b}{a+b}\right)\right)\left(\frac{a+b\sin(c z)}{a+b}\right)^{3/2}-\frac{\cos(c z)\left(2a\left(a^2+b^2\right)+b\left(a^2+3b^2\right)\sin(c z)\right)}{\left(a^2-b^2\right)^2}\right)$$

Involving $((a+b\sin(c z))^{\nu})^{\beta}\sin(d z)$

01.06.21.0896.01

$$\int \left((a+b\sin(c z))^{\nu}\right)^{\beta} \sin(d z)\, dz = -\frac{1}{2(d-c\beta\nu)(d+c\beta\nu)} \left(e^{-i d z}\left(1+\frac{i b e^{i c z}}{\sqrt{a^2-b^2}-a}\right)^{-\beta\nu}\left(1-\frac{i b e^{i c z}}{a+\sqrt{a^2-b^2}}\right)^{-\beta\nu}\left(a-\frac{1}{2} i b e^{-i c z}\left(-1+e^{2 i c z}\right)\right)^{\beta\nu} \left((d-c\beta\nu) F_1\left(-\frac{d+c\beta\nu}{c}; -\beta\nu, -\beta\nu; -\frac{d}{c}-\beta\nu+1; \frac{i b e^{i c z}}{a+\sqrt{a^2-b^2}}, \frac{i b e^{i c z}}{a-\sqrt{a^2-b^2}}\right) + e^{2 i d z}(d+c\beta\nu) F_1\left(\frac{d}{c}-\beta\nu; -\beta\nu, -\beta\nu; \frac{d}{c}-\beta\nu+1; \frac{i b e^{i c z}}{a+\sqrt{a^2-b^2}}, \frac{i b e^{i c z}}{a-\sqrt{a^2-b^2}}\right)\right)(a+b\sin(c z))^{-\beta\nu}\left((a+b\sin(c z))^{\nu}\right)^{\beta}\right)$$

01.06.21.0897.01

$$\int \sqrt{(a+b\sin(c z))^5}\, \sin(c z)\, dz = -\frac{1}{84 b c (a+b\sin(c z))^3}\left(\sqrt{(a+b\sin(c z))^5}\left(8 a \sqrt{\frac{a+b\sin(c z)}{a+b}}\left(3a^3+3 b a^2+29 b^2 a+29 b^3\right) E\left(\frac{1}{4}(\pi-2 c z) \,\middle|\, \frac{2b}{a+b}\right) + 2 b\cos(c z)\left(36 a^3+44 b^2 a-24 b^2\cos(2 c z) a+b\left(72 a^2+29 b^2\right)\sin(c z)-3 b^3\sin(3 c z)\right) - 8\left(3a^4+2b^2a^2-5b^4\right) F\left(\frac{1}{4}(\pi-2 c z) \,\middle|\, \frac{2b}{a+b}\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}\right)\right)$$

01.06.21.0898.01

$$\int \sqrt{(a+b\sin(c z))^3}\, \sin(c z)\, dz = -\frac{1}{10 b c (a+b\sin(c z))^2}\left(\sqrt{(a+b\sin(c z))^3}\left(4\sqrt{\frac{a+b\sin(c z)}{a+b}}\left(a^3+b a^2+3 b^2 a+3 b^3\right) E\left(\frac{1}{4}(\pi-2 c z) \,\middle|\, \frac{2b}{a+b}\right) + 2 b\cos(c z)\left(4a^2+6 b\sin(c z) a+b^2-b^2\cos(2 c z)\right) - 4 a\left(a^2-b^2\right) F\left(\frac{1}{4}(\pi-2 c z) \,\middle|\, \frac{2b}{a+b}\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}\right)\right)$$

01.06.21.0899.01

$$\int \frac{\sin(c z)}{\sqrt{(a+b\sin(c z))^3}}\, dz = \left(2(a+b\sin(c z))\left(-a b\cos(c z)+a\sqrt{\frac{a+b\sin(c z)}{a+b}}\,(a+b) E\left(\frac{1}{4}(\pi-2 c z) \,\middle|\, \frac{2b}{a+b}\right) - \left(a^2-b^2\right) F\left(\frac{1}{4}(\pi-2 c z) \,\middle|\, \frac{2b}{a+b}\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}\right)\right) \Big/ \left(b\left(a^2-b^2\right) c\sqrt{(a+b\sin(c z))^3}\right)$$

01.06.21.0900.01

$$\int \frac{\sin(c\,z)}{\sqrt{(a+b\sin(c\,z))^5}}\,dz = \frac{1}{3\,c\sqrt{(a+b\sin(c\,z))^5}}\left(\frac{2\,(a+b)}{(a-b)^2\,b}\left(\left(a^2+3\,b^2\right)E\left(\frac{1}{4}(\pi-2\,c\,z)\,\middle|\,\frac{2\,b}{a+b}\right)+a\,(b-a)\,F\left(\frac{1}{4}(\pi-2\,c\,z)\,\middle|\,\frac{2\,b}{a+b}\right)\right)\left(\frac{a+b\sin(c\,z)}{a+b}\right)^{5/2}-\frac{2\cos(c\,z)\,(a+b\sin(c\,z))\left(2\,a\left(a^2+b^2\right)+b\left(a^2+3\,b^2\right)\sin(c\,z)\right)}{\left(a^2-b^2\right)^2}\right)$$

Involving $(a+b\sin(c\,z))^\beta \sin^\nu(c\,z)$

01.06.21.0901.01

$$\int \frac{\sin^2(c\,z)}{\sqrt{a+b\sin(c\,z)}}\,dz = \frac{1}{3\,b^2\,c\sqrt{a+b\sin(c\,z)}}\left(4\,a\,(a+b)\,E\left(\frac{1}{4}(\pi-2\,c\,z)\,\middle|\,\frac{2\,b}{a+b}\right)\sqrt{\frac{a+b\sin(c\,z)}{a+b}}-2\left(\sqrt{\frac{a+b\sin(c\,z)}{a+b}}\left(2\,a^2+b^2\right)F\left(\frac{1}{4}(\pi-2\,c\,z)\,\middle|\,\frac{2\,b}{a+b}\right)+b\cos(c\,z)\,(a+b\sin(c\,z))\right)\right)$$

01.06.21.0902.01

$$\int \frac{\sin^2(c\,z)}{\sqrt{a-a\sin(c\,z)}}\,dz = -\frac{\left(\cos\left(\frac{c\,z}{2}\right)-\sin\left(\frac{c\,z}{2}\right)\right)\left(2\left(\cos\left(\frac{c\,z}{2}\right)+\sin\left(\frac{c\,z}{2}\right)\right)^3-(6-6\,i)\sqrt[4]{-1}\,\tanh^{-1}\left(\frac{\tan\left(\frac{c\,z}{4}\right)+1}{\sqrt{2}}\right)\right)}{3\,c\sqrt{a-a\sin(c\,z)}}$$

01.06.21.0903.01

$$\int \frac{\sin^{\frac{1}{2}}(c\,z)}{a+b\sin(c\,z)}\,dz = -\frac{2}{b\,(a+b)\,c}\left((a+b)\,F\left(\frac{1}{4}(\pi-2\,c\,z)\,\middle|\,2\right)-a\,\Pi\left(\frac{2\,b}{a+b};\,\frac{1}{4}(\pi-2\,c\,z)\,\middle|\,2\right)\right)$$

Involving $(a+b\sin(c\,z))^\beta$and rational function of $\sin(c\,z)$

01.06.21.0904.01

$$\int \frac{\sqrt{a+b\sin(c\,z)}}{d+e\sin(c\,z)}\,dz = -\frac{2}{c\,e\,(d+e)\sqrt{a+b\sin(c\,z)}}\left(b\,(d+e)\,F\left(\frac{1}{4}(\pi-2\,c\,z)\,\middle|\,\frac{2\,b}{a+b}\right)+(a\,e-b\,d)\,\Pi\left(\frac{2\,e}{d+e};\,\frac{1}{4}(\pi-2\,c\,z)\,\middle|\,\frac{2\,b}{a+b}\right)\right)\sqrt{\frac{a+b\sin(c\,z)}{a+b}}$$

01.06.21.0905.01

$$\int \frac{\sqrt{a+b\sin(c z)}}{(d+e\sin(c z))^2}\,dz = -\frac{1}{4c}\left(\frac{4e\sqrt{a+b\sin(c z)}\,\cos(c z)}{\left(e^2-d^2\right)(d+e\sin(c z))}+\right.$$

$$\frac{1}{d^2-e^2}\left(\frac{1}{\sqrt{-\frac{1}{a+b}}\,e\,(a e-b d)}\left(8\,i\,d\left((a e-b d)\,F\!\left(i\sinh^{-1}\!\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\,\frac{a+b}{a-b}\right)+\right.\right.\right.$$

$$\left.b\,d\,\Pi\!\left(\frac{(a+b)e}{a e-b d};\,i\sinh^{-1}\!\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\,\frac{a+b}{a-b}\right)\right)$$

$$\left.\sec(c z)\sqrt{\frac{b(\sin(c z)+1)}{b-a}}\,\sqrt{\frac{b-b\sin(c z)}{a+b}}\right)+\frac{1}{b\sqrt{-\frac{1}{a+b}}\,e\,(b d-a e)}$$

$$\left(i(\cos(c z)+\cos(3 c z))\left(2(a-b)\,e\,(a e-b d)\,E\!\left(i\sinh^{-1}\!\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\,\frac{a+b}{a-b}\right)+\right.\right.$$

$$b\left(b\left(2d^2-e^2\right)\Pi\!\left(\frac{(a+b)e}{a e-b d};\,i\sinh^{-1}\!\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\,\frac{a+b}{a-b}\right)-2(d+e)\right.$$

$$\left.\left.(b d-a e)\,F\!\left(i\sinh^{-1}\!\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\,\frac{a+b}{a-b}\right)\right)\right)\sec^2(c z)\sec(2 c z)$$

$$\left.\left.\left.\sqrt{\frac{b(\sin(c z)+1)}{b-a}}\,\sqrt{\frac{b-b\sin(c z)}{a+b}}\right)+\frac{2(4 a d-b e)\,\Pi\!\left(\frac{2e}{d+e};\,\frac{1}{4}(\pi-2 c z)\,\middle|\,\frac{2b}{a+b}\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}}{(d+e)\sqrt{a+b\sin(c z)}}\right)\right)$$

01.06.21.0906.01

$$\int \frac{A+B\sin(c z)}{\sqrt{a+b\sin(c z)}}\,dz =$$

$$-\frac{2}{b c\sqrt{a+b\sin(c z)}}\left((a+b)\,B\,E\!\left(\frac{1}{4}(\pi-2 c z)\,\middle|\,\frac{2b}{a+b}\right)+(A b-a B)\,F\!\left(\frac{1}{4}(\pi-2 c z)\,\middle|\,\frac{2b}{a+b}\right)\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}$$

01.06.21.0907.01

$$\int \frac{1}{(d+e\sin(c z))\sqrt{a+b\sin(c z)}}\,dz = -\frac{2}{c(d+e)\sqrt{a+b\sin(c z)}}\,\Pi\!\left(\frac{2e}{d+e};\,\frac{1}{4}(\pi-2 c z)\,\middle|\,\frac{2b}{a+b}\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}$$

01.06.21.0908.01

$$\int \frac{1}{(d+e\sin(c z))^2\sqrt{a+b\sin(c z)}}\,dz = \frac{1}{4c(ae-bd)}\left(\frac{1}{d^2-e^2}\left(-\frac{1}{\sqrt{-\frac{1}{a+b}}\,(ae-bd)}\left(8 i d\left((ae-bd)F\left(i\sinh^{-1}\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\frac{a+b}{a-b}\right)+ b d\,\Pi\left(\frac{(a+b)e}{ae-bd};i\sinh^{-1}\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\frac{a+b}{a-b}\right)\right) \sec(c z)\sqrt{\frac{b(\sin(c z)+1)}{b-a}}\,\sqrt{\frac{b-b\sin(c z)}{a+b}}\right)-\frac{1}{b\sqrt{-\frac{1}{a+b}}\,(bd-ae)} \left(i(\cos(c z)+\cos(3 c z))\left(2(a-b)e(ae-bd)E\left(i\sinh^{-1}\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\frac{a+b}{a-b}\right)+ b\left(b\left(2d^2-e^2\right)\Pi\left(\frac{(a+b)e}{ae-bd};i\sinh^{-1}\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\frac{a+b}{a-b}\right)-2 (d+e)(bd-ae)F\left(i\sinh^{-1}\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\frac{a+b}{a-b}\right)\right)\right) \sec^2(c z)\sec(2 c z)\sqrt{\frac{b(\sin(c z)+1)}{b-a}}\,\sqrt{\frac{b-b\sin(c z)}{a+b}}\right)+ \frac{2\left(4bd^2-4aed-3be^2\right)\Pi\left(\frac{2e}{d+e};\frac{1}{4}(\pi-2 c z)\middle|\frac{2b}{a+b}\right)\sqrt{\frac{a+b\sin(c z)}{a+b}}}{(d+e)\sqrt{a+b\sin(c z)}}\right)-\frac{4e^2\cos(c z)\sqrt{a+b\sin(c z)}}{\left(e^2-d^2\right)(d+e\sin(c z))}\right)$$

01.06.21.0909.01

$$\int \frac{\sin(c z)}{(d+e\sin(c z))\sqrt{a+b\sin(c z)}}\,dz = -\frac{1}{b\sqrt{-\frac{1}{a+b}}\,c e(bd-ae)}\left(2 i\left((bd-ae)F\left(i\sinh^{-1}\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\frac{a+b}{a-b}\right)- b d\,\Pi\left(\frac{(a+b)e}{ae-bd};i\sinh^{-1}\left(\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\sin(c z)}\right)\middle|\frac{a+b}{a-b}\right)\right)\sec(c z)\sqrt{\frac{b(\sin(c z)+1)}{b-a}}\,\sqrt{\frac{b-b\sin(c z)}{a+b}}\right)$$

Involving $(a+b\sin(2cz))^{\beta}\sin(cz)$

01.06.21.0910.01

$$\int (a+b\sin(2cz))^{5/2}\sin(cz)\,dz = \frac{1}{96\sqrt{b}\,c}\Big(-26a\sqrt{a+b\sin(2cz)}\sin(3cz)b^{3/2}+54a\sin(cz)\sqrt{a+b\sin(2cz)}\,b^{3/2}-28\cos(cz)\sqrt{a+b\sin(2cz)}\,b^{5/2}-6\cos(3cz)\sqrt{a+b\sin(2cz)}\,b^{5/2}+4\cos(5cz)\sqrt{a+b\sin(2cz)}\,b^{5/2}-45a\log\left(\sqrt{b}\cos(cz)+\sqrt{b}\sin(cz)+\sqrt{a+b\sin(2cz)}\right)b^2-66a^2\cos(cz)\sqrt{a+b\sin(2cz)}\sqrt{b}-15(a+b)^3\tan^{-1}\left(\frac{\sqrt{b}(\cos(cz)-\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right)+15\left(b^3+3a^2b\right)\tanh^{-1}\left(\frac{\sqrt{b}(\cos(cz)+\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right)-15a^3\log\left(\sqrt{b}\cos(cz)+\sqrt{b}\sin(cz)+\sqrt{a+b\sin(2cz)}\right)\Big)$$

01.06.21.0911.01

$$\int (a+b\sin(2cz))^{3/2}\sin(cz)\,dz = \frac{1}{16\sqrt{b}\,c}\Big(-2\sqrt{a+b\sin(2cz)}\sin(3cz)b^{3/2}+4\sin(cz)\sqrt{a+b\sin(2cz)}\,b^{3/2}-3\log\left(\sqrt{b}\cos(cz)+\sqrt{b}\sin(cz)+\sqrt{a+b\sin(2cz)}\right)b^2+6a\tanh^{-1}\left(\frac{\sqrt{b}(\cos(cz)+\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right)b-10a\cos(cz)\sqrt{a+b\sin(2cz)}\sqrt{b}-3(a+b)^2\tan^{-1}\left(\frac{\sqrt{b}(\cos(cz)-\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right)-3a^2\log\left(\sqrt{b}\cos(cz)+\sqrt{b}\sin(cz)+\sqrt{a+b\sin(2cz)}\right)\Big)$$

01.06.21.0912.01

$$\int \sqrt{a+b\sin(2cz)}\sin(cz)\,dz = \frac{1}{4\sqrt{b}\,c}\left(-(a+b)\tan^{-1}\left(\frac{\sqrt{b}(\cos(cz)-\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right)+b\tanh^{-1}\left(\frac{\sqrt{b}(\cos(cz)+\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right)-a\log\left(\sqrt{b}\cos(cz)+\sqrt{b}\sin(cz)+\sqrt{a+b\sin(2cz)}\right)-2\sqrt{b}\cos(cz)\sqrt{a+b\sin(2cz)}\right)$$

01.06.21.0913.01

$$\int \frac{\sin(cz)}{\sqrt{a+b\sin(2cz)}}\,dz = -\frac{1}{2\sqrt{b}\,c}\left(\tan^{-1}\left(\frac{\sqrt{b}(\cos(cz)-\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right)+\log\left(\sqrt{b}\cos(cz)+\sqrt{b}\sin(cz)+\sqrt{a+b\sin(2cz)}\right)\right)$$

01.06.21.0914.01

$$\int \frac{\sin(cz)}{(a+b\sin(2cz))^{3/2}}\,dz = -\frac{a\cos(cz)+b\sin(cz)}{\left(a^2-b^2\right)c\sqrt{a+b\sin(2cz)}}$$

01.06.21.0915.01

$$\int \frac{\sin(cz)}{(a+b\sin(2cz))^{5/2}}\,dz = \frac{-3a\left(a^2+b^2\right)\cos(cz)-b\left(6\sin(cz)a^2-2b\cos(3cz)a+\left(a^2+b^2\right)\sin(3cz)\right)}{3\left(a^2-b^2\right)^2c\,(a+b\sin(2cz))^{3/2}}$$

Involving $((a+b\sin(2\,c\,z))^m)^{\pm\frac{1}{2}}\sin(c\,z)$

01.06.21.0916.01

$$\int\sqrt{(a+b\sin(2\,c\,z))^5}\,\sin(c\,z)\,dz = -\left(\sqrt{(a+b\sin(2\,c\,z))^5}\left(26\,a\sqrt{a+b\sin(2\,c\,z)}\,\sin(3\,c\,z)\,b^{3/2}-54\,a\sin(c\,z)\sqrt{a+b\sin(2\,c\,z)}\,b^{3/2}+ 28\cos(c\,z)\sqrt{a+b\sin(2\,c\,z)}\,b^{5/2}+6\cos(3\,c\,z)\sqrt{a+b\sin(2\,c\,z)}\,b^{5/2}-4\cos(5\,c\,z)\sqrt{a+b\sin(2\,c\,z)}\,b^{5/2}+ 45\,a\log\left(\sqrt{b}\,\cos(c\,z)+\sqrt{b}\,\sin(c\,z)+\sqrt{a+b\sin(2\,c\,z)}\right)b^2+66\,a^2\cos(c\,z)\sqrt{a+b\sin(2\,c\,z)}\,\sqrt{b}+ 15\,(a+b)^3\tan^{-1}\left(\frac{\sqrt{b}\,(\cos(c\,z)-\sin(c\,z))}{\sqrt{a+b\sin(2\,c\,z)}}\right)-15\left(b^3+3\,a^2\,b\right)\tanh^{-1}\left(\frac{\sqrt{b}\,(\cos(c\,z)+\sin(c\,z))}{\sqrt{a+b\sin(2\,c\,z)}}\right)+ 15\,a^3\log\left(\sqrt{b}\,\cos(c\,z)+\sqrt{b}\,\sin(c\,z)+\sqrt{a+b\sin(2\,c\,z)}\right)\right)\right)\Big/\left(96\sqrt{b}\,c\,(a+b\sin(2\,c\,z))^{5/2}\right)$$

01.06.21.0917.01

$$\int\sqrt{(a+b\sin(2\,c\,z))^3}\,\sin(c\,z)\,dz = -\left(\sqrt{(a+b\sin(2\,c\,z))^3}\left(2\sqrt{a+b\sin(2\,c\,z)}\,\sin(3\,c\,z)\,b^{3/2}-4\sin(c\,z)\sqrt{a+b\sin(2\,c\,z)}\,b^{3/2}+ 3\log\left(\sqrt{b}\,\cos(c\,z)+\sqrt{b}\,\sin(c\,z)+\sqrt{a+b\sin(2\,c\,z)}\right)b^2-6\,a\tanh^{-1}\left(\frac{\sqrt{b}\,(\cos(c\,z)+\sin(c\,z))}{\sqrt{a+b\sin(2\,c\,z)}}\right)b+ 10\,a\cos(c\,z)\sqrt{a+b\sin(2\,c\,z)}\,\sqrt{b}+3\,(a+b)^2\tan^{-1}\left(\frac{\sqrt{b}\,(\cos(c\,z)-\sin(c\,z))}{\sqrt{a+b\sin(2\,c\,z)}}\right)+ 3\,a^2\log\left(\sqrt{b}\,\cos(c\,z)+\sqrt{b}\,\sin(c\,z)+\sqrt{a+b\sin(2\,c\,z)}\right)\right)\right)\Big/\left(16\sqrt{b}\,c\,(a+b\sin(2\,c\,z))^{3/2}\right)$$

01.06.21.0918.01

$$\int\frac{\sin(c\,z)}{\sqrt{(a+b\sin(2\,c\,z))^3}}\,dz = -\frac{(a\cos(c\,z)+b\sin(c\,z))\,(a+b\sin(2\,c\,z))}{\left(a^2-b^2\right)c\sqrt{(a+b\sin(2\,c\,z))^3}}$$

01.06.21.0919.01

$$\int\frac{\sin(c\,z)}{\sqrt{(a+b\sin(2\,c\,z))^5}}\,dz = -\left((a+b\sin(2\,c\,z))\left(3\,a\left(a^2+b^2\right)\cos(c\,z)+b\left(6\sin(c\,z)\,a^2-2\,b\cos(3\,c\,z)\,a+\left(a^2+b^2\right)\sin(3\,c\,z)\right)\right)\right)\Big/\left(3\left(a^2-b^2\right)^2c\sqrt{(a+b\sin(2\,c\,z))^5}\right)$$

Involving $(a+b\sin(2\,c\,z))^\beta\sin^\nu(c\,z)$

01.06.21.0920.01

$$\int (a+b\sin(2cz))^{3/2}\sin^2(cz)\,dz = \frac{1}{60\,c\sqrt{a+b\sin(2cz)}}\left(-\frac{6\left(2a^2+b^2\right)(\cos(cz)+1)^2\left(\frac{a+b\sin(2cz)}{(\cos(cz)+1)^2}\right)^{3/2}}{b\sqrt{\sec^4\left(\frac{cz}{2}\right)(a+b\sin(2cz))}} + (a+b\sin(2cz))(-10\,b\cos(2cz)+3\,b\cos(4cz)-12\,a\sin(2cz)) - 10\left(3a^2+b^2\right)F\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)\sqrt{\frac{a+b\sin(2cz)}{a+b}} - 40\,a\left((a+b)\,E\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)-a\,F\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)\right)\sqrt{\frac{a+b\sin(2cz)}{a+b}}\right)$$

01.06.21.0921.01

$$\int (a+b\sin(2cz))^{3/2}\sin^3(cz)\,dz = \frac{1}{192\,b^{3/2}\,c}\left(-3\,(a+7b)\tan^{-1}\left(\frac{\sqrt{b}\,(\cos(cz)-\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right)(a+b)^2 + 3\left(a^3+15\,b^2\,a\right)\tanh^{-1}\left(\frac{\sqrt{b}\,(\cos(cz)+\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right) - \sqrt{b}\left(21\log\left(\sqrt{b}\cos(cz)+\sqrt{b}\sin(cz)+\sqrt{a+b\sin(2cz)}\right)b^{5/2} + 18\sqrt{a+b\sin(2cz)}\,\sin(3cz)\,b^2 - 4\sqrt{a+b\sin(2cz)}\,\sin(5cz)\,b^2 - 20\sin(cz)\sqrt{a+b\sin(2cz)}\,b^2 + 90\,a\cos(cz)\sqrt{a+b\sin(2cz)}\,b - 14\,a\cos(3cz)\sqrt{a+b\sin(2cz)}\,b + 27\,a^2\log\left(\sqrt{b}\cos(cz)+\sqrt{b}\sin(cz)+\sqrt{a+b\sin(2cz)}\right)\sqrt{b} + 6\,a^2\sin(cz)\sqrt{a+b\sin(2cz)}\right)\right)$$

01.06.21.0922.01

$$\int (a+b\sin(2cz))^{3/2}\sin^4(cz)\,dz = \frac{1}{560\,b\,c\sqrt{a+b\sin(2cz)}}\left(4\left(-\frac{14\left(2a^2+b^2\right)(\cos(cz)+1)^2\left(\frac{a+b\sin(2cz)}{(\cos(cz)+1)^2}\right)^{3/2}}{\sqrt{\sec^4\left(\frac{cz}{2}\right)(a+b\sin(2cz))}} - \frac{1}{b}\left(2\,a\left(a^2+33\,b^2\right)\left((a+b)\,E\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)-a\,F\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)\right)\sqrt{\frac{a+b\sin(2cz)}{a+b}}\right) - b\sqrt{\frac{a+b\sin(2cz)}{a+b}}\left(53\,a^2+15\,b^2\right)F\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)\right) + (a+b\sin(2cz))\left(\left(4a^2-55\,b^2\right)\cos(2cz)+b\,(28\,b\cos(4cz)-5\,b\cos(6cz)+16\,a\,(\sin(4cz)-7\sin(2cz)))\right)\right)$$

01.06.21.0923.01

$$\int \sqrt{a+b\sin(2cz)}\,\sin^2(cz)\,dz = -\frac{1}{24\,b\,c\,\sqrt{a+b\sin(2cz)}}\left(-2\cos(4cz)\,b^2+2\,b^2+12\sqrt{\frac{a+b\sin(2cz)}{a+b}}\,(a+b)\,E\!\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)b+ 4\,a\sin(2cz)\,b+a\sqrt{\frac{a+b\sin(2cz)}{(\cos(cz)+1)^2}}\cos(2cz)\sqrt{\sec^4\!\left(\frac{cz}{2}\right)(a+b\sin(2cz))}+ 3\,a\sqrt{\frac{a+b\sin(2cz)}{(\cos(cz)+1)^2}}\sqrt{\sec^4\!\left(\frac{cz}{2}\right)(a+b\sin(2cz))}+4\,a\cos(cz)\sqrt{\frac{a+b\sin(2cz)}{(\cos(cz)+1)^2}}\sqrt{\sec^4\!\left(\frac{cz}{2}\right)(a+b\sin(2cz))}\right)$$

01.06.21.0924.01

$$\int \sqrt{a+b\sin(2cz)}\,\sin^3(cz)\,dz = \frac{1}{32\,b^{3/2}\,c}\left(-\left(a^2+6\,b\,a+5\,b^2\right)\tan^{-1}\!\left(\frac{\sqrt{b}\,(\cos(cz)-\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right)+\left(a^2+5\,b^2\right)\tanh^{-1}\!\left(\frac{\sqrt{b}\,(\cos(cz)+\sin(cz))}{\sqrt{a+b\sin(2cz)}}\right)- 2\sqrt{b}\left(6\,b\sqrt{a+b\sin(2cz)}\cos(cz)+3\,a\sqrt{b}\log\!\left(\sqrt{b}\cos(cz)+\sqrt{b}\sin(cz)+\sqrt{a+b\sin(2cz)}\right)- b\cos(3cz)\sqrt{a+b\sin(2cz)}+a\sin(cz)\sqrt{a+b\sin(2cz)}\right)\right)$$

01.06.21.0925.01

$$\int \sqrt{a+b\sin(2cz)}\,\sin^4(cz)\,dz = \frac{1}{120\,b\,c\,\sqrt{a+b\sin(2cz)}} \left(2\left(-\frac{20\,a\,(\cos(cz)+1)^2}{\sqrt{\sec^4\!\left(\frac{cz}{2}\right)(a+b\sin(2cz))}}\left(\frac{a+b\sin(2cz)}{(\cos(cz)+1)^2}\right)^{3/2}-\frac{2\,a^2+21\,b^2}{b}\left((a+b)\,E\!\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)-a\,F\!\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)\right) \sqrt{\frac{a+b\sin(2cz)}{a+b}}-23\,a\,b\sqrt{\frac{a+b\sin(2cz)}{a+b}}\,F\!\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)\right)+ (a+b\sin(2cz))\,(2\,a\cos(2cz)-20\,b\sin(2cz)+3\,b\sin(4cz))\right)$$

01.06.21.0926.01

$$\int \frac{\sin^2(cz)}{\sqrt{a+b\sin(2cz)}}\,dz = -\frac{1}{2\,b\,c\,\sqrt{a+b\sin(2cz)}} \left(2\sqrt{\frac{a+b\sin(2cz)}{(\cos(cz)+1)^2}}\sqrt{\sec^4\!\left(\frac{cz}{2}\right)(a+b\sin(2cz))}\,\cos^4\!\left(\frac{cz}{2}\right)+b\sqrt{\frac{a+b\sin(2cz)}{a+b}}\,F\!\left(\frac{\pi}{4}-cz\,\middle|\,\frac{2b}{a+b}\right)\right)$$

01.06.21.0927.01

$$\int \frac{\sin^3(c z)}{\sqrt{a + b \sin(2 c z)}} \, dz = \frac{1}{8 b^{3/2} c} \left(-(a + 3 b) \tan^{-1}\left(\frac{\sqrt{b} \, (\cos(c z) - \sin(c z))}{\sqrt{a + b \sin(2 c z)}} \right) + a \tanh^{-1}\left(\frac{\sqrt{b} \, (\cos(c z) + \sin(c z))}{\sqrt{a + b \sin(2 c z)}} \right) - 3 b \log\left(\sqrt{b} \, \cos(c z) + \sqrt{b} \, \sin(c z) + \sqrt{a + b \sin(2 c z)} \right) - 2 \sqrt{b} \, \sin(c z) \sqrt{a + b \sin(2 c z)} \right)$$

01.06.21.0928.01

$$\int \frac{\sin^4(c z)}{\sqrt{a + b \sin(2 c z)}} \, dz = \frac{1}{24 b^2 c \sqrt{a + b \sin(2 c z)}} \left(-4 a \sqrt{\frac{a + b \sin(2 c z)}{a + b}} \, (a + b) E\left(\frac{\pi}{4} - c z \,\middle|\, \frac{2 b}{a + b} \right) + 2 \sqrt{\frac{a + b \sin(2 c z)}{a + b}} \, \left(2 a^2 - 5 b^2\right) F\left(\frac{\pi}{4} - c z \,\middle|\, \frac{2 b}{a + b} \right) + b \left(-12 \sqrt{\frac{a + b \sin(2 c z)}{(\cos(c z) + 1)^2}} \sqrt{\sec^4\left(\frac{c z}{2}\right) (a + b \sin(2 c z))} \, \cos(c z) + \cos(2 c z) \left(2 a - 3 \sqrt{\frac{a + b \sin(2 c z)}{(\cos(c z) + 1)^2}} \sqrt{\sec^4\left(\frac{c z}{2}\right) (a + b \sin(2 c z))} \right) + b \sin(4 c z) - 9 \sqrt{\frac{a + b \sin(2 c z)}{(\cos(c z) + 1)^2}} \sqrt{\sec^4\left(\frac{c z}{2}\right) (a + b \sin(2 c z))} \right) \right)$$

01.06.21.0929.01

$$\int \frac{\sin^2(c z)}{(a + b \sin(2 c z))^{3/2}} \, dz = \frac{1}{2 (a - b) b (a + b) c \sqrt{a + b \sin(2 c z)}} \left(a^2 - b^2 + b^2 \cos(2 c z) - b (a + b) E\left(\frac{\pi}{4} - c z \,\middle|\, \frac{2 b}{a + b} \right) \sqrt{\frac{a + b \sin(2 c z)}{a + b}} \right)$$

01.06.21.0930.01

$$\int \frac{\sin^3(c z)}{(a + b \sin(2 c z))^{3/2}} \, dz = \frac{1}{4 b^{3/2} c} \left(\tan^{-1}\left(\frac{\sqrt{b} \, (\cos(c z) - \sin(c z))}{\sqrt{a + b \sin(2 c z)}} \right) - \tanh^{-1}\left(\frac{\sqrt{b} \, (\cos(c z) + \sin(c z))}{\sqrt{a + b \sin(2 c z)}} \right) - \frac{2 \sqrt{b} \, \left(a b \cos(c z) - \left(a^2 - 2 b^2\right) \sin(c z)\right)}{\left(a^2 - b^2\right) \sqrt{a + b \sin(2 c z)}} \right)$$

01.06.21.0931.01

$$\int \frac{\sin^4(c z)}{(a + b \sin(2 c z))^{3/2}} \, dz = \left(2 \cos(2 c z) b^3 - 2 b^3 + 2 a^2 b - a^2 \cos(2 c z) b + \sqrt{\frac{a + b \sin(2 c z)}{a + b}} \, \left(2 a^3 + 2 b a^2 - 3 b^2 a - 3 b^3\right) E\left(\frac{\pi}{4} - c z \,\middle|\, \frac{2 b}{a + b} \right) - 2 a \left(a^2 - b^2\right) F\left(\frac{\pi}{4} - c z \,\middle|\, \frac{2 b}{a + b} \right) \sqrt{\frac{a + b \sin(2 c z)}{a + b}} \right) \Big/ \left(4 (a - b) b^2 (a + b) c \sqrt{a + b \sin(2 c z)} \right)$$

Involving $\sin(e\,z)\sin(d\,z)\,(a+b\sin(c\,z))^{\beta}$

01.06.21.0932.01

$$\int \sin(e\,z)\sin(d\,z)\,(a+b\sin(c\,z))^{\beta}\,dz = \frac{1}{4}\,i\left(1+\frac{i\,b\,e^{i\,c\,z}}{\sqrt{a^2-b^2}-a}\right)^{-\beta}\left(1-\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\right)^{-\beta}\left(a-\frac{1}{2}\,i\,b\,e^{-i\,c\,z}\left(-1+e^{2\,i\,c\,z}\right)\right)^{\beta}\left(\frac{1}{c^2\,\beta^2-(d-e)^2}\left(e^{-i\,(d-e)\,z}\left(e^{2\,i\,(d-e)\,z}\,(d-e+c\,\beta)\,F_1\left(\frac{d-e-c\,\beta}{c};-\beta,-\beta;\frac{-\beta\,c+c+d-e}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}},\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)-(d-e-c\,\beta)\,F_1\left(-\frac{d-e+c\,\beta}{c};-\beta,-\beta;\frac{-\beta\,c+c-d+e}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}},\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)\right)\right)-\frac{1}{c^2\,\beta^2-(d+e)^2}\left(e^{-i\,(d+e)\,z}\left(e^{2\,i\,(d+e)\,z}\,(d+e+c\,\beta)\,F_1\left(\frac{d+e-c\,\beta}{c};-\beta,-\beta;\frac{-\beta\,c+c+d+e}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}},\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)-(d+e-c\,\beta)\,F_1\left(-\frac{d+e+c\,\beta}{c};-\beta,-\beta;-\frac{d+e+c\,(\beta-1)}{c};\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}},\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\right)\right)\right)\right)$$

Involving $\left(a+b\sin^2(c\,z)\right)^{\beta}$

01.06.21.0933.01

$$\int \left(a+b\sin^2(c\,z)\right)^{\beta}dz = \frac{1}{b\,c\,(\beta+1)}\,2^{-\beta-1}\sqrt{\frac{b\cos^2(c\,z)}{a+b}}\,(2\,a+b-b\cos(2\,c\,z))^{\beta+1}\csc(2\,c\,z)\sqrt{-\frac{b\sin^2(c\,z)}{a}}\,F_1\left(\beta+1;\frac{1}{2},\frac{1}{2};\beta+2;\frac{2\,a+b-b\cos(2\,c\,z)}{2\,(a+b)},\frac{2\,a+b-b\cos(2\,c\,z)}{2\,a}\right)$$

01.06.21.0934.01

$$\int \left(a+b\sin^2(c\,z)\right)^{5/2}dz = \left(16\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\,a\left(23\,a^2+23\,b\,a+8\,b^2\right)E\left(c\,z\,\middle|\,-\frac{b}{a}\right)-64\,a\left(2\,a^2+3\,b\,a+b^2\right)\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\,F\left(c\,z\,\middle|\,-\frac{b}{a}\right)-\sqrt{2}\,b\left(88\,a^2+88\,b\,a+25\,b^2-28\,b\,(2\,a+b)\cos(2\,c\,z)+3\,b^2\cos(4\,c\,z)\right)\sin(2\,c\,z)\right)\Big/\left(240\,c\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)$$

01.06.21.0935.01

$$\int \left(a+b\sin^2(cz)\right)^{3/2} dz = \frac{1}{24c\sqrt{2a+b-b\cos(2cz)}}\left(16\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, a(2a+b)E\left(cz\,\middle|\,-\frac{b}{a}\right) - 8a(a+b)\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, F\left(cz\,\middle|\,-\frac{b}{a}\right) + 2\sqrt{2}\, b(-2a-b+b\cos(2cz))\sin(2cz)\right)$$

01.06.21.0936.01

$$\int \sqrt{a+b\sin^2(cz)}\, dz = \frac{\sqrt{2a+b-b\cos(2cz)}}{c\sqrt{\frac{2a+b-b\cos(2cz)}{a}}} E\left(cz\,\middle|\,-\frac{b}{a}\right)$$

01.06.21.0937.01

$$\int \frac{1}{\sqrt{a+b\sin^2(cz)}}\, dz = \frac{1}{c\sqrt{2a+b-b\cos(2cz)}}\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, F\left(cz\,\middle|\,-\frac{b}{a}\right)$$

01.06.21.0938.01

$$\int \frac{1}{\left(a+b\sin^2(cz)\right)^{3/2}}\, dz = \frac{1}{2a(a+b)c\sqrt{2a+b-b\cos(2cz)}}\left(2\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, a E\left(cz\,\middle|\,-\frac{b}{a}\right) + \sqrt{2}\, b\sin(2cz)\right)$$

01.06.21.0939.01

$$\int \frac{1}{\left(a+b\sin^2(cz)\right)^{5/2}}\, dz = \left(2a^2(2a+b)E\left(cz\,\middle|\,-\frac{b}{a}\right)\left(\frac{2a+b-b\cos(2cz)}{a}\right)^{3/2} - a^2(a+b)F\left(cz\,\middle|\,-\frac{b}{a}\right)\left(\frac{2a+b-b\cos(2cz)}{a}\right)^{3/2} - \sqrt{2}\, b\left(-5a^2-5ba-b^2+b(2a+b)\cos(2cz)\right)\sin(2cz)\right) \Big/ \left(3a^2(a+b)^2 c(2a+b-b\cos(2cz))^{3/2}\right)$$

Involving $\left(a+b\sin^2(cz)\right)^\beta \sin(dz)$

01.06.21.0940.01

$$\int \left(a+b\sin^2(cz)\right)^\beta \sin(dz)\, dz = -\frac{1}{d^2-4c^2\beta^2}\left(2^{-2\beta-1} e^{-idz}\left(1-\frac{b e^{2icz}}{2a+b-2\sqrt{a(a+b)}}\right)^{-\beta}\left(1-\frac{b e^{2icz}}{2a+b+2\sqrt{a(a+b)}}\right)^{-\beta}\left(4a-b e^{-2icz}\left(-1+e^{2icz}\right)^2\right)^\beta \left((d-2c\beta)F_1\left(-\frac{d+2c\beta}{2c}; -\beta, -\beta; -\frac{d}{2c}-\beta+1; \frac{b e^{2icz}}{2a+b+2\sqrt{a(a+b)}}, \frac{b e^{2icz}}{2a+b-2\sqrt{a(a+b)}}\right) + e^{2idz}(d+2c\beta)F_1\left(\frac{d}{2c}-\beta; -\beta, -\beta; \frac{d}{2c}-\beta+1; \frac{b e^{2icz}}{2a+b+2\sqrt{a(a+b)}}, \frac{b e^{2icz}}{2a+b-2\sqrt{a(a+b)}}\right)\right)\right)$$

01.06.21.0941.01

$$\int \left(a+b\sin^2(c\,z)\right)^{\beta}\sin(c\,z)\,dz = -\frac{\cos(c\,z)\left(-b\cos^2(c\,z)+a+b\right)^{\beta}}{c}\left(1-\frac{b\cos^2(c\,z)}{a+b}\right)^{-\beta}\,{}_2F_1\left(\frac{1}{2},-\beta;\frac{3}{2};\frac{b\cos^2(c\,z)}{a+b}\right)$$

01.06.21.0942.01

$$\int \left(a-a\sin^2(c\,z)\right)^{\beta}\sin(d\,z)\,dz = \frac{1}{4c^2\beta^2-d^2}\Big(2^{-2\beta-1}e^{-i\,d\,z}\left(e^{-i\,c\,z}+e^{i\,c\,z}\right)^{2\beta}\left(1+e^{2\,i\,c\,z}\right)^{-2\beta}\cos^{-2\beta}(c\,z)\left(a\cos^2(c\,z)\right)^{\beta}\left((d-2c\beta)\,{}_2F_1\left(-\frac{d+2c\beta}{2c},-2\beta;-\frac{d}{2c}-\beta+1;-e^{2\,i\,c\,z}\right)+e^{2\,i\,d\,z}(d+2c\beta)\,{}_2F_1\left(\frac{d}{2c}-\beta,-2\beta;\frac{d}{2c}-\beta+1;-e^{2\,i\,c\,z}\right)\right)\Big)$$

01.06.21.0943.01

$$\int \sin(c\,z)\left(b\sin^2(c\,z)+a\right)^{3/2}dz = -\frac{1}{8c}\left(\frac{3\log\left(\sqrt{2}\sqrt{-b}\cos(c\,z)+\sqrt{2a+b-b\cos(2\,c\,z)}\right)(a+b)^2}{\sqrt{-b}}+\frac{\cos(c\,z)\sqrt{2a+b-b\cos(2\,c\,z)}\,(5a+4b-b\cos(2\,c\,z))}{\sqrt{2}}\right)$$

01.06.21.0944.01

$$\int \sqrt{a+b\sin^2(c\,z)}\,\sin(c\,z)\,dz = -\frac{1}{4c}\left(\sqrt{2}\sqrt{2a+b-b\cos(2\,c\,z)}\cos(c\,z)+\frac{2(a+b)\log\left(\sqrt{2}\sqrt{-b}\cos(c\,z)+\sqrt{2a+b-b\cos(2\,c\,z)}\right)}{\sqrt{-b}}\right)$$

01.06.21.0945.01

$$\int \sqrt{a+a\sin^2(c\,z)}\,\sin(c\,z)\,dz = -\frac{1}{2c\sqrt{\cos(2\,c\,z)-3}}\left(\left(\cos(c\,z)\sqrt{\cos(2\,c\,z)-3}-2\sqrt{2}\log\left(\sqrt{2}\cos(c\,z)+\sqrt{\cos(2\,c\,z)-3}\right)\right)\sqrt{a\left(\sin^2(c\,z)+1\right)}\right)$$

01.06.21.0946.01

$$\int \sqrt{a-a\sin^2(c\,z)}\,\sin(c\,z)\,dz = -\frac{\cos(c\,z)\sqrt{a\cos^2(c\,z)}}{2c}$$

01.06.21.0947.01

$$\int \frac{\sin(c\,z)}{\sqrt{a+b\sin^2(c\,z)}}\,dz = \frac{b\log\left(\sqrt{2}\sqrt{-b}\cos(c\,z)+\sqrt{2a+b-b\cos(2\,c\,z)}\right)}{(-b)^{3/2}\,c}$$

01.06.21.0948.01

$$\int \frac{\sin(c\,z)}{\sqrt{a+a\sin^2(c\,z)}}\,dz = \frac{a(\cos(2\,c\,z)-3)^{3/2}\log\left(\sqrt{2}\cos(c\,z)+\sqrt{\cos(2\,c\,z)-3}\right)}{c(-a(\cos(2\,c\,z)-3))^{3/2}}$$

01.06.21.0949.01

$$\int \frac{\sin(c\,z)}{\sqrt{a-a\sin^2(c\,z)}}\,dz = -\frac{\cos(c\,z)\log(\cos(c\,z))}{c\sqrt{a\cos^2(c\,z)}}$$

01.06.21.0950.01

$$\int \frac{\sin(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{3/2}}\,dz = -\frac{\sqrt{2}\,\cos(c\,z)}{(a+b)\,c\,\sqrt{2\,a+b-b\cos(2\,c\,z)}}$$

01.06.21.0951.01

$$\int \frac{\sin(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{5/2}}\,dz = \frac{2\sqrt{2}\,\cos(c\,z)\,(-3\,a-2\,b+b\cos(2\,c\,z))}{3\,(a+b)^2\,c\,(2\,a+b-b\cos(2\,c\,z))^{3/2}}$$

01.06.21.0952.01

$$\int \frac{\sin(c\,z)}{\left(b\sin^2(c\,z)+a\right)^{7/2}}\,dz = -\frac{4\sqrt{2}\,\cos(c\,z)\left(15\,a^2+20\,b\,a+8\,b^2-2\,b\,(5\,a+3\,b)\cos(2\,c\,z)+b^2\cos(4\,c\,z)\right)}{15\,(a+b)^3\,c\,(2\,a+b-b\cos(2\,c\,z))^{5/2}}$$

01.06.21.0953.01

$$\int \left(a+b\sin^2(c\,z)\right)^{\beta}\sin(2\,c\,z)\,dz = \frac{(2\,a+b-b\cos(2\,c\,z))\left(b\sin^2(c\,z)+a\right)^{\beta}}{2\,b\,c\,(\beta+1)}$$

Involving $\left(\left(a+b\sin^2(c\,z)\right)^{\nu}\right)^{\beta}$

01.06.21.0954.01

$$\int \left(\left(a+b\sin^2(c\,z)\right)^{\nu}\right)^{\beta}dz = \frac{1}{b\,c\,(\beta\,\nu+1)}\left(2^{-\beta\,\nu-1}\,F_1\!\left(\beta\,\nu+1;\,\frac{1}{2},\,\frac{1}{2};\,\beta\,\nu+2;\,\frac{2\,a+b-b\cos(2\,c\,z)}{2\,(a+b)},\,\frac{2\,a+b-b\cos(2\,c\,z)}{2\,a}\right)\sqrt{\frac{b\cos^2(c\,z)}{a+b}}\right.$$
$$\left.(2\,a+b-b\cos(2\,c\,z))^{\beta\,\nu+1}\csc(2\,c\,z)\sqrt{-\frac{b\sin^2(c\,z)}{a}}\,\left(b\sin^2(c\,z)+a\right)^{-\beta\,\nu}\left(\left(b\sin^2(c\,z)+a\right)^{\nu}\right)^{\beta}\right)$$

01.06.21.0955.01

$$\int \sqrt{\left(a+b\sin^2(c\,z)\right)^5}\,dz =$$
$$-\left(\sqrt{(2\,a+b-b\cos(2\,c\,z))^5}\left(-32\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\,a\left(23\,a^2+23\,b\,a+8\,b^2\right)E\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)+128\right.\right.$$
$$\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\,a\left(2\,a^2+3\,b\,a+b^2\right)F\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)+2\sqrt{2}\,b$$
$$\left.\left.\left(88\,a^2+88\,b\,a+25\,b^2-28\,b\,(2\,a+b)\cos(2\,c\,z)+3\,b^2\cos(4\,c\,z)\right)\sin(2\,c\,z)\right)\right)\Big/\left(480\,c\,(2\,a+b-b\cos(2\,c\,z))^3\right)$$

01.06.21.0956.01

$$\int \sqrt{\left(a+b\sin^2(c\,z)\right)^3}\,dz = \left(\sqrt{\left(b\sin^2(c\,z)+a\right)^3}\left(16\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;a\,(2\,a+b)\,E\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)-8\,a\,(a+b)\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;F\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)+2\sqrt{2}\;b\,(-2\,a-b+b\cos(2\,c\,z))\sin(2\,c\,z)\right)\right)\Big/\left(6\sqrt{2}\;c\,(2\,a+b-b\cos(2\,c\,z))^2\right)$$

01.06.21.0957.01

$$\int \frac{1}{\sqrt{\left(a+b\sin^2(c\,z)\right)^3}}\,dz = \frac{(2\,a+b-b\cos(2\,c\,z))\left(2\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;a\,E\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)+\sqrt{2}\;b\sin(2\,c\,z)\right)}{2\,a\,(a+b)\,c\sqrt{(2\,a+b-b\cos(2\,c\,z))^3}}$$

01.06.21.0958.01

$$\int \frac{1}{\sqrt{\left(a+b\sin^2(c\,z)\right)^5}}\,dz = \left(\left(b\sin^2(c\,z)+a\right)^{5/2}\left(2\,a^2\,(2\,a+b)\,E\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)\left(\frac{2\,a+b-b\cos(2\,c\,z)}{a}\right)^{3/2}-a^2\,(a+b)\,F\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)\left(\frac{2\,a+b-b\cos(2\,c\,z)}{a}\right)^{3/2}-\sqrt{2}\;b\left(-5\,a^2-5\,b\,a-b^2+b\,(2\,a+b)\cos(2\,c\,z)\right)\sin(2\,c\,z)\right)\right)\Big/\left(3\,a^2\,(a+b)^2\,c\,(2\,a+b-b\cos(2\,c\,z))^{3/2}\sqrt{\left(b\sin^2(c\,z)+a\right)^5}\right)$$

Involving $\left(\left(a+b\sin^2(c\,z)\right)^{\nu}\right)^{\beta}\sin(d\,z)$

01.06.21.0959.01

$$\int \left(\left(a+b\sin^2(c z)\right)^{\nu}\right)^{\beta} \sin(d z)\, dz = -\frac{1}{d^2-4c^2\beta^2\nu^2}$$
$$\left(2^{-\beta\nu-1} e^{-i d z} \left(1-\frac{b e^{2 i c z}}{2a+b-2\sqrt{a(a+b)}}\right)^{-\beta\nu} \left(1-\frac{b e^{2 i c z}}{2a+b+2\sqrt{a(a+b)}}\right)^{-\beta\nu} \left(4a-b e^{-2 i c z}\left(-1+e^{2 i c z}\right)^2\right)^{\beta\nu}\right.$$
$$\left((d-2c\beta\nu) F_1\left(-\frac{d+2c\beta\nu}{2c}; -\beta\nu, -\beta\nu; -\frac{d}{2c}-\beta\nu+1; \frac{b e^{2 i c z}}{2a+b+2\sqrt{a(a+b)}}, \frac{b e^{2 i c z}}{2a+b-2\sqrt{a(a+b)}}\right)+\right.$$
$$\left.e^{2 i d z}(d+2c\beta\nu) F_1\left(\frac{d}{2c}-\beta\nu; -\beta\nu, -\beta\nu; \frac{d}{2c}-\beta\nu+1; \frac{b e^{2 i c z}}{2a+b+2\sqrt{a(a+b)}}, \frac{b e^{2 i c z}}{2a+b-2\sqrt{a(a+b)}}\right)\right)$$
$$\left.(2a+b-b\cos(2 c z))^{-\beta\nu} \left(\left(b\sin^2(c z)+a\right)^{\nu}\right)^{\beta}\right)$$

01.06.21.0960.01

$$\int \left(\left(a+b\sin^2(c z)\right)^{\nu}\right)^{\beta} \sin(c z)\, dz =$$
$$-\frac{1}{c}\cos(c z)\left(-b\cos^2(c z)+a+b\right)^{\beta\nu}\left(b\sin^2(c z)+a\right)^{-\beta\nu}\left(\left(b\sin^2(c z)+a\right)^{\nu}\right)^{\beta}\left(1-\frac{b\cos^2(c z)}{a+b}\right)^{-\beta\nu} {}_2F_1\left(\frac{1}{2}, -\beta\nu; \frac{3}{2}; \frac{b\cos^2(c z)}{a+b}\right)$$

01.06.21.0961.01

$$\int \sqrt{\left(a+b\sin^2(c z)\right)^5}\, \sin(c z)\, dz =$$
$$\frac{1}{16c\left(a+b\sin^2(c z)\right)^{5/2}}\left(\left(-\frac{5\log\left(\sqrt{2}\sqrt{-b}\cos(c z)+\sqrt{2a+b-b\cos(2 c z)}\right)(a+b)^3}{\sqrt{-b}}-\frac{1}{3\sqrt{2}}\left(\cos(c z)\right.\right.\right.$$
$$\left.\left.\left.\sqrt{2a+b-b\cos(2 c z)}\left(33a^2+53ba+23b^2-b(13a+9b)\cos(2 c z)+b^2\cos(4 c z)\right)\right)\right)\sqrt{\left(b\sin^2(c z)+a\right)^5}\right)$$

01.06.21.0962.01

$$\int \sqrt{\left(a+b\sin^2(c z)\right)^3}\, \sin(c z)\, dz = \frac{1}{8c\left(b\sin^2(c z)+a\right)^{3/2}}$$
$$\left(\left(-\frac{3\log\left(\sqrt{2}\sqrt{-b}\cos(c z)+\sqrt{2a+b-b\cos(2 c z)}\right)(a+b)^2}{\sqrt{-b}}-\frac{\cos(c z)\sqrt{2a+b-b\cos(2 c z)}\,(5a+4b-b\cos(2 c z))}{\sqrt{2}}\right)\right.$$
$$\left.\sqrt{\left(b\sin^2(c z)+a\right)^3}\right)$$

01.06.21.0963.01

$$\int \frac{\sin(c z)}{\sqrt{\left(a+b\sin^2(c z)\right)^3}}\, dz = -\frac{\sqrt{2}\cos(c z)(2a+b-b\cos(2 c z))}{(a+b)c\sqrt{(2a+b-b\cos(2 c z))^3}}$$

01.06.21.0964.01

$$\int \frac{\sin(c\,z)}{\sqrt{\left(a+b\sin^2(c\,z)\right)^5}}\,dz = -\frac{\cos(c\,z)\,(2\,a+b-b\cos(2\,c\,z))\,(3\,a+2\,b-b\cos(2\,c\,z))}{6\,(a+b)^2\,c\,\sqrt{\left(b\sin^2(c\,z)+a\right)^5}}$$

01.06.21.0965.01

$$\int \left(\left(a+b\sin^2(c\,z)\right)^\nu\right)^\beta \sin(2\,c\,z)\,dz = \frac{(2\,a+b-b\cos(2\,c\,z))\left(\left(b\sin^2(c\,z)+a\right)^\nu\right)^\beta}{2\,b\,c\,(\beta\,\nu+1)}$$

01.06.21.0966.01

$$\int \left(\left(a+b\sin^2(c\,z)\right)^\nu\right)^\beta \sin(4\,c\,z)\,dz = \frac{(2\,a+b-b\cos(2\,c\,z))\,(2\,a+b+b\,(\beta\,\nu+1)\cos(2\,c\,z))\left(\left(b\sin^2(c\,z)+a\right)^\nu\right)^\beta}{b^2\,c\,(\beta\,\nu+1)\,(\beta\,\nu+2)}$$

Involving $\left(a+b\sin^2(c\,z)\right)^\beta \sin^\nu(c\,z)$

01.06.21.0967.01

$$\int \left(a+b\sin^2(c\,z)\right)^\beta \sin^\nu(c\,z)\,dz = \frac{1}{\nu\,c+c}$$
$$\left(2^\beta F_1\!\left(\frac{\nu+1}{2};\frac{1}{2},-\beta;\frac{\nu+3}{2};\sin^2(c\,z),-\frac{b\sin^2(c\,z)}{a}\right)\sqrt{\cos^2(c\,z)}\,\sec(c\,z)\sin^{\nu+1}(c\,z)\left(b\sin^2(c\,z)+a\right)^\beta\left(\frac{2\,b\sin^2(c\,z)}{a}+2\right)^{-\beta}\right)$$

01.06.21.0968.01

$$\int \left(a+b\sin^2(c\,z)\right)^{3/2}\sin^2(c\,z)\,dz = \left(16\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;a\left(3\,a^2+13\,b\,a+8\,b^2\right)E\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)-\right.$$
$$16\,a\left(3\,a^2+7\,b\,a+4\,b^2\right)\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;F\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)-$$
$$\left.\sqrt{2}\;b\left(48\,a^2+68\,b\,a+25\,b^2-4\,b\,(9\,a+7\,b)\cos(2\,c\,z)+3\,b^2\cos(4\,c\,z)\right)\sin(2\,c\,z)\right)\Big/\left(240\,b\,c\,\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)$$

01.06.21.0969.01

$$\int \left(a+b\sin^2(c\,z)\right)^{3/2}\sin^3(c\,z)\,dz = \frac{1}{16\,c}\left(\frac{(a+b)^2\,(5\,b-a)\log\!\left(\sqrt{2}\,\sqrt{-b}\,\cos(c\,z)+\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)}{(-b)^{3/2}}-\right.$$
$$\left.\frac{1}{3\sqrt{2}\,b}\left(\cos(c\,z)\sqrt{2\,a+b-b\cos(2\,c\,z)}\,\left(3\,a^2+29\,b\,a+23\,b^2-b\,(7\,a+9\,b)\cos(2\,c\,z)+b^2\cos(4\,c\,z)\right)\right)\right)$$

01.06.21.0970.01

$$\int \left(a+b\sin^2(c z)\right)^{3/2} \sin^4(c z)\, dz = \left(-128 \sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, a\left(a^3-2ba^2-12b^2a-8b^3\right) E\left(cz \,\middle|\, -\frac{b}{a}\right) + 64\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, a\left(2a^3-3ba^2-13b^2a-8b^3\right) F\left(cz \,\middle|\, -\frac{b}{a}\right) + \sqrt{2}\, b\left(-32a^3-496ba^2-684b^2a-250b^3+b\left(144a^2+480ba+299b^2\right)\cos(2cz) - 2b^2(26a+27b)\cos(4cz)+5b^3\cos(6cz)\right)\sin(2cz)\right) \Big/ \left(2240\, b^2 c \sqrt{2a+b-b\cos(2cz)}\right)$$

01.06.21.0971.01

$$\int \sqrt{a+b\sin^2(cz)}\, \sin^2(cz)\, dz = \left(8\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, a(a+2b)\, E\left(cz \,\middle|\, -\frac{b}{a}\right) - 8a(a+b)\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, F\left(cz \,\middle|\, -\frac{b}{a}\right) + 2\sqrt{2}\, b(-2a-b+b\cos(2cz))\sin(2cz)\right) \Big/ \left(24\, b\, c\sqrt{2a+b-b\cos(2cz)}\right)$$

01.06.21.0972.01

$$\int \sqrt{a+b\sin^2(cz)}\, \sin^3(cz)\, dz = \frac{1}{8c}\left(\frac{\cos(cz)\sqrt{2a+b-b\cos(2cz)}\,(-a-4b+b\cos(2cz))}{\sqrt{2}\, b} + \frac{(a+b)(3b-a)\log\left(\sqrt{2}\sqrt{-b}\cos(cz)+\sqrt{2a+b-b\cos(2cz)}\right)}{(-b)^{3/2}}\right)$$

01.06.21.0973.01

$$\int \sqrt{a+b\sin^2(cz)}\, \sin^4(cz)\, dz = \left(-16\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, a\left(2a^2-3ba-8b^2\right) E\left(cz \,\middle|\, -\frac{b}{a}\right) + 32\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, a\left(a^2-ba-2b^2\right) F\left(cz \,\middle|\, -\frac{b}{a}\right) - \sqrt{2}\, b\left(8a^2+48ba+25b^2-4b(4a+7b)\cos(2cz)+3b^2\cos(4cz)\right)\sin(2cz)\right) \Big/ \left(240\, b^2 c\sqrt{2a+b-b\cos(2cz)}\right)$$

01.06.21.0974.01

$$\int \sqrt{a+b\sin^2(c\,z)}\,\sin^5(c\,z)\,dz = \frac{1}{96\,c}\left(\frac{1}{b^2}\left(\sqrt{2}\cos(c\,z)\sqrt{2\,a+b-b\cos(2\,c\,z)}\left(3\,a^2-5\,b\,a-23\,b^2+b\,(a+9\,b)\cos(2\,c\,z)-b^2\cos(4\,c\,z)\right)\right)-\frac{1}{(-b)^{5/2}}\left(6\,(a+b)\left(a^2-2\,b\,a+5\,b^2\right)\log\left(\sqrt{2}\sqrt{-b}\cos(c\,z)+\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)\right)\right)$$

01.06.21.0975.01

$$\int \frac{\sin^\nu(c\,z)}{\sqrt{a+b\sin^2(c\,z)}}\,dz = F_1\left(\frac{\nu+1}{2};\frac{1}{2},\frac{1}{2};\frac{\nu+3}{2};\sin^2(c\,z),-\frac{b\sin^2(c\,z)}{a}\right)\sqrt{\cos^2(c\,z)}\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\sec(c\,z)\sin^{\nu+1}(c\,z)\Big/\left(c\,(\nu+1)\sqrt{2\,b\sin^2(c\,z)+2\,a}\right)$$

01.06.21.0976.01

$$\int \frac{\sin^2(c\,z)}{\sqrt{a+b\sin^2(c\,z)}}\,dz = \frac{\sqrt{2\,a+b-b\cos(2\,c\,z)}\left(E\left(c\,z\,\middle|\,-\frac{b}{a}\right)-F\left(c\,z\,\middle|\,-\frac{b}{a}\right)\right)}{b\,c\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}}$$

01.06.21.0977.01

$$\int \frac{\sin^3(c\,z)}{\sqrt{a+b\sin^2(c\,z)}}\,dz = -\frac{1}{4\,(-b)^{3/2}\,c}\left(2\,(a-b)\log\left(\sqrt{2}\sqrt{-b}\cos(c\,z)+\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)-\sqrt{2}\sqrt{-b}\cos(c\,z)\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)$$

01.06.21.0978.01

$$\int \frac{\sin^4(c\,z)}{\sqrt{a+b\sin^2(c\,z)}}\,dz = \left(-8\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\,a\,(a-b)\,E\left(c\,z\,\middle|\,-\frac{b}{a}\right)+4\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\,a\,(2\,a-b)\,F\left(c\,z\,\middle|\,-\frac{b}{a}\right)+\sqrt{2}\,b\,(-2\,a-b+b\cos(2\,c\,z))\sin(2\,c\,z)\right)\Big/\left(12\,b^2\,c\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)$$

01.06.21.0979.01

$$\int \frac{\sin^5(c\,z)}{\sqrt{a+b\sin^2(c\,z)}}\,dz = \frac{1}{8\,c}\left(\frac{\cos(c\,z)\sqrt{2\,a+b-b\cos(2\,c\,z)}\,(3\,a-4\,b+b\cos(2\,c\,z))}{\sqrt{2}\,b^2}+\frac{b\left(3\,a^2-2\,b\,a+3\,b^2\right)\log\left(\sqrt{2}\sqrt{-b}\cos(c\,z)+\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)}{(-b)^{7/2}}\right)$$

01.06.21.0980.01

$$\int \frac{\sin^6(c\,z)}{\sqrt{a+b\sin^2(c\,z)}}\,dz = \left(16\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;a\left(8\,a^2-7\,b\,a+8\,b^2\right)E\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)-\right.$$
$$16\,a\left(8\,a^2-3\,b\,a+4\,b^2\right)\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;F\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)-$$
$$\left.\sqrt{2}\;b\left(-32\,a^2+28\,b\,a+25\,b^2+4\,b\,(a-7\,b)\cos(2\,c\,z)+3\,b^2\cos(4\,c\,z)\right)\sin(2\,c\,z)\right)\Big/\left(240\,b^3\,c\,\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)$$

01.06.21.0981.01

$$\int \frac{\sin^7(c\,z)}{\sqrt{a+b\sin^2(c\,z)}}\,dz = \frac{1}{16\,c}\left(\frac{(b-a)\left(5\,a^2+2\,b\,a+5\,b^2\right)\log\left(\sqrt{2}\;\sqrt{-b}\;\cos(c\,z)+\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)}{(-b)^{7/2}}-\right.$$
$$\left.\frac{1}{3\sqrt{2}\;b^3}\left(\cos(c\,z)\sqrt{2\,a+b-b\cos(2\,c\,z)}\;\left(15\,a^2-19\,b\,a+23\,b^2+b\,(5\,a-9\,b)\cos(2\,c\,z)+b^2\cos(4\,c\,z)\right)\right)\right)$$

01.06.21.0982.01

$$\int \frac{\sin^2(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{3/2}}\,dz =$$
$$\left(-2\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;a\,E\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)+2\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;(a+b)\,F\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)-\sqrt{2}\;b\sin(2\,c\,z)\right)\Big/$$
$$\left(2\,b\,(a+b)\,c\,\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)$$

01.06.21.0983.01

$$\int \frac{\sin^3(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{3/2}}\,dz = \frac{1}{b^2\,c}\left(\frac{\sqrt{2}\;a\,b\cos(c\,z)}{(a+b)\sqrt{2\,a+b-b\cos(2\,c\,z)}}+\sqrt{-b}\;\log\left(\sqrt{2}\;\sqrt{-b}\;\cos(c\,z)+\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)\right)$$

01.06.21.0984.01

$$\int \frac{\sin^4(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{3/2}}\,dz =$$
$$\left(a\left(2\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;(2\,a+b)\,E\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)-4\,(a+b)\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\;F\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)+\sqrt{2}\;b\sin(2\,c\,z)\right)\right)\Big/$$
$$\left(2\,b^2\,(a+b)\,c\,\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)$$

01.06.21.0985.01

$$\int \frac{\sin^5(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{3/2}}\,dz = \frac{1}{2\,c}\left(\frac{\cos(c\,z)\left(-6\,a^2-3\,b\,a-b^2+b\,(a+b)\cos(2\,c\,z)\right)}{\sqrt{2}\;b^2\,(a+b)\sqrt{2\,a+b-b\cos(2\,c\,z)}}+\frac{b\,(b-3\,a)\log\left(\sqrt{2}\;\sqrt{-b}\;\cos(c\,z)+\sqrt{2\,a+b-b\cos(2\,c\,z)}\right)}{(-b)^{7/2}}\right)$$

01.06.21.0986.01

$$\int \frac{\sin^2(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{5/2}}\,dz = \left(-2\,a^2\,(a-b)\,E\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)\left(\frac{2\,a+b-b\cos(2\,c\,z)}{a}\right)^{3/2}+2\,a^2\,(a+b)\,F\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)\left(\frac{2\,a+b-b\cos(2\,c\,z)}{a}\right)^{3/2}-\sqrt{2}\;b\left(4\,a^2+b\,a-b^2-(a-b)\,b\cos(2\,c\,z)\right)\sin(2\,c\,z)\right)\Big/\left(6\,a\,b\,(a+b)^2\,c\,(2\,a+b-b\cos(2\,c\,z))^{3/2}\right)$$

01.06.21.0987.01

$$\int \frac{\sin^3(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{5/2}}\,dz = \frac{\sqrt{2}\;\cos(c\,z)\,(-5\,a-3\,b+(a+3\,b)\cos(2\,c\,z))}{3\,(a+b)^2\,c\,(2\,a+b-b\cos(2\,c\,z))^{3/2}}$$

01.06.21.0988.01

$$\int \frac{\sin^4(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{5/2}}\,dz = -\left(2\,a^2\,(a+2\,b)\,E\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)\left(\frac{2\,a+b-b\cos(2\,c\,z)}{a}\right)^{3/2}-a\left(2\,a^2+5\,b\,a+3\,b^2\right)F\!\left(c\,z\,\middle|\,-\frac{b}{a}\right)\left(\frac{2\,a+b-b\cos(2\,c\,z)}{a}\right)^{3/2}-\sqrt{2}\;b\left(-a^2-4\,b\,a-2\,b^2+b\,(a+2\,b)\cos(2\,c\,z)\right)\sin(2\,c\,z)\right)\Big/\left(3\,b^2\,(a+b)^2\,c\,(2\,a+b-b\cos(2\,c\,z))^{3/2}\right)$$

Involving $\left(a+b\sin^2(c\,z)\right)^{\beta}$ and rational function of $\sin(c\,z)$

01.06.21.0989.01

$$\int \frac{1}{(d+e\sin(c\,z))\sqrt{a+b\sin^2(c\,z)}}\,dz = \frac{1}{c\,e\sqrt{2\,a+b-b\cos(2\,c\,z)}}\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}\left(\frac{e}{d}\,\Pi\!\left(\frac{e^2}{d^2};c\,z\,\middle|\,-\frac{b}{a}\right)-\frac{1}{\sqrt{1-\frac{d^2}{e^2}}\sqrt{\frac{b\,d^2}{a\,e^2}+1}}\tanh^{-1}\!\left(\frac{\cos(c\,z)}{\sqrt{1-\frac{d^2}{e^2}}\sqrt{\frac{2\,a+b-b\cos(2\,c\,z)}{a}}}\sqrt{\frac{2\,b\,d^2}{a\,e^2}+2}\right)\right)$$

01.06.21.0990.01

$$\int \frac{\sin(c\,z)}{(d+e\sin(c\,z))\sqrt{a+b\sin^2(c\,z)}}\,dz = \left(\sqrt{\frac{2a+b-b\cos(2\,c\,z)}{a}}\left(\frac{d}{\sqrt{1-\frac{d^2}{e^2}}\sqrt{\frac{b\,d^2}{a\,e^2}+1}}\tanh^{-1}\left(\frac{\sqrt{\frac{2\,b\,d^2}{a\,e^2}+2}\,\cos(c\,z)}{\sqrt{1-\frac{d^2}{e^2}}\sqrt{\frac{2a+b-b\cos(2\,c\,z)}{a}}}\right)+ e\,F\left(c\,z \,\middle|\, -\frac{b}{a}\right) - e\,\Pi\left(\frac{e^2}{d^2};\, c\,z \,\middle|\, -\frac{b}{a}\right)\right)\right)\Big/\left(c\,e^2\sqrt{2a+b-b\cos(2\,c\,z)}\right)$$

01.06.21.0991.01

$$\int \frac{1}{(d+e\sin(c\,z))^2\sqrt{a+b\sin^2(c\,z)}}\,dz = \frac{\cos(c\,z)\sqrt{2a+b-b\cos(2\,c\,z)}\;e^3}{\sqrt{2}\;c\left(d^2-e^2\right)\left(b\,d^2+a\,e^2\right)(d+e\sin(c\,z))} + \frac{\tanh^{-1}\left(\frac{\sqrt{\frac{2\,b\,d^2}{a\,e^2}+2}\,\cos(c\,z)}{\sqrt{1-\frac{d^2}{e^2}}\sqrt{\frac{2a+b-b\cos(2\,c\,z)}{a}}}\right)\left(d\left(2\,b\,d^2+a\,e^2-b\,e^2\right)\sqrt{\frac{2a+b-b\cos(2\,c\,z)}{a}}\right)}{c\sqrt{1-\frac{d^2}{e^2}}\sqrt{\frac{b\,d^2}{a\,e^2}+1}\;e\left(e^2-d^2\right)\left(b\,d^2+a\,e^2\right)\sqrt{2a+b-b\cos(2\,c\,z)}} + \frac{\left(e^2\sqrt{2a+b-b\cos(2\,c\,z)}\right)E\left(c\,z \,\middle|\, -\frac{b}{a}\right)}{c\left(d^2-e^2\right)\left(b\,d^2+a\,e^2\right)\sqrt{\frac{2a+b-b\cos(2\,c\,z)}{a}}} - \frac{\sqrt{\frac{2a+b-b\cos(2\,c\,z)}{a}}\;F\left(c\,z \,\middle|\, -\frac{b}{a}\right)}{c\left(d^2-e^2\right)\sqrt{2a+b-b\cos(2\,c\,z)}} + \frac{\left(\left(2\,b\,d^2+a\,e^2-b\,e^2\right)\sqrt{\frac{2a+b-b\cos(2\,c\,z)}{a}}\right)\Pi\left(\frac{e^2}{d^2};\, c\,z \,\middle|\, -\frac{b}{a}\right)}{c\left(d^2-e^2\right)\left(b\,d^2+a\,e^2\right)\sqrt{2a+b-b\cos(2\,c\,z)}}$$

01.06.21.0992.01

$$\int \frac{1}{(d+e\sin(c z))^3\sqrt{a+b\sin^2(c z)}}\,dz = \frac{3 d e^2 \left(2 b d^2+a e^2-b e^2\right)\sqrt{2 a+b-b\cos(2 c z)}\; E\!\left(c z \,\middle|\, -\frac{b}{a}\right)}{2 c \left(d^2-e^2\right)^2 \left(b d^2+a e^2\right)^2 \sqrt{\frac{2 a+b-b\cos(2 c z)}{a}}} +$$

$$\left(\left(a^2\left(2 d^2+e^2\right) e^4+a b\left(5 d^4+2 e^2 d^2-e^4\right) e^2+b^2\left(6 d^6-5 e^2 d^4+2 e^4 d^2\right)\right)\sqrt{\frac{2 a+b-b\cos(2 c z)}{a}}\;\Pi\!\left(\frac{e^2}{d^2}; c z \,\middle|\, -\frac{b}{a}\right)\right)\Big/$$

$$\left(2 c d\left(d^2-e^2\right)^2\left(b d^2+a e^2\right)^2\sqrt{2 a+b-b\cos(2 c z)}\right)+$$

$$\left(4\sqrt{2}\; e^3\cos(c z)\,(e\sin(c z)-d)^5\,(d+e\sin(c z))^3\left(-14 b^2 d^4-28 a b d^4+6 b^2 e\sin(3 c z)\, d^3-16 a^2 e^2 d^2+\right.\right.$$
$$8 b^2 e^2 d^2+8 a b e^2 d^2-3(4 a+3 b)\, e\left(2 b d^2+a e^2-b e^2\right)\sin(c z)\, d-3 b^2 e^3\sin(3 c z)\, d+$$
$$\left.\left.3 a b e^3\sin(3 c z)\, d+4 a^2 e^4+2 a b e^4+2 b\left(7 b d^4+4 a e^2 d^2-4 b e^2 d^2-a e^4\right)\cos(2 c z)\right)\right)\Big/$$

$$\left(c\left(d^2-e^2\right)^2\left(b d^2+a e^2\right)^2\sqrt{2 a+b-b\cos(2 c z)}\;\left(2 d^2-e^2+e^2\cos(2 c z)\right)^5\right)-$$

$$\frac{d\left(4 b d^2+3 a e^2-b e^2\right)\sqrt{\frac{2 a+b-b\cos(2 c z)}{a}}\; F\!\left(c z \,\middle|\, -\frac{b}{a}\right)}{2 c\left(d^2-e^2\right)^2\left(b d^2+a e^2\right)\sqrt{2 a+b-b\cos(2 c z)}} -$$

$$\left(\left(a^2\left(2 d^2+e^2\right) e^4+a b\left(5 d^4+2 e^2 d^2-e^4\right) e^2+b^2\left(6 d^6-5 e^2 d^4+2 e^4 d^2\right)\right)\tanh^{-1}\!\left(\frac{\sqrt{\frac{2 b d^2}{a e^2}+2}\;\cos(c z)}{\sqrt{1-\frac{d^2}{e^2}}\;\sqrt{\frac{2 a+b-b\cos(2 c z)}{a}}}\right)\right.$$

$$\left.\sqrt{\frac{2 a+b-b\cos(2 c z)}{a}}\right)\Big/\left(2 c\sqrt{1-\frac{d^2}{e^2}}\;\sqrt{\frac{b d^2}{a e^2}+1}\; e\left(d^2-e^2\right)^2\left(b d^2+a e^2\right)^2\sqrt{2 a+b-b\cos(2 c z)}\right)$$

01.06.21.0993.01

$$\int \frac{\sin(c z)}{(d+e\sin(c z))^2 \sqrt{a+b\sin^2(c z)}}\, dz = -\frac{d\cos(c z)\sqrt{2a+b-b\cos(2cz)}\; e^2}{\sqrt{2}\, c\left(d^2-e^2\right)\left(b d^2+a e^2\right)(d+e\sin(c z))} - \frac{\left(b d^4+a e^4\right)}{c\sqrt{1-\frac{d^2}{e^2}}\sqrt{\frac{b d^2}{a e^2}+1}\; e^2\left(e^2-d^2\right)\left(b d^2+a e^2\right)\sqrt{2a+b-b\cos(2cz)}} \sqrt{\frac{2a+b-b\cos(2cz)}{a}}\tan^{-1}\left(\frac{\sqrt{\frac{2bd^2}{ae^2}+2}\;\cos(c z)}{\sqrt{1-\frac{d^2}{e^2}}\sqrt{\frac{2a+b-b\cos(2cz)}{a}}}\right) - \frac{d e\sqrt{2a+b-b\cos(2cz)}}{c\left(d^2-e^2\right)\left(b d^2+a e^2\right)\sqrt{\frac{2a+b-b\cos(2cz)}{a}}} E\left(c z \,\middle|\, -\frac{b}{a}\right) + \frac{d}{c e\left(d^2-e^2\right)\sqrt{2a+b-b\cos(2cz)}}\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\, F\left(c z \,\middle|\, -\frac{b}{a}\right) + \frac{\left(b d^4+a e^4\right)}{c d e\left(e^2-d^2\right)\left(b d^2+a e^2\right)\sqrt{2a+b-b\cos(2cz)}}\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\; \Pi\left(\frac{e^2}{d^2}; c z \,\middle|\, -\frac{b}{a}\right)$$

01.06.21.0994.01

$$\int \frac{\sqrt{a+b\sin^2(c z)}}{d+e\sin^2(c z)}\, dz = \frac{\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\left(b d\, F\left(c z \,\middle|\, -\frac{b}{a}\right) + (a e - b d)\,\Pi\left(-\frac{e}{d}; c z \,\middle|\, -\frac{b}{a}\right)\right)}{c d e\sqrt{2a+b-b\cos(2cz)}}$$

01.06.21.0995.01

$$\int \frac{1}{\left(e\sin^2(c z)+d\right)\sqrt{a+b\sin^2(c z)}}\, dz = \frac{1}{c d\sqrt{2a+b-b\cos(2cz)}}\sqrt{\frac{2a+b-b\cos(2cz)}{a}}\; \Pi\left(-\frac{e}{d}; c z \,\middle|\, -\frac{b}{a}\right)$$

01.06.21.0996.01

$$\int \frac{\sin(c z)}{\left(e\sin^2(c z)+d\right)\sqrt{a+b\sin^2(c z)}}\, dz = \frac{1}{c\sqrt{-d-e}\;\sqrt{a e-b d}}\tan^{-1}\left(\frac{2\sqrt{a e-b d}\;\cos(c z)}{\sqrt{-2d-2e}\;\sqrt{2a+b-b\cos(2cz)}}\right)$$

01.06.21.0997.01

$$\int \frac{1}{\left(e\sin^2(c z)+d\right)^2 \sqrt{a+b\sin^2(c z)}}\, dz = \left(\sqrt{\frac{2a+b-b\cos(2 c z)}{a}} \left(2\,\Pi\left(-\frac{e}{d}; c z \,\middle|\, -\frac{b}{a}\right) - \frac{1}{(d+e)(b d - a e)} \left(a d e \left(E\left(c z \,\middle|\, -\frac{b}{a}\right) + \frac{(b d - a e) F\left(c z \,\middle|\, -\frac{b}{a}\right)}{a e} + \frac{\sqrt{\frac{b\sin^2(c z)}{a}+1}\; e\sin(2 c z)}{2\left(e\sin^2(c z)+d\right)} - \frac{d\left(\frac{e^2}{d^2}+\frac{b}{a}\right)\Pi\left(-\frac{e}{d}; c z \,\middle|\, -\frac{b}{a}\right)}{e}\right)\right)\right)\right) \Big/ \left(2 c d^2 \sqrt{2a+b-b\cos(2 c z)}\right)$$

01.06.21.0998.01

$$\int \frac{\sin(c z)}{\left(e\sin^2(c z)+d\right)^2 \sqrt{a+b\sin^2(c z)}}\, dz = \left((b(2d+e)-a e)\tan^{-1}\left(\frac{2\sqrt{a e - b d}\,\cos(c z)}{\sqrt{-2d-2e}\,\sqrt{2a+b-b\cos(2 c z)}}\right) - \frac{2 e (d+e)\sqrt{a e - b d}\,\cos(c z)\sqrt{2a+b-b\cos(2 c z)}}{\sqrt{-2d-2e}\,(2d+e-e\cos(2 c z))}\right) \Big/ \left(2 c (-d-e)^{3/2} (a e - b d)^{3/2}\right)$$

Involving $\sin(e z)\sin(d z)\left(a+b\sin^2(c z)\right)^\beta$

01.06.21.0999.01

$$\int \sin(e z)\sin(d z)\left(a+b\sin^2(c z)\right)^\beta dz = \frac{1}{4} i \left(1-\frac{b\, e^{2 i c z}}{2a+b-2\sqrt{a(a+b)}}\right)^{-\beta} \left(1-\frac{b\, e^{2 i c z}}{2a+b+2\sqrt{a(a+b)}}\right)^{-\beta} \left(a+b\sin^2(c z)\right)^\beta \left(\frac{1}{4c^2\beta^2-(d-e)^2}\left(e^{-i(d-e)z}\left(e^{2i(d-e)z}(d-e+2c\beta) F_1\left(\frac{d-e-2c\beta}{2c}; -\beta, -\beta; \frac{-2\beta c+2c+d-e}{2c}; \frac{b\, e^{2 i c z}}{2a+b+2\sqrt{a(a+b)}}, \frac{b\, e^{2 i c z}}{2a+b-2\sqrt{a(a+b)}}\right) - (d-e-2c\beta) F_1\left(-\frac{d-e+2c\beta}{2c}; -\beta, -\beta; \frac{-2\beta c+2c-d+e}{2c}; \frac{b\, e^{2 i c z}}{2a+b+2\sqrt{a(a+b)}}, \frac{b\, e^{2 i c z}}{2a+b-2\sqrt{a(a+b)}}\right)\right)\right) - \frac{1}{4c^2\beta^2-(d+e)^2}\left(e^{-i(d+e)z}\left(e^{2i(d+e)z}(d+e+2c\beta) F_1\left(\frac{d+e-2c\beta}{2c}; -\beta, -\beta; \frac{-2\beta c+2c+d+e}{2c}; \frac{b\, e^{2 i c z}}{2a+b+2\sqrt{a(a+b)}}, \frac{b\, e^{2 i c z}}{2a+b-2\sqrt{a(a+b)}}\right) - (d+e-2c\beta) F_1\left(-\frac{d+e+2c\beta}{2c}; -\beta, -\beta; -\frac{d+e+2c(\beta-1)}{2c}; \frac{b\, e^{2 i c z}}{2a+b+2\sqrt{a(a+b)}}, \frac{b\, e^{2 i c z}}{2a+b-2\sqrt{a(a+b)}}\right)\right)\right)\right)$$

Involving $\left(a + b\sin^2(c\,z)\right)^\beta$ and algebraic function of $\sin(c\,z)$

01.06.21.1000.01

$$\int \left(a + b\sin^2(c\,z)\right)^\nu \left(d + e\sin^2(c\,z)\right)^\beta \sin(c\,z)\,dz = -\frac{1}{c}\left(F_1\left(\frac{1}{2}; -\nu, -\beta; \frac{3}{2}; \frac{b\cos^2(c\,z)}{a+b}, \frac{e\cos^2(c\,z)}{d+e}\right)\cos(c\,z)\left(b\sin^2(c\,z)+a\right)^\nu \left(\frac{b\sin^2(c\,z)+a}{a+b}\right)^{-\nu} \left(e\sin^2(c\,z)+d\right)^\beta \left(\frac{e\sin^2(c\,z)+d}{d+e}\right)^{-\beta}\right)$$

01.06.21.1001.01

$$\int \frac{\left(d + e\sin^2(c\,z)\right)^\beta \sin(c\,z)}{\sqrt{a + b\sin^2(c\,z)}}\,dz = -\frac{1}{c\sqrt{b\sin^2(c\,z)+a}}\left(F_1\left(\frac{1}{2}; \frac{1}{2}, -\beta; \frac{3}{2}; \frac{b\cos^2(c\,z)}{a+b}, \frac{e\cos^2(c\,z)}{d+e}\right)\cos(c\,z)\sqrt{\frac{b\sin^2(c\,z)+a}{a+b}} \left(e\sin^2(c\,z)+d\right)^\beta \left(\frac{e\sin^2(c\,z)+d}{d+e}\right)^{-\beta}\right)$$

Other integrals

01.06.21.1002.01

$$\int \sqrt{\frac{a + b\sin(e\,z)}{c + d\sin(e\,z)}}\,dz = -\left(\sqrt{2}\,(b\,c - a\,d)\sqrt{\frac{(c+d)\cot^2\left(\frac{1}{4}(\pi - 2\,e\,z)\right)}{d-c}}\right.$$
$$\left(b\,(c+d)\,\Pi\left(\frac{a\,d - b\,c}{(a+b)\,d}; \sin^{-1}\left(\sqrt{-\frac{(a+b)\csc^2\left(\frac{1}{4}(\pi - 2\,e\,z)\right)(c + d\sin(e\,z))}{2\,a\,d - 2\,b\,c}}\right)\middle|\,\frac{2\,(a\,d - b\,c)}{(a+b)\,(d-c)}\right) -\right.$$
$$\left.(a+b)\,d\,F\left(\sin^{-1}\left(\sqrt{-\frac{(a+b)\csc^2\left(\frac{1}{4}(\pi - 2\,e\,z)\right)(c + d\sin(e\,z))}{2\,a\,d - 2\,b\,c}}\right)\middle|\,\frac{2\,(a\,d - b\,c)}{(a+b)\,(d-c)}\right)\right)$$
$$\sec(e\,z)\left(\cos\left(\frac{e\,z}{2}\right) - \sin\left(\frac{e\,z}{2}\right)\right)^4 \sqrt{\frac{(c+d)\csc^2\left(\frac{1}{4}(\pi - 2\,e\,z)\right)(a + b\sin(e\,z))}{a\,d - b\,c}}\sqrt{\frac{a + b\sin(e\,z)}{c + d\sin(e\,z)}}$$
$$\left.\sqrt{\frac{(a+b)\,(c + d\sin(e\,z))}{(a\,d - b\,c)\,(\sin(e\,z) - 1)}}\right) \Big/ \left((a+b)\,d\,(c+d)\,e\,(a + b\sin(e\,z))\right)$$

01.06.21.1003.01

$$\int \frac{\sqrt{a+b\sin(e\,z)}}{\sqrt{c+d\sin(e\,z)}}\,dz = -\left(\sqrt{2}\,(b\,c-a\,d)\sqrt{\frac{(c+d)\cot^2\left(\frac{1}{4}(\pi-2\,e\,z)\right)}{d-c}}\right.$$
$$\left(b\,(c+d)\,\Pi\left(\frac{a\,d-b\,c}{(a+b)\,d};\sin^{-1}\left(\sqrt{-\frac{(a+b)\csc^2\left(\frac{1}{4}(\pi-2\,e\,z)\right)(c+d\sin(e\,z))}{2\,a\,d-2\,b\,c}}\right)\middle|\frac{2\,(a\,d-b\,c)}{(a+b)\,(d-c)}\right)-\right.$$
$$\left.(a+b)\,d\,F\left(\sin^{-1}\left(\sqrt{-\frac{(a+b)\csc^2\left(\frac{1}{4}(\pi-2\,e\,z)\right)(c+d\sin(e\,z))}{2\,a\,d-2\,b\,c}}\right)\middle|\frac{2\,(a\,d-b\,c)}{(a+b)\,(d-c)}\right)\right)\sec(e\,z)$$
$$\left.\left(\cos\left(\frac{e\,z}{2}\right)-\sin\left(\frac{e\,z}{2}\right)\right)^4\sqrt{\frac{(c+d)\csc^2\left(\frac{1}{4}(\pi-2\,e\,z)\right)(a+b\sin(e\,z))}{a\,d-b\,c}}\sqrt{\frac{(a+b)\,(c+d\sin(e\,z))}{(a\,d-b\,c)\,(\sin(e\,z)-1)}}\right)\Big/$$
$$\left((a+b)\,d\,(c+d)\,e\sqrt{a+b\sin(e\,z)}\,\sqrt{c+d\sin(e\,z)}\right)$$

01.06.21.1004.01

$$\int\sqrt{\frac{a+b\sin^2(e\,z)}{\left(c+d\sin^2(e\,z)\right)^3}}\,dz = \cos(e\,z)\sqrt{\frac{2\,a+b-b\cos(2\,e\,z)}{(2\,c+d-d\cos(2\,e\,z))^3}}$$
$$\sqrt{\frac{a\,(2\,c+d-d\cos(2\,e\,z))}{c\,(2\,a+b-b\cos(2\,e\,z))}}\left(\frac{a\sqrt{\frac{a+b}{a}}\,(2\,c+d-d\cos(2\,e\,z))}{\sqrt{\frac{a\cos^2(e\,z)}{2\,a+b-b\cos(2\,e\,z)}}}E\left(\sin^{-1}\left(\frac{\sqrt{2}\sqrt{\frac{a+b}{a}}\sin(e\,z)}{\sqrt{\frac{2\,a+b-b\cos(2\,e\,z)}{a}}}\right)\middle|\frac{b\,c-a\,d}{a\,c+b\,c}\right)+\right.$$
$$\left.2\sqrt{\frac{2\,a+b-b\cos(2\,e\,z)}{a}}\,(a\,d-b\,c)\sqrt{\frac{a\,(2\,c+d-d\cos(2\,e\,z))}{c\,(2\,a+b-b\cos(2\,e\,z))}}\sin(e\,z)\right)\Big/\left(a\,(c+d)\,e\sqrt{\frac{2\,a+b-b\cos(2\,e\,z)}{a}}\right)$$

01.06.21.1005.01

$$\int\frac{1}{\left(a+b\sin^2(e\,z)\right)\sqrt{\frac{a+b\sin^2(e\,z)}{c+d\sin^2(e\,z)}}}\,dz =$$
$$\frac{\cos(e\,z)}{a\sqrt{\frac{a+b}{a}}\;e\sqrt{\frac{a\cos^2(e\,z)}{2\,a+b-b\cos(2\,e\,z)}}\sqrt{\frac{2\,a+b-b\cos(2\,e\,z)}{a}}\sqrt{\frac{a\,(2\,c+d-d\cos(2\,e\,z))}{c\,(2\,a+b-b\cos(2\,e\,z))}}\sqrt{\frac{b\sin^2(e\,z)+a}{d\sin^2(e\,z)+c}}}E\left(\sin^{-1}\left(\frac{\sqrt{\frac{2\,a+2\,b}{a}}\sin(e\,z)}{\sqrt{\frac{2\,a+b-b\cos(2\,e\,z)}{a}}}\right)\middle|\frac{b\,c-a\,d}{a\,c+b\,c}\right)$$

01.06.21.1006.01

$$\int \frac{\sqrt{\frac{a+b\sin^2(e z)}{c+d\sin^2(e z)}}}{c+d\sin^2(e z)}\,dz = \sqrt{\frac{a\cos^2(e z)}{2a+b-b\cos(2 e z)}}\,\sec(e z)\left(\sqrt{\frac{a+b}{a}}\,a\,(2c+d-d\cos(2 e z))\,E\!\left(\sin^{-1}\!\left(\frac{\sqrt{\frac{2a+2b}{a}}\,\sin(e z)}{\sqrt{\frac{2a+b-b\cos(2 e z)}{a}}}\right)\middle|\,\frac{b c-a d}{a c+b c}\right)+\right.$$
$$\left. 2\sqrt{\frac{2a+b-b\cos(2 e z)}{a}}\,(a d-b c)\sqrt{\frac{a\cos^2(e z)}{2a+b-b\cos(2 e z)}}\,\sqrt{\frac{a(2c+d-d\cos(2 e z))}{c(2a+b-b\cos(2 e z))}}\,\sin(e z)\right)$$
$$\sqrt{\frac{b\sin^2(e z)+a}{d\sin^2(e z)+c}}\Bigg/\left(a\,c\,(c+d)\,e\sqrt{\frac{2a+b-b\cos(2 e z)}{a}}\,\sqrt{\frac{a(2c+d-d\cos(2 e z))}{c(2a+b-b\cos(2 e z))}}\right)$$

01.06.21.1007.01

$$\int \frac{1}{\sqrt{\left(a+b\sin^2(e z)\right)\left(c+d\sin^2(e z)\right)}}\,dz = \left((2a+b-b\cos(2 e z))\sqrt{-\frac{c\cot^2(e z)}{c+d}}\right.$$
$$\left.\sqrt{\frac{a(2c+d-d\cos(2 e z))\csc^2(e z)}{a d-b c}}\,F\!\left(\sin^{-1}\!\left(\sqrt{\frac{a(2c+d-d\cos(2 e z))\csc^2(e z)}{2 a d-2 b c}}\right)\middle|\,\frac{a d-b c}{a(c+d)}\right)\tan(e z)\right)\Bigg/$$
$$\left(a\,e\sqrt{-(2a+b-b\cos(2 e z))(-2c-d+d\cos(2 e z))}\,\sqrt{\frac{c(2a+b-b\cos(2 e z))\csc^2(e z)}{b c-a d}}\right)$$

01.06.21.1008.01

$$\int \frac{1}{\sqrt{\left(a+b\sin^2(e\,z)\right)\left(c+d\sin^2(e\,z)\right)}\,\left(f+g\sin^2(e\,z)\right)}\,dz = \left(\sqrt{b\sin^2(e\,z)+a}\,\sqrt{d\sin^2(e\,z)+c}\left(\frac{1}{\sqrt{\frac{a\cos^2(e\,z)}{2a+b-b\cos(2\,e\,z)}}}\left(a^2\,c\,g\cos(e\,z)\sqrt{\frac{2a+b-b\cos(2\,e\,z)}{a}}\right.\right.\right.$$

$$\sqrt{\frac{a\,(2c+d-d\cos(2\,e\,z))}{c\,(2a+b-b\cos(2\,e\,z))}}\;\Pi\!\left(\frac{b\,f-a\,g}{a\,f+b\,f};\sin^{-1}\!\left(\frac{\sqrt{\frac{2a+2b}{a}}\,\sin(e\,z)}{\sqrt{\frac{2a+b-b\cos(2\,e\,z)}{a}}}\right)\middle|\,\frac{b\,c-a\,d}{a\,c+b\,c}\right)\Bigg)+$$

$$\sqrt{\frac{a+b}{a}}\;b\sqrt{-\frac{c\cot^2(e\,z)}{c+d}}\;\sqrt{\frac{a\,(2c+d-d\cos(2\,e\,z))\csc^2(e\,z)}{a\,d-b\,c}}\;(a\,d-b\,c)\sqrt{\frac{c\,(2a+b-b\cos(2\,e\,z))\csc^2(e\,z)}{b\,c-a\,d}}$$

$$\left.\left.f\,F\!\left(\sin^{-1}\!\left(\sqrt{\frac{a\,(2c+d-d\cos(2\,e\,z))\csc^2(e\,z)}{2\,a\,d-2\,b\,c}}\right)\middle|\,\frac{a\,d-b\,c}{a\,(c+d)}\right)\sin^2(e\,z)\tan(e\,z)\right)\right)\Bigg/$$

$$\left(a\sqrt{\frac{a+b}{a}}\;c\,e\,f\,(a\,g-b\,f)\sqrt{2a+b-b\cos(2\,e\,z)}\;\sqrt{2c+d-d\cos(2\,e\,z)}\;\sqrt{\left(b\sin^2(e\,z)+a\right)\left(d\sin^2(e\,z)+c\right)}\right)$$

01.06.21.1009.01

$$\int \frac{\sin^2(e\,z)}{\sqrt{\left(b\sin^2(e\,z)+a\right)\left(d\sin^2(e\,z)+c\right)^3}}\,dz = -\left(\cos(e\,z)\left(\sqrt{\frac{a+b}{a}}\;a\,(2\,c+d-d\cos(2\,e\,z))\,E\!\left(\sin^{-1}\!\left(\frac{\sqrt{\frac{2a+2b}{a}}\;\sin(e\,z)}{\sqrt{\frac{2a+b-b\cos(2ez)}{a}}}\right)\middle|\,\frac{b\,c-a\,d}{a\,c+b\,c}\right)+\right.\right.$$

$$\sqrt{\frac{2\,a+b-b\cos(2\,e\,z)}{a}}\;(b\,c-a\,d)\sqrt{\frac{a\cos^2(e\,z)}{2\,a+b-b\cos(2\,e\,z)}}\;\sqrt{\frac{a\,(2\,c+d-d\cos(2\,e\,z))}{c\,(2\,a+b-b\cos(2\,e\,z))}}$$

$$\left(\frac{1}{\sqrt{-\frac{c\cot^2(e\,z)}{c+d}}}\left(\sqrt{\frac{c\,(2\,a+b-b\cos(2\,e\,z))\csc^2(e\,z)}{b\,c-a\,d}}\;\sqrt{\frac{a\,(2\,c+d-d\cos(2\,e\,z))\csc^2(e\,z)}{a\,d-b\,c}}\right.\right.$$

$$\left.\left.\left.F\!\left(\sin^{-1}\!\left(\sqrt{\frac{a\,(2\,c+d-d\cos(2\,e\,z))\csc^2(e\,z)}{2\,a\,d-2\,b\,c}}\right)\middle|\,\frac{a\,d-b\,c}{a\,(c+d)}\right)\right)-2\right)\sin(e\,z)\right)$$

$$\left.\sqrt{b\sin^2(e\,z)+a}\;\left(d\sin^2(e\,z)+c\right)^{3/2}\right)\Bigg/\left((c+d)\,(a\,d-b\,c)\,e\sqrt{\frac{a\cos^2(e\,z)}{2\,a+b-b\cos(2\,e\,z)}}\right.$$

$$\sqrt{2\,a+b-b\cos(2\,e\,z)}\;\sqrt{\frac{2\,a+b-b\cos(2\,e\,z)}{a}}\;\sqrt{2\,c+d-d\cos(2\,e\,z)}$$

$$\left.\sqrt{\frac{a\,(2\,c+d-d\cos(2\,e\,z))}{c\,(2\,a+b-b\cos(2\,e\,z))}}\;\sqrt{\left(b\sin^2(e\,z)+a\right)\left(d\sin^2(e\,z)+c\right)^3}\right)$$

Involving functions of the direct function and a power function

Involving powers of the direct function and a power function

Involving powers of sin and power

Involving $z^{\alpha-1}\sin^{\nu}(a\,z)$

01.06.21.1010.01

$$\int z^{\alpha-1}\sin^{\nu}(a\,z)\,dz = \frac{2^{-\nu}\,(1-\nu \bmod 2)}{\alpha}\,z^{\alpha}\binom{\nu}{\frac{\nu}{2}} - (2\,i)^{-\nu}\,z^{\alpha}$$

$$\sum_{j=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{j}\binom{\nu}{j}\left(\Gamma(\alpha,\,i\,a\,(2\,j-\nu)\,z)\,(i\,a\,(2\,j-\nu)\,z)^{-\alpha} + (-1)^{\nu}\,(i\,a\,(\nu-2\,j)\,z)^{-\alpha}\,\Gamma(\alpha,\,i\,a\,(\nu-2\,j)\,z)\right) /;\ \alpha\neq 0\bigwedge \nu\in\mathbb{N}^{+}$$

01.06.21.1011.01

$$\int\frac{\sin^{\nu}(a\,z)}{z}\,dz =$$

$$2^{-\nu}\binom{\nu}{\frac{\nu}{2}}\log(z)\,(1-\nu \bmod 2) + 2^{1-\nu}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{k}\binom{\nu}{k}\left(\cos\left(\frac{\pi\,\nu}{2}\right)\mathrm{Ci}(a\,(\nu-2\,k)\,z) + \sin\left(\frac{\pi\,\nu}{2}\right)\mathrm{Si}(a\,(\nu-2\,k)\,z)\right) /;\ \nu\in\mathbb{N}^{+}$$

01.06.21.1012.01

$$\int z^{\alpha-1}\sin^{2}(a\,z)\,dz = \frac{1}{4}\,z^{\alpha}\left(2^{-\alpha}\,\Gamma(\alpha,\,-2\,i\,a\,z)\,(-i\,a\,z)^{-\alpha} + 2^{-\alpha}\,(i\,a\,z)^{-\alpha}\,\Gamma(\alpha,\,2\,i\,a\,z) + \frac{2}{\alpha}\right)$$

01.06.21.1013.01

$$\int z^{\alpha-1}\sin^{3}(a\,z)\,dz =$$

$$\frac{1}{8}\,i\,3^{-\alpha}\,z^{\alpha}\left(a^{2}\,z^{2}\right)^{-\alpha}\left(-3^{\alpha+1}\,\Gamma(\alpha,\,i\,a\,z)\,(-i\,a\,z)^{\alpha} + \Gamma(\alpha,\,3\,i\,a\,z)\,(-i\,a\,z)^{\alpha} + 3^{\alpha+1}\,(i\,a\,z)^{\alpha}\,\Gamma(\alpha,\,-i\,a\,z) - (i\,a\,z)^{\alpha}\,\Gamma(\alpha,\,-3\,i\,a\,z)\right)$$

01.06.21.1014.01

$$\int z^{n}\sin^{\nu}(a\,z)\,dz = n!\,\sin^{\nu}(a\,z)\left(1-e^{2\,i\,a\,z}\right)^{-\nu}\sum_{j=0}^{n}\frac{(-1)^{j}\,z^{n-j}}{(n-j)!\,(-i\,a\,\nu)^{j+1}}\,{}_{j+2}F_{j+1}\left(-\frac{\nu}{2},\,\ldots,\,-\frac{\nu}{2},\,-\nu;\,1-\frac{\nu}{2},\,\ldots,\,1-\frac{\nu}{2};\,e^{2\,i\,a\,z}\right) /;\ n\in\mathbb{N}$$

01.06.21.1015.01

$$\int z\sin^{\nu}(a\,z)\,dz = \frac{1}{2\,a^{2}}\left(\sin^{\nu+1}(a\,z)\right.$$

$$\left.\left(\frac{2\,a\,z\cos(a\,z)}{\nu+1}\,{}_{2}F_{1}\left(1,\,\frac{\nu+2}{2};\,\frac{\nu+3}{2};\,\sin^{2}(a\,z)\right) - 2^{-\nu-1}\sqrt{\pi}\,\Gamma(\nu+1)\,{}_{3}\tilde{F}_{2}\left(1,\,\frac{\nu+2}{2},\,\frac{\nu+2}{2};\,\frac{\nu+3}{2},\,\frac{\nu+4}{2};\,\sin^{2}(a\,z)\right)\sin(a\,z)\right)\right)$$

01.06.21.1016.01

$$\int\frac{\sin^{2}(a\,z)}{z}\,dz = \frac{1}{2}\,(\log(z) - \mathrm{Ci}(2\,a\,z))$$

01.06.21.1017.01

$$\int\frac{\sin^{3}(a\,z)}{z}\,dz = \frac{1}{4}\,(3\,\mathrm{Si}(a\,z) - \mathrm{Si}(3\,a\,z))$$

01.06.21.1018.01

$$\int\frac{\sin^{4}(a\,z)}{z}\,dz = \frac{1}{8}\,(-4\,\mathrm{Ci}(2\,a\,z) + \mathrm{Ci}(4\,a\,z) + 3\log(z))$$

01.06.21.1019.01

$$\int\frac{\sin^{5}(a\,z)}{z}\,dz = \frac{1}{16}\,(10\,\mathrm{Si}(a\,z) - 5\,\mathrm{Si}(3\,a\,z) + \mathrm{Si}(5\,a\,z))$$

01.06.21.1020.01

$$\int z\sin^2(a\,z)\,dz = -\frac{\cos(2\,a\,z)+2\,a\,z\,(\sin(2\,a\,z)-a\,z)}{8\,a^2}$$

01.06.21.1021.01

$$\int z\sin^3(a\,z)\,dz = -\frac{27\,a\,z\cos(a\,z)-3\,a\,z\cos(3\,a\,z)-27\sin(a\,z)+\sin(3\,a\,z)}{36\,a^2}$$

01.06.21.1022.01

$$\int z\sin^4(a\,z)\,dz = \frac{-16\cos(2\,a\,z)+\cos(4\,a\,z)+4\,a\,z\,(6\,a\,z-8\sin(2\,a\,z)+\sin(4\,a\,z))}{128\,a^2}$$

01.06.21.1023.01

$$\int z\sin^5(a\,z)\,dz = \frac{1}{3600\,a^2}(-2250\,a\,z\cos(a\,z)+375\,a\,z\cos(3\,a\,z)-45\,a\,z\cos(5\,a\,z)+2250\sin(a\,z)-125\sin(3\,a\,z)+9\sin(5\,a\,z))$$

01.06.21.1024.01

$$\int z^2\sin^2(a\,z)\,dz = \frac{4\,a^3\,z^3-6\,a\cos(2\,a\,z)\,z+\left(3-6\,a^2\,z^2\right)\sin(2\,a\,z)}{24\,a^3}$$

01.06.21.1025.01

$$\int z^2\sin^3(a\,z)\,dz = \frac{-81\left(a^2\,z^2-2\right)\cos(a\,z)+\left(9\,a^2\,z^2-2\right)\cos(3\,a\,z)-6\,a\,z\,(\sin(3\,a\,z)-27\sin(a\,z))}{108\,a^3}$$

01.06.21.1026.01

$$\int z^2\sin^4(a\,z)\,dz = \frac{1}{256\,a^3}\left(32\,a^3\,z^3-64\,a^2\sin(2\,a\,z)\,z^2+8\,a^2\sin(4\,a\,z)\,z^2-64\,a\cos(2\,a\,z)\,z+4\,a\cos(4\,a\,z)\,z+32\sin(2\,a\,z)-\sin(4\,a\,z)\right)$$

01.06.21.1027.01

$$\int z^2\sin^5(a\,z)\,dz = \frac{1}{54\,000\,a^3}\left(-675\,a^2\cos(5\,a\,z)\,z^2+67\,500\,a\sin(a\,z)\,z-3750\,a\sin(3\,a\,z)\,z+270\,a\sin(5\,a\,z)\,z-33\,750\left(a^2\,z^2-2\right)\cos(a\,z)+625\left(9\,a^2\,z^2-2\right)\cos(3\,a\,z)+54\cos(5\,a\,z)\right)$$

01.06.21.1028.01

$$\int z^2\sin^6(a\,z)\,dz = \frac{1}{13\,824\,a^3}\left(1440\,a^3\,z^3-3240\,a^2\sin(2\,a\,z)\,z^2+648\,a^2\sin(4\,a\,z)\,z^2-72\,a^2\sin(6\,a\,z)\,z^2-3240\,a\cos(2\,a\,z)\,z+324\,a\cos(4\,a\,z)\,z-24\,a\cos(6\,a\,z)\,z+1620\sin(2\,a\,z)-81\sin(4\,a\,z)+4\sin(6\,a\,z)\right)$$

01.06.21.1029.01

$$\int z^3\sin^2(a\,z)\,dz = \frac{2\,a^4\,z^4+\left(3-6\,a^2\,z^2\right)\cos(2\,a\,z)+\left(6\,a\,z-4\,a^3\,z^3\right)\sin(2\,a\,z)}{16\,a^4}$$

01.06.21.1030.01

$$\int z^3\sin^3(a\,z)\,dz = \frac{1}{108\,a^4}\left(-81\,a\,z\left(a^2\,z^2-6\right)\cos(a\,z)+3\,a\,z\left(3\,a^2\,z^2-2\right)\cos(3\,a\,z)-2\left(-117\,a^2\,z^2+\left(9\,a^2\,z^2-2\right)\cos(2\,a\,z)+242\right)\sin(a\,z)\right)$$

01.06.21.1031.01

$$\int z^3 \sin^4(a z)\, dz = \frac{1}{1024 a^4} \left(-192 \left(2 a^2 z^2 - 1\right) \cos(2 a z) + 3 \left(8 a^2 z^2 - 1\right) \cos(4 a z) + 4 a z \left(24 a^3 z^3 + \left(96 - 64 a^2 z^2\right) \sin(2 a z) + \left(8 a^2 z^2 - 3\right) \sin(4 a z)\right)\right)$$

01.06.21.1032.01

$$\int z^{n+\frac{1}{2}} \sin^\nu(a z)\, dz = \frac{2^{1-\nu} z^{n+\frac{3}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{2 n + 3} - (2 i)^{-\nu} z^{n+\frac{3}{2}} \sum_{j=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^j \binom{\nu}{j} \left(\left(\operatorname{erfc}\left(\sqrt{i a (2 j - \nu) z}\right) \Gamma\left(n + \frac{3}{2}\right) + e^{-i a (2 j - \nu) z} \sum_{k=0}^{n} \frac{(i a (2 j - \nu) z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} - e^{-i a (2 j - \nu) z} \sum_{k=n+1}^{-1} \frac{(i a (2 j - \nu) z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}}\right) (i a (2 j - \nu) z)^{-n-\frac{3}{2}} + (-1)^\nu (i a (\nu - 2 j) z)^{-n-\frac{3}{2}} \left(\operatorname{erfc}\left(\sqrt{i a (\nu - 2 j) z}\right) \Gamma\left(n + \frac{3}{2}\right) + e^{-i a (\nu - 2 j) z} \sum_{k=0}^{n} \frac{(i a (\nu - 2 j) z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} - e^{-i a (\nu - 2 j) z} \sum_{k=n+1}^{-1} \frac{(i a (\nu - 2 j) z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}}\right)\right) /;\ n \in \mathbb{Z} \land \nu \in \mathbb{N}^+$$

Involving $z^{\alpha-1} \sin^\nu(a z + b)$

01.06.21.1033.01

$$\int z^{\alpha-1} \sin^\nu(b + a z)\, dz = \frac{2^{-\nu} (1 - \nu \bmod 2) z^\alpha}{\alpha} \binom{\nu}{\frac{\nu}{2}} - 2^{-\nu} z^\alpha \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(a^2 (2 k - \nu)^2 z^2\right)^{-\alpha} \left(e^{-i\left(\frac{\pi \nu}{2} - b (\nu - 2 k)\right)} \Gamma(\alpha, i a (2 k - \nu) z) (-i a (2 k - \nu) z)^\alpha + e^{i\left(\frac{\pi \nu}{2} - b (\nu - 2 k)\right)} (i a (2 k - \nu) z)^\alpha \Gamma(\alpha, -i a (2 k - \nu) z)\right) /;\ \alpha \neq 0 \land n \in \mathbb{N}^+$$

01.06.21.1034.01

$$\int \frac{\sin^\nu(a z + b)}{z}\, dz = 2^{-\nu} \binom{\nu}{\frac{\nu}{2}} \log(z) (1 - \nu \bmod 2) + 2^{1-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\cos\left(\frac{\pi \nu}{2} - b (\nu - 2 k)\right) \operatorname{Ci}(a (2 k - \nu) z) - \sin\left(\frac{\pi \nu}{2} - b (\nu - 2 k)\right) \operatorname{Si}(a (2 k - \nu) z)\right) /;\ n \in \mathbb{N}^+$$

01.06.21.1035.01

$$\int z^{\alpha-1} \sin^2(a z + b)\, dz = \frac{1}{\alpha} \left(2^{-\alpha-2} z^\alpha \left(a^2 z^2\right)^{-\alpha} \left(\alpha \Gamma(\alpha, 2 i a z) (\cos(b) - i \sin(b))^2 (-i a z)^\alpha + 2^{\alpha+1} \left(a^2 z^2\right)^\alpha + (i a z)^\alpha \alpha \Gamma(\alpha, -2 i a z) (\cos(b) + i \sin(b))^2\right)\right)$$

01.06.21.1036.01

$$\int z^{\alpha-1} \sin^3(a z + b)\, dz = \frac{1}{8} i\, 3^{-\alpha} e^{-3 i b} z^\alpha \left(a^2 z^2\right)^{-\alpha} \left(-3^{\alpha+1} e^{2 i b} \Gamma(\alpha, i a z) (-i a z)^\alpha + \Gamma(\alpha, 3 i a z) (-i a z)^\alpha + 3^{\alpha+1} e^{4 i b} (i a z)^\alpha \Gamma(\alpha, -i a z) - e^{6 i b} (i a z)^\alpha \Gamma(\alpha, -3 i a z)\right)$$

01.06.21.1037.01

$$\int z^n \sin^\nu(a z+b)\, dz = n!\, \sin^\nu(a z+b) \left(1-e^{2 i (a z+b)}\right)^{-\nu} \sum_{j=0}^n \frac{(-1)^j z^{n-j}}{(n-j)!\, (-i a \nu)^{j+1}}\, {}_{j+2}F_{j+1}\left(-\frac{\nu}{2}, \ldots, -\frac{\nu}{2}, -\nu; 1-\frac{\nu}{2}, \ldots, 1-\frac{\nu}{2}; e^{2 i (a z+b)}\right) /; n \in \mathbb{N}$$

01.06.21.1038.01

$$\int z \sin^\nu(a z+b)\, dz = \frac{1}{2 a^2} \sin^{\nu+1}(b+a z) \left(2 b \cos(b+a z)\, {}_2F_1\left(\frac{1}{2}, \frac{1-\nu}{2}; \frac{3}{2}; \cos^2(b+a z)\right) \sin^2(b+a z)^{\frac{1}{2}(-\nu-1)} + \frac{2 (b+a z) \cos(b+a z)\, {}_2F_1\left(1, \frac{\nu+2}{2}; \frac{\nu+3}{2}; \sin^2(b+a z)\right)}{\nu+1} - 2^{-\nu-1} \sqrt{\pi}\, \Gamma(\nu+1)\, {}_3\tilde{F}_2\left(1, \frac{\nu+2}{2}, \frac{\nu+2}{2}; \frac{\nu+3}{2}, \frac{\nu+4}{2}; \sin^2(b+a z)\right) \sin(b+a z)\right)$$

01.06.21.1039.01

$$\int \frac{\sin^2(b+a z)}{z^2}\, dz = \frac{\cos(2 (b+a z)) + 2 a z \operatorname{Ci}(2 a z) \sin(2 b) + 2 a z \cos(2 b) \operatorname{Si}(2 a z) - 1}{2 z}$$

01.06.21.1040.01

$$\int \frac{\sin^2(a z+b)}{z}\, dz = \frac{1}{2} (-\cos(2 b) \operatorname{Ci}(2 a z) + \log(z) + \sin(2 b) \operatorname{Si}(2 a z))$$

01.06.21.1041.01

$$\int \frac{\sin^3(a z+b)}{z}\, dz = \frac{1}{4} (3 \operatorname{Ci}(a z) \sin(b) - \operatorname{Ci}(3 a z) \sin(3 b) + 3 \cos(b) \operatorname{Si}(a z) - \cos(3 b) \operatorname{Si}(3 a z))$$

01.06.21.1042.01

$$\int \frac{\sin^4(a z+b)}{z}\, dz = \frac{1}{8} (-4 \cos(2 b) \operatorname{Ci}(2 a z) + \cos(4 b) \operatorname{Ci}(4 a z) + 3 \log(z) + 4 \sin(2 b) \operatorname{Si}(2 a z) - \sin(4 b) \operatorname{Si}(4 a z))$$

01.06.21.1043.01

$$\int \frac{\sin^5(a z+b)}{z}\, dz = \frac{1}{16} (10 \operatorname{Ci}(a z) \sin(b) - 5 \operatorname{Ci}(3 a z) \sin(3 b) + \operatorname{Ci}(5 a z) \sin(5 b) + 10 \cos(b) \operatorname{Si}(a z) - 5 \cos(3 b) \operatorname{Si}(3 a z) + \cos(5 b) \operatorname{Si}(5 a z))$$

01.06.21.1044.01

$$\int z \sin^2(b+a z)\, dz = -\frac{\cos(2 (b+a z)) + 2 a z (\sin(2 (b+a z)) - a z)}{8 a^2}$$

01.06.21.1045.01

$$\int z \sin^3(b+a z)\, dz = \frac{3 a z (\cos(3 (b+a z)) - 9 \cos(b+a z)) + 27 \sin(b+a z) - \sin(3 (b+a z))}{36 a^2}$$

01.06.21.1046.01

$$\int z \sin^4(b+a z)\, dz = \frac{1}{128 a^2} (-16 \cos(2 (b+a z)) + \cos(4 (b+a z)) + 4 a z (6 a z - 8 \sin(2 (b+a z)) + \sin(4 (b+a z))))$$

01.06.21.1047.01

$$\int z\sin^5(b+a\,z)\,dz = \frac{1}{3600\,a^2}(9\sin(5\,(b+a\,z)) - 5\,(3\,a\,z\,(150\cos(b+a\,z) - 25\cos(3\,(b+a\,z)) + 3\cos(5\,(b+a\,z))) + 25\,(\sin(3\,(b+a\,z)) - 18\sin(b+a\,z))))$$

01.06.21.1048.01

$$\int z^2\sin^2(b+a\,z)\,dz = \frac{4\,a^3\,z^3 - 6\,a\cos(2\,(b+a\,z))\,z + \left(3 - 6\,a^2\,z^2\right)\sin(2\,(b+a\,z))}{24\,a^3}$$

01.06.21.1049.01

$$\int z^2\sin^3(b+a\,z)\,dz = \frac{1}{108\,a^3}\left(-81\left(a^2\,z^2-2\right)\cos(b+a\,z) + \left(9\,a^2\,z^2-2\right)\cos(3\,(b+a\,z)) - 6\,a\,z\,(\sin(3\,(b+a\,z)) - 27\sin(b+a\,z))\right)$$

01.06.21.1050.01

$$\int z^2\sin^4(b+a\,z)\,dz = \frac{1}{256\,a^3}\left(4\,a\,z\left(8\,a^2\,z^2 - 16\cos(2\,(b+a\,z)) + \cos(4\,(b+a\,z))\right) + 32\left(1-2\,a^2\,z^2\right)\sin(2\,(b+a\,z)) + \left(8\,a^2\,z^2-1\right)\sin(4\,(b+a\,z))\right)$$

01.06.21.1051.01

$$\int z^2\sin^5(b+a\,z)\,dz = \frac{1}{54\,000\,a^3}\left(-33\,750\left(a^2\,z^2-2\right)\cos(b+a\,z) + 625\left(9\,a^2\,z^2-2\right)\cos(3\,(b+a\,z)) + 54\cos(5\,(b+a\,z)) + 15\,a\,z\,(-45\,a\,z\cos(5\,(b+a\,z)) + 4500\sin(b+a\,z) - 250\sin(3\,(b+a\,z)) + 18\sin(5\,(b+a\,z)))\right)$$

01.06.21.1052.01

$$\int z^2\sin^6(b+a\,z)\,dz = \frac{1}{13\,824\,a^3}\left(12\,a\,z\left(120\,a^2\,z^2 - 270\cos(2\,(b+a\,z)) + 27\cos(4\,(b+a\,z)) - 2\cos(6\,(b+a\,z))\right) - 1620\left(2\,a^2\,z^2-1\right)\sin(2\,(b+a\,z)) + 81\left(8\,a^2\,z^2-1\right)\sin(4\,(b+a\,z)) + 4\left(1-18\,a^2\,z^2\right)\sin(6\,(b+a\,z))\right)$$

01.06.21.1053.01

$$\int z^3\sin^2(b+a\,z)\,dz = \frac{2\,a^4\,z^4 + \left(3-6\,a^2\,z^2\right)\cos(2\,(b+a\,z)) + \left(6\,a\,z - 4\,a^3\,z^3\right)\sin(2\,(b+a\,z))}{16\,a^4}$$

01.06.21.1054.01

$$\int z^3\sin^3(b+a\,z)\,dz = \frac{1}{108\,a^4}\left(-81\left(a^2\,z^2-6\right)a\,z\cos(b+a\,z) + \left(9\,a^3\,z^3 - 6\,a\,z\right)\cos(3\,(b+a\,z)) + 2\left(117\,a^2\,z^2 + \left(2-9\,a^2\,z^2\right)\cos(2\,(b+a\,z)) - 242\right)\sin(b+a\,z)\right)$$

01.06.21.1055.01

$$\int z^3\sin^4(b+a\,z)\,dz = \frac{1}{1024\,a^4}\left(192\left(1-2\,a^2\,z^2\right)\cos(2\,(b+a\,z)) + 3\left(8\,a^2\,z^2-1\right)\cos(4\,(b+a\,z)) + 4\,a\,z\left(24\,a^3\,z^3 + 32\left(3-2\,a^2\,z^2\right)\sin(2\,(b+a\,z)) + \left(8\,a^2\,z^2-3\right)\sin(4\,(b+a\,z))\right)\right)$$

01.06.21.1056.01

$$\int z^{n+\frac{1}{2}} \sin^{\nu}(a z+b)\, dz = \frac{2^{1-\nu}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\, z^{n+\frac{3}{2}}}{2n+3} - 2^{-\nu}\sqrt{z}\,(-i a)^{-n-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\left(\left((-1)^s\binom{\nu}{s}\right)\left(\left(e^{i\left(\frac{\pi\nu}{2}-b(\nu-2s)\right)}\sqrt{i a(2s-\nu)z}\,\operatorname{erfc}\left(\sqrt{-i a(2s-\nu)z}\right) - (-1)^n e^{-i\left(\frac{\pi\nu}{2}-b(\nu-2s)\right)}\sqrt{-i a(2s-\nu)z}\,\operatorname{erfc}\left(\sqrt{i a(2s-\nu)z}\right)\right)\Gamma\left(n+\frac{3}{2}\right) + e^{i\left(\frac{\pi\nu}{2}-b(\nu-2s)+a(2s-\nu)z\right)}\sqrt{i a(2s-\nu)z}\left(\sum_{k=0}^{n}\frac{(-i a(2s-\nu)z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - \sum_{k=n+1}^{-1}\frac{(-i a(2s-\nu)z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right) - (-1)^n e^{-i\left(\frac{\pi\nu}{2}-b(\nu-2s)+a(2s-\nu)z\right)}\sqrt{-i a(2s-\nu)z}\left(\sum_{k=0}^{n}\frac{(i a(2s-\nu)z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - \sum_{k=n+1}^{-1}\frac{(i a(2s-\nu)z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right)\right)\right) \Big/ \left((2s-\nu)^{n+1}\sqrt{a^2(2s-\nu)^2 z^2}\right) /;\ n\in\mathbb{Z}\land\alpha\neq 0\land\nu\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\sin^{\nu}(a z^r)$

01.06.21.1057.01

$$\int z^{\alpha-1}\sin^{\nu}(a z^r)\, dz = \frac{2^{-\nu}(1-\nu \bmod 2)}{\alpha} z^{\alpha}\binom{\nu}{\frac{\nu}{2}} - \frac{(2i)^{-\nu} z^{\alpha}}{r}\sum_{i=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^i\binom{\nu}{i}\left((-1)^{\nu}\Gamma\left(\frac{\alpha}{r}, -i a(2i-\nu)z^r\right)(-i a(2i-\nu)z^r)^{-\frac{\alpha}{r}} + (i a(2i-\nu)z^r)^{-\frac{\alpha}{r}}\Gamma\left(\frac{\alpha}{r}, i a(2i-\nu)z^r\right)\right) /;\ \nu\in\mathbb{N}^+$$

01.06.21.1058.01

$$\int \frac{\sin^{\nu}(a z^r)}{z}\, dz = 2^{-\nu}\binom{\nu}{\frac{\nu}{2}}\log(z)(1-\nu \bmod 2) + \frac{2^{1-\nu}}{r}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\cos\left(\frac{\pi\nu}{2}\right)\operatorname{Ci}(a(\nu-2k)z^r) + \sin\left(\frac{\pi\nu}{2}\right)\operatorname{Si}(a(\nu-2k)z^r)\right) /;\ \nu\in\mathbb{N}^+$$

01.06.21.1059.01

$$\int z^n \sin^{\nu}(a z^2)\, dz = \frac{2^{-\nu} z^{n+1}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)}{n+1} - 2^{-\nu-1} z^{n+1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(e^{-\frac{1}{2} i\pi\nu}\Gamma\left(\frac{n+1}{2}, -i a(\nu-2k)z^2\right)(-i a(\nu-2k)z^2)^{\frac{1}{2}(-n-1)} + e^{\frac{i\pi\nu}{2}}(i a(\nu-2k)z^2)^{\frac{1}{2}(-n-1)}\Gamma\left(\frac{n+1}{2}, i a(\nu-2k)z^2\right)\right) /;\ n\in\mathbb{Z}\land n\neq -1\land\nu\in\mathbb{N}^+$$

01.06.21.1060.01

$$\int z^{2n}\sin^{\nu}(a z^2)\,dz = \frac{2^{-\nu} z^{2n+1}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)}{2n+1} - i^{-\nu}2^{-\nu-1}z^{2n+1}\sum_{j=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^j\binom{\nu}{j}\left((-1)^{\nu}\left(\operatorname{erfc}\left(\sqrt{-i a(2j-\nu)z^2}\right)\Gamma\left(n+\frac{1}{2}\right)+e^{i a(2j-\nu)z^2}\sum_{k=0}^{n-1}\frac{\left(-i a(2j-\nu)z^2\right)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}} - e^{i a(2j-\nu)z^2}\sum_{k=n}^{-1}\frac{\left(-i a(2j-\nu)z^2\right)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}\right)\left(-i a(2j-\nu)z^2\right)^{\frac{1}{2}(-2n-1)} + \left(i a(2j-\nu)z^2\right)^{\frac{1}{2}(-2n-1)}\left(\operatorname{erfc}\left(\sqrt{i a(2j-\nu)z^2}\right)\Gamma\left(n+\frac{1}{2}\right)+e^{-i a(2j-\nu)z^2}\sum_{k=0}^{n-1}\frac{\left(i a(2j-\nu)z^2\right)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}} - e^{-i a(2j-\nu)z^2}\sum_{k=n}^{-1}\frac{\left(i a(2j-\nu)z^2\right)^{k+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{k-n+1}}\right)\right) /;\ n\in\mathbb{Z}\land \nu\in\mathbb{N}^+$$

01.06.21.1061.01

$$\int z^{2n-1}\sin^{\nu}(a z^2)\,dz = \frac{2^{-\nu-1} z^{2n}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)}{n} - i^{-\nu}2^{-\nu-1}z^{2n}\sum_{j=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^j\binom{\nu}{j}\left((-1)^{\nu}\left(-i a(2j-\nu)z^2\right)^{-n}\left(\frac{(-1)^{n-1}\operatorname{Ei}\left(i a(2j-\nu)z^2\right)}{(-n)!}+e^{i a(2j-\nu)z^2}\sum_{k=0}^{n-1}\frac{\left(-i a(2j-\nu)z^2\right)^{k}}{(n)_{k-n+1}} - e^{i a(2j-\nu)z^2}\sum_{k=n}^{-1}\frac{\left(-i a(2j-\nu)z^2\right)^{k}}{(n)_{k-n+1}}\right) + \left(i a(2j-\nu)z^2\right)^{-n}\left(\frac{(-1)^{n-1}\operatorname{Ei}\left(-i a(2j-\nu)z^2\right)}{(-n)!} + e^{-i a(2j-\nu)z^2}\sum_{k=0}^{n-1}\frac{\left(i a(2j-\nu)z^2\right)^{k}}{(n)_{k-n+1}} - e^{-i a(2j-\nu)z^2}\sum_{k=n}^{-1}\frac{\left(i a(2j-\nu)z^2\right)^{k}}{(n)_{k-n+1}}\right)\right) /;\ n\in\mathbb{Z}\land n\neq 0\land \nu\in\mathbb{N}^+$$

01.06.21.1062.01

$$\int z^n \sin^\nu\left(a\sqrt{z}\right) dz = \frac{2^{-\nu} z^{n+1} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{n+1} - i^{-\nu}\, 2^{1-\nu} z^{n+1} \sum_{j=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^j \binom{\nu}{j} \left(i\, a\,(2j-\nu)\sqrt{z}\right)^{-2(n+1)} \left(\frac{(-1)^{2(n+1)-1}\operatorname{Ei}\left(-i\, a\,(2j-\nu)\sqrt{z}\right)}{(-2(n+1))!} + (-1)^\nu \left(\frac{(-1)^{2(n+1)-1}\operatorname{Ei}\left(i\, a\,(2j-\nu)\sqrt{z}\right)}{(-2(n+1))!} + e^{i\, a\,(2j-\nu)\sqrt{z}} \sum_{k=0}^{2(n+1)-1} \frac{\left(-i\, a\,(2j-\nu)\sqrt{z}\right)^k}{(2(n+1))_{k-2(n+1)+1}} - e^{i\, a\,(2j-\nu)\sqrt{z}} \sum_{k=2(n+1)}^{-1} \frac{\left(-i\, a\,(2j-\nu)\sqrt{z}\right)^k}{(2(n+1))_{k-2(n+1)+1}}\right) + e^{-i\, a\,(2j-\nu)\sqrt{z}} \sum_{k=0}^{2(n+1)-1} \frac{\left(i\, a\,(2j-\nu)\sqrt{z}\right)^k}{(2(n+1))_{k-2(n+1)+1}} - e^{-i\, a\,(2j-\nu)\sqrt{z}} \sum_{k=2(n+1)}^{-1} \frac{\left(i\, a\,(2j-\nu)\sqrt{z}\right)^k}{(2(n+1))_{k-2(n+1)+1}}\right) /;\, n \in \mathbb{Z} \land n \neq 0 \land \nu \in \mathbb{N}^+$$

Involving $z^{\alpha-1} \sin^\nu\left(a\, z^r + b\right)$

01.06.21.1063.01

$$\int z^{\alpha-1} \sin^\nu(a\, z^r + b)\, dz = \frac{2^{-\nu} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)\, z^\alpha}{\alpha} - \frac{1}{r}\left((2^{-\nu} z^\alpha) \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{i\, b\,(\nu-2k) - \frac{i\pi\nu}{2}}\, \Gamma\left(\frac{\alpha}{r}, -i\, a\,(\nu-2k)\, z^r\right) (-i\, a\,(\nu-2k)\, z^r)^{-\frac{\alpha}{r}} + e^{\frac{i\pi\nu}{2} - i\, b\,(\nu-2k)} (i\, a\,(\nu-2k)\, z^r)^{-\frac{\alpha}{r}}\, \Gamma\left(\frac{\alpha}{r}, i\, a\,(\nu-2k)\, z^r\right)\right)\right) /;\, \alpha \neq 0 \land \nu \in \mathbb{N}^+$$

01.06.21.1064.01

$$\int \frac{\sin^\nu(a\, z^r + b)}{z}\, dz = 2^{-\nu} \binom{\nu}{\frac{\nu}{2}} \log(z)\,(1-\nu \bmod 2) + \frac{1}{r}\left(2^{-\nu} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{-\frac{1}{2} i\,(-4bk + 2b\nu + \pi\nu)} \left(e^{i\pi\nu}\operatorname{Ei}(-i\, a\,(\nu-2k)\, z^r) + e^{2\, i\, b\,(\nu-2k)}\operatorname{Ei}(i\, a\,(\nu-2k)\, z^r)\right)\right)\right) /;\, \nu \in \mathbb{N}^+$$

01.06.21.1065.01

$$\int z^n \sin^\nu\left(a\, z^2 + b\right) dz = \frac{2^{-\nu} z^{n+1} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{n+1} - 2^{-\nu-1} z^{n+1} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{i\, b\,(\nu-2k) - \frac{i\pi\nu}{2}}\, \Gamma\left(\frac{n+1}{2}, -i\, a\,(\nu-2k)\, z^2\right) \left(-i\, a\,(\nu-2k)\, z^2\right)^{\frac{1}{2}(-n-1)} + e^{\frac{i\pi\nu}{2} - i\, b\,(\nu-2k)} \left(i\, a\,(\nu-2k)\, z^2\right)^{\frac{1}{2}(-n-1)}\, \Gamma\left(\frac{n+1}{2}, i\, a\,(\nu-2k)\, z^2\right)\right) /;\, n \in \mathbb{Z} \land n \neq -1 \land \nu \in \mathbb{N}^+$$

01.06.21.1066.01

$$\int z^{2n}\sin^{\nu}(a z^2+b)\,dz = \frac{2^{-\nu} z^{2n+1}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)}{2n+1} - 2^{-\nu-1} z^{2n+1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(e^{i b(\nu-2k)-\frac{i\pi\nu}{2}}\left(\operatorname{erfc}\left(\sqrt{-i a(\nu-2k) z^2}\right)\Gamma\left(n+\frac{1}{2}\right)+\right.\right.$$

$$\left. e^{i a(\nu-2k) z^2}\sum_{j=0}^{n-1}\frac{\left(-i a(\nu-2k) z^2\right)^{j+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{j-n+1}} - e^{i a(\nu-2k) z^2}\sum_{j=n}^{-1}\frac{\left(-i a(\nu-2k) z^2\right)^{j+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{j-n+1}}\right)\left(-i a(\nu-2k) z^2\right)^{\frac{1}{2}(-2n-1)} +$$

$$e^{\frac{i\pi\nu}{2}-i b(\nu-2k)}\left(i a(\nu-2k) z^2\right)^{\frac{1}{2}(-2n-1)}\left(\operatorname{erfc}\left(\sqrt{i a(\nu-2k) z^2}\right)\Gamma\left(n+\frac{1}{2}\right)+\right.$$

$$\left.\left. e^{-i a(\nu-2k) z^2}\sum_{j=0}^{n-1}\frac{\left(i a(\nu-2k) z^2\right)^{j+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{j-n+1}} - e^{-i a(\nu-2k) z^2}\sum_{j=n}^{-1}\frac{\left(i a(\nu-2k) z^2\right)^{j+\frac{1}{2}}}{\left(n+\frac{1}{2}\right)_{j-n+1}}\right)\right) /;\, n\in\mathbb{Z}\bigwedge \nu\in\mathbb{N}^+$$

01.06.21.1067.01

$$\int z^{2n-1}\sin^{\nu}(a z^2+b)\,dz = \frac{2^{-\nu-1} z^{2n}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)}{n} - 2^{-\nu-1} z^{2n}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}$$

$$\left(e^{i b(\nu-2k)-\frac{i\pi\nu}{2}}\left(\frac{(-1)^{n-1}\operatorname{Ei}\left(i a(\nu-2k) z^2\right)}{(-n)!} + e^{i a(\nu-2k) z^2}\sum_{j=0}^{n-1}\frac{\left(-i a(\nu-2k) z^2\right)^j}{(n)_{j-n+1}} - e^{i a(\nu-2k) z^2}\sum_{j=n}^{-1}\frac{\left(-i a(\nu-2k) z^2\right)^j}{(n)_{j-n+1}}\right)\right.$$

$$\left(-i a(\nu-2k) z^2\right)^{-n} + e^{\frac{i\pi\nu}{2}-i b(\nu-2k)}\left(i a(\nu-2k) z^2\right)^{-n}\left(\frac{(-1)^{n-1}\operatorname{Ei}\left(-i a(\nu-2k) z^2\right)}{(-n)!}+\right.$$

$$\left.\left. e^{-i a(\nu-2k) z^2}\sum_{j=0}^{n-1}\frac{\left(i a(\nu-2k) z^2\right)^j}{(n)_{j-n+1}} - e^{-i a(\nu-2k) z^2}\sum_{j=n}^{-1}\frac{\left(i a(\nu-2k) z^2\right)^j}{(n)_{j-n+1}}\right)\right) /;\, n\in\mathbb{Z}\land n\neq 0\bigwedge \nu\in\mathbb{N}^+$$

01.06.21.1068.01

$$\int z^n \sin^\nu\left(\sqrt{z}\, a+b\right) dz = \frac{2^{-\nu} z^{n+1} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{n+1} - 2^{1-\nu} z^{n+1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{i b (\nu-2k) - \frac{i \pi \nu}{2}} \left(\frac{(-1)^{2(n+1)-1} \operatorname{Ei}\left(i a (\nu-2k) \sqrt{z}\right)}{(-2(n+1))!} + e^{i a (\nu-2k)\sqrt{z}} \sum_{j=0}^{2(n+1)-1} \frac{\left(-i a (\nu-2k) \sqrt{z}\right)^j}{(2(n+1))_{j-2(n+1)+1}} - e^{i a (\nu-2k)\sqrt{z}} \sum_{j=2(n+1)}^{-1} \frac{\left(-i a (\nu-2k) \sqrt{z}\right)^j}{(2(n+1))_{j-2(n+1)+1}} \right) \left(-i a (\nu-2k) \sqrt{z}\right)^{-2(n+1)} + e^{\frac{i \pi \nu}{2} - i b (\nu-2k)} \left(i a (\nu-2k) \sqrt{z}\right)^{-2(n+1)} \left(e^{-i a (\nu-2k)\sqrt{z}} \sum_{j=0}^{2(n+1)-1} \frac{\left(i a (\nu-2k) \sqrt{z}\right)^j}{(2(n+1))_{j-2(n+1)+1}} - e^{-i a (\nu-2k)\sqrt{z}} \sum_{j=2(n+1)}^{-1} \frac{\left(i a (\nu-2k) \sqrt{z}\right)^j}{(2(n+1))_{j-2(n+1)+1}} + \frac{(-1)^{2(n+1)-1} \operatorname{Ei}\left(-i a (\nu-2k) \sqrt{z}\right)}{(-2(n+1))!} \right) \right) /; n \in \mathbb{Z} \land n \neq -1 \bigwedge \nu \in \mathbb{N}^+$$

Involving $z^n \sin^\nu\left(c z^r + f z\right)$

01.06.21.1069.01

$$\int z^n \sin^\nu\left(c z^2 + f z\right) dz = 2^{-n-\nu-1} (-f)^n \left(\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{\nu-2k} \left((-1)^k e^{-\frac{i\left(f^2 (2k-\nu)^2 + 2 c \pi \nu (2k-\nu)\right)}{4 c (2k-\nu)}} (f(2k-\nu) + 2 c z (2k-\nu)) \binom{\nu}{k} \left(e^{\frac{i f^2 (2k-\nu)}{2c}} \sum_{j=0}^{n} \left(\frac{i (f(2k-\nu) + 2 c z (2k-\nu))^2}{c(2k-\nu)} \right)^{\frac{1}{2}(-j-1)} \left(-\frac{2 f (2k-\nu) + 4 c z (2k-\nu)}{f(2k-\nu)} \right)^j \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f(2k-\nu) + 2 c z (2k-\nu))^2}{4 c (2k-\nu)} \right) + e^{i \pi \nu} \sum_{j=0}^{n} \left(-\frac{i (f(2k-\nu) + 2 c z (2k-\nu))^2}{c(2k-\nu)} \right)^{\frac{1}{2}(-j-1)} \left(-\frac{2 f (2k-\nu) + 4 c z (2k-\nu)}{f(2k-\nu)} \right)^j \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (f(2k-\nu) + 2 c z (2k-\nu))^2}{4 c (2k-\nu)} \right) \right) \right) \right) c^{-n-1} + \frac{2^{-\nu} z^{n+1} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{n+1} /; n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

01.06.21.1070.01

$$\int z^n \sin^\nu\left(\sqrt{z}\, c + f\, z\right) dz = 2^{-\nu-1} f^{-2n-2} c^{2n} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{(2k-\nu)^2} \left((-1)^k 4^{-n} e^{-\frac{i(2k-\nu)c^2}{4f} - \frac{i\pi\nu}{2}} \binom{\nu}{k} \left(e^{\frac{i c^2 (2k-\nu)}{2f}} \sum_{j=0}^{n} \sum_{h=0}^{j} 4^j \left(-\frac{c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)}{c(2k-\nu)} \right)^{h+j} \right.\right.$$

$$\left(\frac{i\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right)^2}{f(2k-\nu)} \right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(c(2k-\nu)\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right) \right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right)^2}{4f(2k-\nu)} \right) + 2f\, i\,(2k-\nu)$$

$$\left. \sqrt{\frac{i\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right)^2}{f(2k-\nu)}}\; \Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right)^2}{4f(2k-\nu)} \right) \right) +$$

$$e^{i\pi\nu} \sum_{j=0}^{n} \sum_{h=0}^{j} 4^j \left(-\frac{c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)}{c(2k-\nu)} \right)^{h+j} \left(-\frac{i\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right)^2}{f(2k-\nu)} \right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}$$

$$\binom{n}{j} \left(c(2k-\nu)\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right)^2}{4f(2k-\nu)} \right) - \right.$$

$$2\,i\, f\,(2k-\nu) \sqrt{-\frac{i\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right)^2}{f(2k-\nu)}}\; \Gamma\left(\frac{1}{2}(h+j+2), \right.$$

$$\left.\left.\left.\left. -\frac{i\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right)^2}{4f(2k-\nu)} \right) \right) \right) \right) + \frac{2^{-\nu} z^{n+1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{n+1} \;/;\; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n \sin^\nu\left(c\, z^r + f\, z + g\right)$

01.06.21.1071.01

$$\int z^n \sin^\nu\left(c z^2 + f z + g\right) dz = 2^{-n-\nu-1} (-f)^n c^{-n-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{\nu - 2k} \Bigg((-1)^k e^{-\frac{i\left(f^2 (2k-\nu)^2 + 4c\left(\frac{\pi \nu}{2} - g(\nu-2k)\right)(2k-\nu)\right)}{4c(2k-\nu)}}$$

$$(f(2k-\nu) + 2cz(2k-\nu)) \binom{\nu}{k} \Bigg(e^{\frac{i f^2 (2k-\nu)}{2c}} \sum_{j=0}^{n} \left(\frac{i (f(2k-\nu) + 2cz(2k-\nu))^2}{c(2k-\nu)} \right)^{\frac{1}{2}(-j-1)}$$

$$\left(-\frac{2f(2k-\nu) + 4cz(2k-\nu)}{f(2k-\nu)} \right)^j \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f(2k-\nu) + 2cz(2k-\nu))^2}{4c(2k-\nu)} \right) +$$

$$e^{2i\left(\frac{\pi \nu}{2} - g(\nu-2k)\right)} \sum_{j=0}^{n} \left(-\frac{i (f(2k-\nu) + 2cz(2k-\nu))^2}{c(2k-\nu)} \right)^{\frac{1}{2}(-j-1)} \left(-\frac{2f(2k-\nu) + 4cz(2k-\nu)}{f(2k-\nu)} \right)^j$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (f(2k-\nu) + 2cz(2k-\nu))^2}{4c(2k-\nu)} \right) \Bigg) \Bigg) + \frac{2^{-\nu} z^{n+1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{n+1} \;/;\; n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

01.06.21.1072.01

$$\int z^n \sin^\nu\left(\sqrt{z}\, c + f\, z + g\right) dz = 2^{-\nu-1} f^{-2n-2} c^{2n} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{(2k-\nu)^2} \left((-1)^k 4^{-n} e^{-\frac{i(2k-\nu)c^2}{4f} - i\left(\frac{\pi\nu}{2} - g(\nu-2k)\right)} \binom{\nu}{k} \left(e^{\frac{i c^2 (2k-\nu)}{2f}} \sum_{j=0}^{n} \sum_{h=0}^{j} 4^j \left(-\frac{c(2k-\nu) + 2 f \sqrt{z}\,(2k-\nu)}{c(2k-\nu)} \right)^{h+j} \left(\frac{i\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right)^2}{f(2k-\nu)} \right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(c(2k-\nu)\left(c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(c(2k-\nu)+2f\sqrt{z}\,(2k-\nu)\right)^2}{4f(2k-\nu)} \right) + 2 f\, i\, (2k-\nu) \sqrt{\frac{i\left(c(2k-\nu)+2f\sqrt{z}\,(2k-\nu)\right)^2}{f(2k-\nu)}} \Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(c(2k-\nu)+2f\sqrt{z}\,(2k-\nu)\right)^2}{4f(2k-\nu)} \right) \right) + e^{2i\left(\frac{\pi\nu}{2} - g(\nu-2k)\right)} \sum_{j=0}^{n} \sum_{h=0}^{j} 4^j \left(-\frac{c(2k-\nu) + 2f\sqrt{z}\,(2k-\nu)}{c(2k-\nu)} \right)^{h+j} \left(-\frac{i\left(c(2k-\nu)+2f\sqrt{z}\,(2k-\nu)\right)^2}{f(2k-\nu)} \right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(c(2k-\nu)\left(c(2k-\nu)+2f\sqrt{z}\,(2k-\nu)\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(c(2k-\nu)+2f\sqrt{z}\,(2k-\nu)\right)^2}{4f(2k-\nu)} \right) - 2 i f (2k-\nu) \sqrt{-\frac{i\left(c(2k-\nu)+2f\sqrt{z}\,(2k-\nu)\right)^2}{f(2k-\nu)}} \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(c(2k-\nu)+2f\sqrt{z}\,(2k-\nu)\right)^2}{4f(2k-\nu)} \right) \right) \right) \right) + \frac{2^{-\nu} z^{n+1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{n+1} \;/;\; n \in \mathbb{N} \wedge \nu \in \mathbb{N}^+$$

Involving powers of the direct function and algebraic functions

Involving powers of sin and algebraic functions

Involving $(a z + b)^{\beta}$

01.06.21.1073.01

$$\int (a z+b)^{\beta} \sin^{\nu}(c z)\, dz = \frac{2^{-\nu} (b+a z)^{\beta+1} (1-\nu \bmod 2)}{a (\beta+1)} \binom{\nu}{\frac{\nu}{2}} - \frac{2^{-\nu} (b+a z)^{\beta+1}}{a} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(i^{\nu} e^{\frac{i b c (\nu-2k)}{a}} \left(\frac{i c (\nu-2k) (b+a z)}{a} \right)^{-\beta-1} \Gamma\left(\beta+1, \frac{i c (\nu-2k) (b+a z)}{a}\right) + i^{-\nu} e^{-\frac{i b c (\nu-2k)}{a}} \left(-\frac{i c (\nu-2k) (b+a z)}{a} \right)^{-\beta-1} \Gamma\left(\beta+1, -\frac{i c (\nu-2k) (b+a z)}{a}\right) \right) /; \nu \in \mathbb{N}$$

01.06.21.1074.01

$$\int (a z+b)^{\beta} \sin^{2}(c z)\, dz = \frac{1}{a c (\beta+1)} \left(2^{-\beta-3} (b+a z)^{\beta} \left(\frac{c^2 (b+a z)^2}{a^2} \right)^{-\beta} \left(a (\beta+1) \Gamma\left(\beta+1, -\frac{2 i c (b+a z)}{a}\right) \left(i \cos\left(\frac{2 b c}{a}\right) + \sin\left(\frac{2 b c}{a}\right) \right) \left(\frac{i c (b+a z)}{a} \right)^{\beta} + 2^{\beta+2} \left(\frac{c^2 (b+a z)^2}{a^2} \right)^{\beta} c (b+a z) + \left(-\frac{i c (b+a z)}{a} \right)^{\beta} a (\beta+1) \Gamma\left(\beta+1, \frac{2 i c (b+a z)}{a}\right) \left(\sin\left(\frac{2 b c}{a}\right) - i \cos\left(\frac{2 b c}{a}\right) \right) \right) \right)$$

01.06.21.1075.01

$$\int \frac{\sin^{\nu}(c z)}{\sqrt{a z+b}}\, dz = \frac{2^{1-\nu} \sqrt{b+a z}\, (1-\nu \bmod 2)}{a} \binom{\nu}{\frac{\nu}{2}} + \frac{2^{-\nu} \sqrt{\pi}}{a} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{i^{\nu}}{\sqrt{-\frac{i c (\nu-2k)}{a}}} e^{\frac{i b c (\nu-2k)}{a}} \operatorname{erfi}\left(\sqrt{-\frac{i c (\nu-2k)}{a}} \sqrt{b+a z} \right) + \frac{i^{-\nu}}{\sqrt{\frac{i c (\nu-2k)}{a}}} e^{-\frac{i b c (\nu-2k)}{a}} \operatorname{erfi}\left(\sqrt{\frac{i c (\nu-2k)}{a}} \sqrt{b+a z} \right) \right) /; \nu \in \mathbb{N}$$

01.06.21.1076.01

$$\int \frac{\sin^{2}(c z)}{\sqrt{a z+b}}\, dz = \frac{1}{2 c} \sqrt{\frac{c}{a}} \left(-\sqrt{\pi} \cos\left(\frac{2 b c}{a}\right) C\left(\frac{2 \sqrt{\frac{c}{a}} \sqrt{b+a z}}{\sqrt{\pi}} \right) - \sqrt{\pi}\, S\left(\frac{2 \sqrt{\frac{c}{a}} \sqrt{b+a z}}{\sqrt{\pi}} \right) \sin\left(\frac{2 b c}{a}\right) + 2 \sqrt{\frac{c}{a}} \sqrt{b+a z} \right)$$

Involving products of the direct function and a power function

Involving products of two direct functions and a power function

Involving $z^{\alpha-1}\sin(c\,z)\sin(a\,z)$

01.06.21.1077.01

$$\int z^{\alpha-1}\sin(c\,z)\sin(a\,z)\,dz = -\frac{1}{4}z^{\alpha}\left(\Gamma(\alpha,-i(a-c)z)(-i(a-c)z)^{-\alpha} + (i(a-c)z)^{-\alpha}\,\Gamma(\alpha,i(a-c)z) - (-i(a+c)z)^{-\alpha}\,\Gamma(\alpha,-i(a+c)z) - (i(a+c)z)^{-\alpha}\,\Gamma(\alpha,i(a+c)z)\right)$$

01.06.21.1078.01

$$\int z^{n}\sin(c\,z)\sin(a\,z)\,dz = \frac{1}{4}n!\left(-(-i(a-c))^{-n-1}e^{i(a-c)z}\sum_{k=0}^{n}\frac{(-i(a-c)z)^k}{k!} - (i(a-c))^{-n-1}e^{-i(a-c)z}\sum_{k=0}^{n}\frac{(i(a-c)z)^k}{k!} + (-i(a+c))^{-n-1}e^{i(a+c)z}\sum_{k=0}^{n}\frac{(-i(a+c)z)^k}{k!} + (i(a+c))^{-n-1}e^{-i(a+c)z}\sum_{k=0}^{n}\frac{(i(a+c)z)^k}{k!}\right)/;\ n\in\mathbb{N}$$

01.06.21.1079.01

$$\int z^{-n}\sin(c\,z)\sin(a\,z)\,dz = -\frac{i}{4\left(c^2-a^2\right)(n-1)!}\left(e^{-i(a-c)z}\left(-(a+c)(n-1)!\,(i(a-c))^n\sum_{k=1}^{n-1}\frac{(i(a-c))^{k-n}z^{k-n}}{(1-n)_k} + (-1)^n e^{i(a-c)z}\left((a+c)\,\text{Ei}(-i(a-c)z)(i(a-c))^n + (a-c)(-i(a+c))^n\,\text{Ei}(i(a+c)z)\right) - (a-c)(-i(a+c))^n e^{2iaz}(n-1)!\sum_{k=1}^{n-1}\frac{(-i(a+c))^{k-n}z^{k-n}}{(1-n)_k}\right) + e^{-i(2a+c)z}\left((a+c)e^{3iaz}(n-1)!\,(-i(a-c))^n\sum_{k=1}^{n-1}\frac{(-i(a-c))^{k-n}z^{k-n}}{(1-n)_k} - (-1)^n e^{i(2a+c)z}\left((a+c)\,\text{Ei}(i(a-c)z)(-i(a-c))^n + (a-c)(i(a+c))^n\,\text{Ei}(-i(a+c)z)\right) + (a-c)(i(a+c))^n e^{iaz}(n-1)!\sum_{k=1}^{n-1}\frac{(i(a+c))^{k-n}z^{k-n}}{(1-n)_k}\right)\right)/;\ n\in\mathbb{N}^+$$

01.06.21.1080.01

$$\int\frac{\sin(c\,z)\sin(a\,z)}{z}\,dz = \frac{1}{2}\left(\text{Ci}((a-c)z) - \text{Ci}((a+c)z)\right)$$

Involving $z^{\alpha-1}\sin(c\,z)\sin(a\,z+b)$

01.06.21.1081.01

$$\int z^{\alpha-1}\sin(c\,z)\sin(b+a\,z)\,dz = \frac{1}{4}e^{-ib}z^{\alpha}\left(-e^{2ib}\,\Gamma(\alpha,-i(a-c)z)(-i(a-c)z)^{-\alpha} - (i(a-c)z)^{-\alpha}\,\Gamma(\alpha,i(a-c)z) + e^{2ib}(-i(a+c)z)^{-\alpha}\,\Gamma(\alpha,-i(a+c)z) + (i(a+c)z)^{-\alpha}\,\Gamma(\alpha,i(a+c)z)\right)$$

Involving $z^{\alpha-1}\sin(c\,z+d)\sin(a\,z+b)$

01.06.21.1082.01

$$\int z^{\alpha-1}\sin(d+c\,z)\sin(b+a\,z)\,dz = -\frac{1}{4}\,e^{-i(b+d)}\,z^{\alpha}\left(e^{2ib}\,\Gamma(\alpha,\,-i(a-c)z)\,(-i(a-c)z)^{-\alpha} + e^{2id}\,(i(a-c)z)^{-\alpha}\,\Gamma(\alpha,\,i(a-c)z) - e^{2i(b+d)}\,(-i(a+c)z)^{-\alpha}\,\Gamma(\alpha,\,-i(a+c)z) - (i(a+c)z)^{-\alpha}\,\Gamma(\alpha,\,i(a+c)z)\right)$$

Involving $z^n \sin(d\,z)\sin(c\,z^r)$

01.06.21.1083.01

$$\int z^n \sin(d\,z)\sin(c\,z^2)\,dz = \frac{1}{8\,c^{n+1}}\,i\,e^{-\frac{i d^2}{4c}}\left(-(-i)^n\sum_{j=0}^{n}2^{j-n}(-i\,d)^{n-j}\,(i(d+2cz))^{j+1}\left(-\frac{i(d+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,-\frac{i(d+2cz)^2}{4c}\right) + (-i)^n\sum_{j=0}^{n}2^{j-n}(i\,d)^{n-j}\,(-i(d-2cz))^{j+1}\left(-\frac{i(d-2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,-\frac{i(d-2cz)^2}{4c}\right) + e^{\frac{i d^2}{2c}}\,i^n\sum_{j=0}^{n}2^{j-n}(i\,d)^{n-j}\,(-i(d+2cz))^{j+1}\left(\frac{i(d+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,\frac{i(d+2cz)^2}{4c}\right) - i^n\,e^{\frac{i d^2}{2c}}\sum_{j=0}^{n}2^{j-n}(-i\,d)^{n-j}\,(i(d-2cz))^{j+1}\left(\frac{i(d-2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,\frac{i(d-2cz)^2}{4c}\right)\right)\,/;\,n\in\mathbb{N}$$

01.06.21.1084.01

$$\int z^n \sin(e+d\,z)\sin\!\left(c\sqrt{z}\right)dz = -2^{-2n-3}\,(i\,d)^{-2n-2}\left(-e^{i e-\frac{i c^2}{4d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2n}\left(-i\,c+2\,i\,d\sqrt{z}\right)^{h+j}\left(\frac{i\left(-i\,c+2\,i\,d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(2\,i\,d\sqrt{\frac{i\left(-i\,c+2\,i\,d\sqrt{z}\right)^2}{d}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,\frac{i\left(-i\,c+2\,i\,d\sqrt{z}\right)^2}{4d}\right) - i\,c\left(-i\,c+2\,i\,d\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,\frac{i\left(-i\,c+2\,i\,d\sqrt{z}\right)^2}{4d}\right)\right) + e^{i e-\frac{i c^2}{4d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2n}\left(i\,c+2\,i\,d\sqrt{z}\right)^{h+j}\left(\frac{i\left(i\,c+2\,i\,d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(c\,i\left(i\,c+2\,i\,d\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(i c+2 i d \sqrt{z}\right)^2}{4 d}\right)+2 \sqrt{\frac{i\left(i c+2 i d \sqrt{z}\right)^2}{d}}\; d\, i\, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(i c+2 i d \sqrt{z}\right)^2}{4 d}\right)\Bigg)+$$

$$e^{\frac{i c^2}{4 d}-i e} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c)^{-h-j+2 n} \left(-i c-2 i d \sqrt{z}\right)^{h+j} \left(-\frac{i\left(-i c-2 i d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}$$

$$\binom{n}{j}\Bigg(-i c\left(-i c-2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(-i c-2 i d \sqrt{z}\right)^2}{4 d}\right)-$$

$$2 i d \sqrt{-\frac{i\left(-i c-2 i d \sqrt{z}\right)^2}{d}}\; \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(-i c-2 i d \sqrt{z}\right)^2}{4 d}\right)\Bigg)-$$

$$e^{\frac{i c^2}{4 d}-i e} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i c)^{-h-j+2 n} \left(i c-2 i d \sqrt{z}\right)^{h+j} \left(-\frac{i\left(i c-2 i d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}$$

$$\binom{n}{j}\Bigg(i c\left(i c-2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(i c-2 i d \sqrt{z}\right)^2}{4 d}\right)-$$

$$2 i d \sqrt{-\frac{i\left(i c-2 i d \sqrt{z}\right)^2}{d}}\; \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(i c-2 i d \sqrt{z}\right)^2}{4 d}\right)\Bigg)\Bigg) /; n \in \mathbb{N}$$

Involving $z^n \sin(d z+e) \sin\left(c z^r\right)$

01.06.21.1085.01

$$\int z^n \sin(d z + e) \sin(c z^2)\, dz = \frac{1}{8}\left((-i c)^{-n-1} e^{\frac{i d^2}{4c} - i e} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d - 2 i c z)^{j+1} \left(-\frac{i(-i d - 2 i c z)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(-i d - 2 i c z)^2}{4c}\right) - (-i c)^{-n-1} e^{\frac{i d^2}{4c} + i e} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d - 2 i c z)^{j+1} \left(-\frac{i(i d - 2 i c z)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(i d - 2 i c z)^2}{4c}\right) - (i c)^{-n-1} e^{-\frac{i d^2}{4c} - i e} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d + 2 i c z)^{j+1} \left(\frac{i(-i d + 2 i c z)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(-i d + 2 i c z)^2}{4c}\right) + (i c)^{-n-1} e^{i e - \frac{i d^2}{4c}} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 i c z)^{j+1} \left(\frac{i(i d + 2 i c z)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(i d + 2 i c z)^2}{4c}\right)\right) /; n \in \mathbb{N}$$

01.06.21.1086.01

$$\int z^n \sin(e + d z) \sin(c \sqrt{z})\, dz = -2^{-2n-3} (i d)^{-2n-2} \left(-e^{i e - \frac{i c^2}{4d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c)^{-h-j+2n} \left(-i c + 2 i d \sqrt{z}\right)^{h+j} \left(\frac{i\left(-i c + 2 i d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(2 i d \sqrt{\frac{i\left(-i c + 2 i d \sqrt{z}\right)^2}{d}}\, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(-i c + 2 i d \sqrt{z}\right)^2}{4d}\right) - i c \left(-i c + 2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(-i c + 2 i d \sqrt{z}\right)^2}{4d}\right)\right) + e^{i e - \frac{i c^2}{4d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i c)^{-h-j+2n} \left(i c + 2 i d \sqrt{z}\right)^{h+j} \left(\frac{i\left(i c + 2 i d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(c i \left(i c + 2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(i c + 2 i d \sqrt{z}\right)^2}{4d}\right) + 2 \sqrt{\frac{i\left(i c + 2 i d \sqrt{z}\right)^2}{d}}\, d\, i\, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(i c + 2 i d \sqrt{z}\right)^2}{4d}\right)\right) + \right.$$

$$e^{\frac{i c^2}{4 d} - i e} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c)^{-h-j+2n} \left(-i c - 2 i d \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i c - 2 i d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}$$

$$\binom{n}{j} \left(-i c \left(-i c - 2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(-i c - 2 i d \sqrt{z}\right)^2}{4 d}\right) -\right.$$

$$\left.\left. 2 i d \sqrt{-\frac{i \left(-i c - 2 i d \sqrt{z}\right)^2}{d}} \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i \left(-i c - 2 i d \sqrt{z}\right)^2}{4 d}\right)\right)\right) -$$

$$e^{\frac{i c^2}{4 d} - i e} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i c)^{-h-j+2n} \left(i c - 2 i d \sqrt{z}\right)^{h+j} \left(-\frac{i \left(i c - 2 i d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}$$

$$\binom{n}{j} \left(i c \left(i c - 2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(i c - 2 i d \sqrt{z}\right)^2}{4 d}\right) -\right.$$

$$\left.\left.\left. 2 i d \sqrt{-\frac{i \left(i c - 2 i d \sqrt{z}\right)^2}{d}} \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i \left(i c - 2 i d \sqrt{z}\right)^2}{4 d}\right)\right)\right)\right) /; n \in \mathbb{N}$$

Involving $z^{\alpha-1} \sin(b z^r) \sin(c z^r)$

01.06.21.1087.01

$$\int z^{\alpha-1} \sin(b z^r) \sin(c z^r) \, dz = \frac{z^\alpha}{4 r} \left(-\Gamma\left(\frac{\alpha}{r}, (-i b + i c) z^r\right) ((-i b + i c) z^r)^{-\frac{\alpha}{r}} + \right.$$

$$\left. ((i b + i c) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (i b + i c) z^r\right) + ((-i b - i c) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-i b - i c) z^r\right) - ((i b - i c) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (i b - i c) z^r\right)\right)$$

01.06.21.1088.01

$$\int z^n \sin(b z^2) \sin(c z^2) \, dz =$$

$$-\frac{1}{8} z^{n+1} \left(\Gamma\left(\frac{n+1}{2}, (-i b + i c) z^2\right) \left((-i b + i c) z^2\right)^{\frac{1}{2}(-n-1)} - \left((i b + i c) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (i b + i c) z^2\right) - \right.$$

$$\left. \left((-i b - i c) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (-i b - i c) z^2\right) + \left((i b - i c) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (i b - i c) z^2\right)\right) /; n \in \mathbb{N}$$

01.06.21.1089.01

$$\int z^n \sin\left(\sqrt{z}\; b\right) \sin\left(\sqrt{z}\; c\right) dz = \frac{1}{2} \left(-\Gamma\left(2(n+1), (-i b + i c)\sqrt{z}\right)(-i b + i c)^{-2(n+1)} + (i b + i c)^{-2(n+1)}\, \Gamma\left(2(n+1), (i b + i c)\sqrt{z}\right) + (-i b - i c)^{-2(n+1)}\, \Gamma\left(2(n+1), (-i b - i c)\sqrt{z}\right) - (i b - i c)^{-2(n+1)}\, \Gamma\left(2(n+1), (i b - i c)\sqrt{z}\right)\right) /; n \in \mathbb{N}$$

Involving $z^n \sin(d\, z) \sin\left(c\, z^r + g\right)$

01.06.21.1090.01

$$\int z^n \sin(d\, z) \sin\left(c\, z^2 + g\right) dz = \frac{1}{8} i\, c^{-2n-1} e^{-\frac{i\left(d^2+4 c g\right)}{4c}} \left(e^{2 i g} \left(\sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (i (2 c z - d))^{j+1} \left(-\frac{i (2 c z - d)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (2 c z - d)^2}{4 c}\right)\right)(-i c)^n - e^{2 i g} \left(\sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i (d + 2 c z))^{j+1} \left(-\frac{i (d + 2 c z)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (d + 2 c z)^2}{4 c}\right)\right)(-i c)^n - (i c)^n e^{\frac{i d^2}{2c}} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (-i (2 c z - d))^{j+1} \left(\frac{i (2 c z - d)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (2 c z - d)^2}{4 c}\right) + (i c)^n e^{\frac{i d^2}{2c}} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i (d + 2 c z))^{j+1} \left(\frac{i (d + 2 c z)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (d + 2 c z)^2}{4 c}\right)\right) /; n \in \mathbb{N}$$

01.06.21.1091.01

$$\int z^n \sin(d\,z)\sin\left(\sqrt{z}\;c+g\right)dz = (-1)^n\,2^{-2n-3}\,d^{-2(n+1)}\,e^{-\frac{i\left(c^2+4dg\right)}{4d}}$$

$$\Bigg(-e^{\frac{i c^2}{2d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2n}\left(-i\left(c+2d\sqrt{z}\right)\right)^{h+j}\left(\frac{i\left(c+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(c\left(c+2d\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(c+2d\sqrt{z}\right)^2}{4d}\right)+2\sqrt{\frac{i\left(c+2d\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(c+2d\sqrt{z}\right)^2}{4d}\right)\Bigg)+$$

$$e^{\frac{i\left(c^2+4dg\right)}{2d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2n}\left(i\left(c-2d\sqrt{z}\right)\right)^{h+j}\left(\frac{i\left(c-2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(c\left(c-2d\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(c-2d\sqrt{z}\right)^2}{4d}\right)+2\sqrt{\frac{i\left(c-2d\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(c-2d\sqrt{z}\right)^2}{4d}\right)\Bigg)+$$

$$e^{2ig}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2n}\left(i\left(c+2d\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(c+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(2\,i\,d\sqrt{-\frac{i\left(c+2d\sqrt{z}\right)^2}{d}}$$

$$\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(c+2d\sqrt{z}\right)^2}{4d}\right)-c\left(c+2d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(c+2d\sqrt{z}\right)^2}{4d}\right)\Bigg)+$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2n}\left(-i\left(c-2d\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(c-2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg(c\left(c-2d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(c-2d\sqrt{z}\right)^2}{4d}\right)-$$

$$2\,i\,d\sqrt{-\frac{i\left(c-2d\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(c-2d\sqrt{z}\right)^2}{4d}\right)\Bigg)\Bigg)\;/;\;n\in\mathbb{N}$$

Involving $z^n \sin(d\,z+e)\sin\left(c\,z^r+g\right)$

01.06.21.1092.01

$$\int z^n \sin(e+d\,z)\sin\left(c\,z^2+g\right)dz = \frac{1}{8}\,i\,c^{-2n-1}\,e^{-\frac{i\left(d^2+4c(e+g)\right)}{4c}}$$

$$\left(e^{2ig}\left(\sum_{j=0}^{n} 2^{j-n}(i\,d)^{n-j}(i(2cz-d))^{j+1}\left(-\frac{i(2cz-d)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i(2cz-d)^2}{4c}\right)\right)(-i\,c)^n-\right.$$

$$e^{2i(e+g)}\left(\sum_{j=0}^{n} 2^{j-n}(-i\,d)^{n-j}(i(d+2cz))^{j+1}\left(-\frac{i(d+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i(d+2cz)^2}{4c}\right)\right)(-i\,c)^n-$$

$$(i\,c)^n\,e^{\frac{i\left(d^2+4ce\right)}{2c}}\sum_{j=0}^{n} 2^{j-n}(-i\,d)^{n-j}(-i(2cz-d))^{j+1}\left(\frac{i(2cz-d)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i(2cz-d)^2}{4c}\right)+$$

$$\left.(i\,c)^n\,e^{\frac{i\,d^2}{2c}}\sum_{j=0}^{n} 2^{j-n}(i\,d)^{n-j}(-i(d+2cz))^{j+1}\left(\frac{i(d+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i(d+2cz)^2}{4c}\right)\right)\;/;\;n\in\mathbb{N}$$

01.06.21.1093.01

$$\int z^n \sin(d\,z+e)\sin\left(\sqrt{z}\;c+g\right)dz = (-1)^n\,2^{-2n-3}\,d^{-2(n+1)}\,e^{-\frac{i\left(c^2+4d(e+g)\right)}{4d}}$$

$$\left(-e^{\frac{i\,c^2}{2d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2n}\left(-i\left(c+2d\sqrt{z}\right)\right)^{h+j}\left(\frac{i\left(c+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(c\left(c+2d\sqrt{z}\right)\right.\right.$$

$$\left.\Gamma\left(\frac{1}{2}(h+j+1),\frac{i\left(c+2d\sqrt{z}\right)^2}{4d}\right)+2\sqrt{\frac{i\left(c+2d\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(c+2d\sqrt{z}\right)^2}{4d}\right)\right)+$$

$$e^{\frac{i\left(c^2+4dg\right)}{2d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2n}\left(i\left(c-2d\sqrt{z}\right)\right)^{h+j}\left(\frac{i\left(c-2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(c\left(c-2d\sqrt{z}\right)\right.$$

$$\left.\Gamma\left(\frac{1}{2}(h+j+1),\frac{i\left(c-2d\sqrt{z}\right)^2}{4d}\right)+2\sqrt{\frac{i\left(c-2d\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(c-2d\sqrt{z}\right)^2}{4d}\right)\right)+$$

$$e^{2i(e+g)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2n}\left(i\left(c+2d\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(c+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(2\,i\,d\sqrt{-\frac{i\left(c+2\,d\sqrt{z}\right)^2}{d}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(c+2\,d\sqrt{z}\right)^2}{4\,d}\right)-\right.$$

$$\left.\left.c\left(c+2\,d\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(c+2\,d\sqrt{z}\right)^2}{4\,d}\right)\right)\right)+$$

$$e^{2\,i\,e}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2\,n}\left(-i\left(c-2\,d\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(c-2\,d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\left(c\left(c-2\,d\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(c-2\,d\sqrt{z}\right)^2}{4\,d}\right)-\right.$$

$$\left.\left.2\,i\,d\sqrt{-\frac{i\left(c-2\,d\sqrt{z}\right)^2}{d}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(c-2\,d\sqrt{z}\right)^2}{4\,d}\right)\right)\right)\text{/; } n\in\mathbb{N}$$

Involving $z^{\alpha-1}\sin(b\,z^r)\sin(c\,z^r+g)$

01.06.21.1094.01

$$\int z^{\alpha-1}\sin(b\,z^r)\sin(c\,z^r+g)\,dz=$$
$$\frac{1}{4\,r}z^{\alpha}\left(-e^{-i\,g}\,\Gamma\!\left(\frac{\alpha}{r},\,(-i\,b+i\,c)\,z^r\right)((-i\,b+i\,c)\,z^r)^{-\frac{\alpha}{r}}+e^{-i\,g}\,((i\,b+i\,c)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(i\,b+i\,c)\,z^r\right)+\right.$$
$$\left.e^{i\,g}\,((-i\,b-i\,c)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(-i\,b-i\,c)\,z^r\right)-e^{i\,g}\,((i\,b-i\,c)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(i\,b-i\,c)\,z^r\right)\right)$$

01.06.21.1095.01

$$\int z^n\sin(b\,z^2)\sin(c\,z^2+g)\,dz=$$
$$-\frac{1}{8}z^{n+1}\left(e^{-i\,g}\,\Gamma\!\left(\frac{n+1}{2},\,(-i\,b+i\,c)\,z^2\right)\left((-i\,b+i\,c)\,z^2\right)^{\frac{1}{2}(-n-1)}-e^{-i\,g}\left((i\,b+i\,c)\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\!\left(\frac{n+1}{2},\,(i\,b+i\,c)\,z^2\right)-\right.$$
$$\left.e^{i\,g}\left((-i\,b-i\,c)\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\!\left(\frac{n+1}{2},\,(-i\,b-i\,c)\,z^2\right)+e^{i\,g}\left((i\,b-i\,c)\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\!\left(\frac{n+1}{2},\,(i\,b-i\,c)\,z^2\right)\right)\text{/; } n\in\mathbb{N}$$

01.06.21.1096.01

$$\int z^n\sin\left(\sqrt{z}\;b\right)\sin\left(\sqrt{z}\;c+g\right)dz=$$
$$\frac{1}{2}\left(-e^{-i\,g}\,\Gamma\!\left(2\,(n+1),\,(-i\,b+i\,c)\sqrt{z}\right)(-i\,b+i\,c)^{-2\,(n+1)}+(i\,b+i\,c)^{-2\,(n+1)}\,e^{-i\,g}\,\Gamma\!\left(2\,(n+1),\,(i\,b+i\,c)\sqrt{z}\right)+\right.$$
$$\left.(-i\,b-i\,c)^{-2\,(n+1)}\,e^{i\,g}\,\Gamma\!\left(2\,(n+1),\,(-i\,b-i\,c)\sqrt{z}\right)-(i\,b-i\,c)^{-2\,(n+1)}\,e^{i\,g}\,\Gamma\!\left(2\,(n+1),\,(i\,b-i\,c)\sqrt{z}\right)\right)\text{/; } n\in\mathbb{N}$$

Involving $z^{\alpha-1}\sin(b z^r + e)\sin(c z^r + g)$

01.06.21.1097.01

$$\int z^{\alpha-1}\sin(b z^r+e)\sin(c z^r+g)\,dz = \frac{z^\alpha}{4r}\left(-e^{-i g+i e}\,\Gamma\left(\frac{\alpha}{r},(-i b+i c) z^r\right)((-i b+i c) z^r)^{-\frac{\alpha}{r}}+e^{-i g-i e}((i b+i c) z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},(i b+i c) z^r\right)+ e^{i g+i e}((-i b-i c) z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},(-i b-i c) z^r\right)-e^{i g-i e}((i b-i c) z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},(i b-i c) z^r\right)\right)$$

01.06.21.1098.01

$$\int z^n\sin(b z^2+e)\sin(c z^2+g)\,dz = -\frac{1}{8} z^{n+1}\left(e^{i e-i g}\,\Gamma\left(\frac{n+1}{2},(-i b+i c) z^2\right)\left((-i b+i c) z^2\right)^{\frac{1}{2}(-n-1)}-e^{-i e-i g}\left((i b+i c) z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\left(\frac{n+1}{2},(i b+i c) z^2\right)- e^{i e+i g}\left((-i b-i c) z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\left(\frac{n+1}{2},(-i b-i c) z^2\right)+e^{-i e+i g}\left((i b-i c) z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\left(\frac{n+1}{2},(i b-i c) z^2\right)\right) /; n\in\mathbb{N}$$

01.06.21.1099.01

$$\int z^n\sin(\sqrt{z}\,b+e)\sin(\sqrt{z}\,c+g)\,dz = \frac{1}{2}\left(-e^{i e-i g}\,\Gamma\left(2(n+1),(-i b+i c)\sqrt{z}\right)(-i b+i c)^{-2(n+1)}+(i b+i c)^{-2(n+1)}e^{-i e-i g}\,\Gamma\left(2(n+1),(i b+i c)\sqrt{z}\right)+ (-i b-i c)^{-2(n+1)}e^{i e+i g}\,\Gamma\left(2(n+1),(-i b-i c)\sqrt{z}\right)-(i b-i c)^{-2(n+1)}e^{-i e+i g}\,\Gamma\left(2(n+1),(i b-i c)\sqrt{z}\right)\right) /; n\in\mathbb{N}$$

Involving $z^n\sin(d z)\sin(c z^r + f z)$

01.06.21.1100.01

$$\int z^n\sin(d z)\sin(c z^2+f z)\,dz = \frac{1}{8} i c^{-2n-1} e^{-\frac{i(d+f)^2}{4c}} \left(e^{\frac{i d f}{c}}\left(\sum_{j=0}^n 2^{j-n}(i(d-f))^{n-j}(i(-d+f+2cz))^{j+1}\left(-\frac{i(-d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i(-d+f+2cz)^2}{4c}\right)\right)\right.$$
$$(-i c)^n-\left(\sum_{j=0}^n 2^{j-n}(-i(d+f))^{n-j}(i(d+f+2cz))^{j+1}\left(-\frac{i(d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i(d+f+2cz)^2}{4c}\right)\right)$$
$$(-i c)^n-(i c)^n e^{\frac{i(d^2+f^2)}{2c}}$$
$$\sum_{j=0}^n 2^{j-n}(-i(d-f))^{n-j}(-i(-d+f+2cz))^{j+1}\left(\frac{i(-d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i(-d+f+2cz)^2}{4c}\right)+(i c)^n$$
$$\left. e^{\frac{i(d+f)^2}{2c}}\sum_{j=0}^n 2^{j-n}(i(d+f))^{n-j}(-i(d+f+2cz))^{j+1}\left(\frac{i(d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i(d+f+2cz)^2}{4c}\right)\right) /; n\in\mathbb{N}$$

01.06.21.1101.01

$$\int z^n \sin(d\,z)\sin\left(\sqrt{z}\;c+f\,z+g\right)dz = (-1)^n\,2^{-2n-3}\,e^{-i g}\Bigg(e^{\frac{i c^2}{4f-4d}}\Bigg(e^{\frac{1}{2} i\left(\frac{c^2}{d-f}+4g\right)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2n}\left(i\left(c+2\,(f-d)\sqrt{z}\right)\right)^{h+j}\left(\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2\,(f-d)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{4\,(d-f)}\right)+\right.$$

$$\left.2\sqrt{\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{d-f}}\;(d-f)\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{4\,(d-f)}\right)\right)+$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2n}\left(i\left(2\,(d-f)\sqrt{z}-c\right)\right)^{h+j}\left(-\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2\,(f-d)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{4\,(d-f)}\right)-\right.$$

$$\left.\left.2\,i\,(d-f)\sqrt{-\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{d-f}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{4\,(d-f)}\right)\right)\right)(d-f)^{-2(n+1)}+$$

$$e^{-\frac{i c^2}{4(d+f)}}\,(d+f)^{-2(n+1)}\Bigg(e^{2 i g}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2n}\left(i\left(c+2\,(d+f)\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\,i\,(d+f)\sqrt{-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{d+f}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)-\right.$$

$$\left.c\left(c+2\,(d+f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)\right)-$$

$$e^{\frac{i c^2}{2(d+f)}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c)^{-h-j+2n} \left(-i \left(c + 2(d+f)\sqrt{z}\right)\right)^{h+j} \left(\frac{i \left(c + 2(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left(c \left(c + 2(d+f)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i \left(c + 2(d+f)\sqrt{z}\right)^2}{4(d+f)}\right) + \right.$$

$$\left. 2\sqrt{\frac{i \left(c + 2(d+f)\sqrt{z}\right)^2}{d+f}} (d+f)\, i\, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i \left(c + 2(d+f)\sqrt{z}\right)^2}{4(d+f)}\right)\right) /; n \in \mathbb{N}$$

Involving $z^n \sin(d z + e) \sin\left(c z^r + f z\right)$

01.06.21.1102.01

$$\int z^n \sin(d z + e) \sin\left(c z^2 + f z\right) dz = \frac{1}{8} i c^{-2n-1} e^{-\frac{i\left(d^2 + 2 f d + f^2 + 4 c e\right)}{4c}}$$

$$\left(e^{\frac{i d f}{c}} \left(\sum_{j=0}^{n} 2^{j-n} (i(d-f))^{n-j} (i(-d+f+2cz))^{j+1} \left(-\frac{i(-d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(-d+f+2cz)^2}{4c}\right)\right)\right.$$

$$(-i c)^n - e^{2 i e} \left(\sum_{j=0}^{n} 2^{j-n} (-i(d+f))^{n-j} (i(d+f+2cz))^{j+1} \left(-\frac{i(d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\right.$$

$$\left.\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(d+f+2cz)^2}{4c}\right)\right) (-i c)^n - (i c)^n e^{\frac{i\left(d^2 + f^2 + 4 c e\right)}{2c}}$$

$$\sum_{j=0}^{n} 2^{j-n} (-i(d-f))^{n-j} (-i(-d+f+2cz))^{j+1} \left(\frac{i(-d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(-d+f+2cz)^2}{4c}\right) + (i c)^n$$

$$\left. e^{\frac{i(d+f)^2}{2c}} \sum_{j=0}^{n} 2^{j-n} (i(d+f))^{n-j} (-i(d+f+2cz))^{j+1} \left(\frac{i(d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(d+f+2cz)^2}{4c}\right)\right) /; n \in \mathbb{N}$$

01.06.21.1103.01

$$\int z^n \sin(d z + e) \sin\left(\sqrt{z}\, c + f z + g\right) dz =$$

$$(-1)^n 2^{-2n-3} e^{-i(e+g)} \left(\left(e^{\frac{1}{4} i \left(\frac{c^2}{d-f} + 8g\right)} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i c)^{-h-j+2n} \left(i \left(c + 2(f-d)\sqrt{z}\right)\right)^{h+j} \left(\frac{i \left(c + 2(f-d)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}\right.\right.$$

$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2(f-d)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{4(d-f)}\right)+\right.$$

$$\left.\left. 2\sqrt{\frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{d-f}}\,(d-f)\,i\,\Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{4(d-f)}\right)\right)\right)+$$

$$e^{-\frac{i\left(c^2+8e(f-d)\right)}{4(d-f)}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2n}\left(i\left(2(d-f)\sqrt{z}-c\right)\right)^{h+j}\left(-\frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2(f-d)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{4(d-f)}\right)-\right.$$

$$\left.\left.\left. 2\,i\,(d-f)\sqrt{-\frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{d-f}}\;\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{4(d-f)}\right)\right)\right)\right)(d-f)^{-2n-2}+$$

$$e^{-\frac{i c^2}{4(d+f)}}\,(d+f)^{-2n-2}\left(e^{2i(e+g)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2n}\left(i\left(c+2(d+f)\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(c+2(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}\right.$$

$$\binom{j}{h}\binom{n}{j}\left(2\,i\,(d+f)\sqrt{-\frac{i\left(c+2(d+f)\sqrt{z}\right)^2}{d+f}}\;\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(c+2(d+f)\sqrt{z}\right)^2}{4(d+f)}\right)-\right.$$

$$\left.\left. c\left(c+2(d+f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(c+2(d+f)\sqrt{z}\right)^2}{4(d+f)}\right)\right)\right)-$$

$$e^{\frac{i c^2}{2(d+f)}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2n}\left(-i\left(c+2(d+f)\sqrt{z}\right)\right)^{h+j}\left(\frac{i\left(c+2(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2(d+f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(c+2(d+f)\sqrt{z}\right)^2}{4(d+f)}\right)+\right.$$

Involving $z^n \sin(b z^r) \sin(c z^r + f z)$

01.06.21.1104.01

$$\int z^n \sin(b z^2) \sin(c z^2 + f z) \, dz = \frac{1}{8} \left(-(-i (b-c))^{-n-1} e^{\frac{i f^2}{4(b-c)}} \sum_{j=0}^{n} 2^{j-n} (-i f)^{n-j} (i (f + 2(c-b) z))^{j+1} \left(\frac{i (f + 2(c-b) z)^2}{b-c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f + 2(c-b) z)^2}{4(b-c)} \right) - (i (b-c))^{-n-1} e^{\frac{i f^2}{4c-4b}} \sum_{j=0}^{n} 2^{j-n} (i f)^{n-j} (-i (f + 2(c-b) z))^{j+1} \left(-\frac{i (f + 2(c-b) z)^2}{b-c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (f + 2(c-b) z)^2}{4(b-c)} \right) + (-i (b+c))^{-n-1} e^{\frac{i f^2}{4(b+c)}} \sum_{j=0}^{n} 2^{j-n} (i f)^{n-j} (-i (f + 2(b+c) z))^{j+1} \left(\frac{i (f + 2(b+c) z)^2}{b+c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f + 2(b+c) z)^2}{4(b+c)} \right) + (i (b+c))^{-n-1} e^{-\frac{i f^2}{4(b+c)}} \sum_{j=0}^{n} 2^{j-n} (-i f)^{n-j} (i (f + 2(b+c) z))^{j+1} \left(-\frac{i (f + 2(b+c) z)^2}{b+c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (f + 2(b+c) z)^2}{4(b+c)} \right) \right) /; n \in \mathbb{N}$$

01.06.21.1105.01

$$\int z^n \sin(b \sqrt{z}) \sin(\sqrt{z}\, c + f z) \, dz =$$

$$(-1)^n 2^{-2n-3} f^{-2(n+1)} \left(e^{\frac{i (b-c)^2}{4f}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i (b-c))^{-h-j+2n} \left(i \left(b - c - 2 f \sqrt{z} \right) \right)^{h+j} \left(\frac{i \left(-b + c + 2 f \sqrt{z} \right)^2}{f} \right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left((b-c) \left(b - c - 2 f \sqrt{z} \right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i \left(-b + c + 2 f \sqrt{z} \right)^2}{4f} \right) + 2 \sqrt{\frac{i \left(-b + c + 2 f \sqrt{z} \right)^2}{f}} \, f \, i \, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i \left(-b + c + 2 f \sqrt{z} \right)^2}{4f} \right) \right) - e^{-\frac{i (b+c)^2}{4f}} \left(e^{\frac{i (b+c)^2}{2f}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i (b+c))^{-h-j+2n} \left(-i \left(b + c + 2 f \sqrt{z} \right) \right)^{h+j} \left(\frac{i \left(b + c + 2 f \sqrt{z} \right)^2}{f} \right)^{\frac{1}{2}(-h-j-1)} \right.\right.$$

$$\binom{j}{h}\binom{n}{j}\left((b+c)\left(b+c+2f\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)+\right.$$

$$\left.2\sqrt{\frac{i\left(b+c+2f\sqrt{z}\right)^2}{f}}\;f\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)\right)+$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i(b+c))^{-h-j+2n}\left(i\left(b+c+2f\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(b+c+2f\sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((b+c)\left(b+c+2f\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)-\right.$$

$$\left.\left.2\,i\,f\sqrt{-\frac{i\left(b+c+2f\sqrt{z}\right)^2}{f}}\;\Gamma\left(\frac{1}{2}(h+j+2),-\frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)\right)\right)+$$

$$e^{-\frac{i(b-c)^2}{4f}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i(b-c))^{-h-j+2n}\left(-i\left(b-c-2f\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((b-c)\left(b-c-2f\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{4f}\right)-\right.$$

$$\left.\left.2\,i\,f\sqrt{-\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{f}}\;\Gamma\left(\frac{1}{2}(h+j+2),-\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{4f}\right)\right)\right)\;/;\;n\in\mathbb{N}$$

Involving $z^n \sin(b z^r + e) \sin(c z^r + f z)$

01.06.21.1106.01

$$\int z^n \sin\left(b z^2+e\right) \sin\left(c z^2+f z\right) dz = \frac{1}{8} e^{-i e} \left(-e^{\frac{i f^2}{4(b-c)}} \left(\sum_{j=0}^{n} 2^{j-n} (-i f)^{n-j} (i (f+2(c-b) z))^{j+1} \left(\frac{i (f+2(c-b) z)^2}{b-c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f+2(c-b) z)^2}{4(b-c)}\right)\right) (-i (b-c))^{-n-1} - (i (b-c))^{-n-1} e^{-\frac{i\left(f^2-8 b e+8 c e\right)}{4(b-c)}} \sum_{j=0}^{n} 2^{j-n} (i f)^{n-j} (-i (f+2(c-b) z))^{j+1} \left(-\frac{i (f+2(c-b) z)^2}{b-c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (f+2(c-b) z)^2}{4(b-c)}\right) + (-i (b+c))^{-n-1} e^{\frac{i f^2}{4(b+c)}} \sum_{j=0}^{n} 2^{j-n} (i f)^{n-j} (-i (f+2(b+c) z))^{j+1} \left(\frac{i (f+2(b+c) z)^2}{b+c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f+2(b+c) z)^2}{4(b+c)}\right) + (i (b+c))^{-n-1} e^{\frac{i\left(-f^2+8 b e+8 c e\right)}{4(b+c)}} \sum_{j=0}^{n} 2^{j-n} (-i f)^{n-j} (i (f+2(b+c) z))^{j+1} \left(-\frac{i (f+2(b+c) z)^2}{b+c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (f+2(b+c) z)^2}{4(b+c)}\right)\right) /; n \in \mathbb{N}$$

01.06.21.1107.01

$$\int z^n \sin\left(\sqrt{z}\, b+e\right) \sin\left(\sqrt{z}\, c+f z\right) dz = (-1)^n 2^{-2n-3} e^{-i e} f^{-2(n+1)} \left(e^{\frac{i\left(b^2-2 c b+c^2+8 e f\right)}{4 f}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i (b-c))^{-h-j+2n} \left(i \left(b-c-2 f \sqrt{z}\right)\right)^{h+j} \left(\frac{i \left(-b+c+2 f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left((b-c)\left(b-c-2 f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i \left(-b+c+2 f \sqrt{z}\right)^2}{4 f}\right) + 2 \sqrt{\frac{i \left(-b+c+2 f \sqrt{z}\right)^2}{f}}\, f\, i\, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i \left(-b+c+2 f \sqrt{z}\right)^2}{4 f}\right)\right) - e^{\frac{i (b+c)^2}{4 f}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i (b+c))^{-h-j+2n} \left(-i \left(b+c+2 f \sqrt{z}\right)\right)^{h+j} \left(\frac{i \left(b+c+2 f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((b+c)\left(b+c+2 f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(b+c+2 f \sqrt{z}\right)^2}{4 f}\right)+\right.$$

$$\left.2 \sqrt{\frac{i\left(b+c+2 f \sqrt{z}\right)^2}{f}}\, f\, i\, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(b+c+2 f \sqrt{z}\right)^2}{4 f}\right)\right)+$$

$$e^{-\frac{i (b-c)^2}{4 f}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i\,(b-c))^{-h-j+2 n} \left(-i\left(b-c-2 f \sqrt{z}\right)\right)^{h+j} \left(-\frac{i\left(-b+c+2 f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((b-c)\left(b-c-2 f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(-b+c+2 f \sqrt{z}\right)^2}{4 f}\right)-\right.$$

$$\left.2\, i\, f \sqrt{-\frac{i\left(-b+c+2 f \sqrt{z}\right)^2}{f}}\; \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(-b+c+2 f \sqrt{z}\right)^2}{4 f}\right)\right)-$$

$$e^{2\, i\, e-\frac{i (b+c)^2}{4 f}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\,(b+c))^{-h-j+2 n} \left(i\left(b+c+2 f \sqrt{z}\right)\right)^{h+j} \left(-\frac{i\left(b+c+2 f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((b+c)\left(b+c+2 f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(b+c+2 f \sqrt{z}\right)^2}{4 f}\right)-\right.$$

$$\left.\left.\left.2\, i\, f \sqrt{-\frac{i\left(b+c+2 f \sqrt{z}\right)^2}{f}}\; \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(b+c+2 f \sqrt{z}\right)^2}{4 f}\right)\right)\right)\right) /;\, n \in \mathbb{N}$$

Involving $z^n \sin\left(b z^r + d z\right) \sin\left(c z^r + f z\right)$

01.06.21.1108.01

$$\int z^n \sin\left(b z^2 + d z\right) \sin\left(c z^2 + f z\right) dz = \frac{1}{8}\left(-e^{\frac{i(d-f)^2}{4(b-c)}}\left(\sum_{j=0}^{n} 2^{j-n} (i(d-f))^{n-j} (-i(d-f+2bz-2cz))^{j+1} \left(\frac{i(d-f+2bz-2cz)^2}{b-c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(d-f+2bz-2cz)^2}{4(b-c)}\right)\right)(-i(b-c))^{-n-1} - (i(b-c))^{-n-1} e^{-\frac{i(d-f)^2}{4(b-c)}} \sum_{j=0}^{n} 2^{j-n} (-i(d-f))^{n-j} (i(d-f+2bz-2cz))^{j+1} \left(-\frac{i(d-f+2bz-2cz)^2}{b-c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(d-f+2bz-2cz)^2}{4(b-c)}\right) + (-i(b+c))^{-n-1} e^{\frac{i(d+f)^2}{4(b+c)}} \sum_{j=0}^{n} 2^{j-n} (i(d+f))^{n-j} (-i(d+f+2(b+c)z))^{j+1} \left(\frac{i(d+f+2(b+c)z)^2}{b+c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(d+f+2(b+c)z)^2}{4(b+c)}\right) + (i(b+c))^{-n-1} e^{-\frac{i(d+f)^2}{4(b+c)}} \sum_{j=0}^{n} 2^{j-n} (-i(d+f))^{n-j} (i(d+f+2(b+c)z))^{j+1} \left(-\frac{i(d+f+2(b+c)z)^2}{b+c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(d+f+2(b+c)z)^2}{4(b+c)}\right)\right) /; n \in \mathbb{N}$$

01.06.21.1109.01

$$\int z^n \sin\left(\sqrt{z}\, b + d z\right) \sin\left(\sqrt{z}\, c + f z\right) dz = -(-1)^n 2^{-2n-3} \left(-e^{-\frac{i(b+c)^2}{4(d+f)}}\left(e^{\frac{i(b+c)^2}{2(d+f)}} \sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h} 4^j (-i(b+c))^{-h-j+2n} \left(-i\left(b+c+2(d+f)\sqrt{z}\right)\right)^{h+j} \left(\frac{i\left(b+c+2(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}\left((-b-c)\left(b+c+2(d+f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(b+c+2(d+f)\sqrt{z}\right)^2}{4(d+f)}\right) - 2i(d+f)\sqrt{\frac{i\left(b+c+2(d+f)\sqrt{z}\right)^2}{d+f}}\,\Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(b+c+2(d+f)\sqrt{z}\right)^2}{4(d+f)}\right)\right) + \sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h} 4^j (i(b+c))^{-h-j+2n} \left(i\left(b+c+2(d+f)\sqrt{z}\right)\right)^{h+j} \left(-\frac{i\left(b+c+2(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((-b-c)\left(b+c+2(d+f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(b+c+2(d+f)\sqrt{z}\right)^2}{4(d+f)}\right)+\right.$$

$$\left.\left.2\sqrt{-\frac{i\left(b+c+2(d+f)\sqrt{z}\right)^2}{d+f}}\,(d+f)\,i\,\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(b+c+2(d+f)\sqrt{z}\right)^2}{4(d+f)}\right)\right)\right)(d+f)^{-2n-2}+$$

$$\frac{1}{(d-f)^{2n+2}}\left(e^{\frac{i(b-c)^2}{4(d-f)}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i(b-c))^{-h-j+2n}\left(-i\left(b-c+2(d-f)\sqrt{z}\right)\right)^{h+j}\right.$$

$$\left(\frac{i\left(b-c+2(d-f)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((c-b)\left(b-c+2(d-f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(b-c+2(d-f)\sqrt{z}\right)^2}{4(d-f)}\right)-\right.$$

$$\left.\left.2\,i\,(d-f)\sqrt{\frac{i\left(b-c+2(d-f)\sqrt{z}\right)^2}{d-f}}\,\Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(b-c+2(d-f)\sqrt{z}\right)^2}{4(d-f)}\right)\right)\right)+\frac{1}{(d-f)^{2n+2}}$$

$$\left(e^{-\frac{i(b-c)^2}{4(d-f)}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i(b-c))^{-h-j+2n}\left(i\left(b-c+2(d-f)\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(b-c+2(d-f)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}\right.$$

$$\binom{j}{h}\binom{n}{j}\left((c-b)\left(b-c+2(d-f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(b-c+2(d-f)\sqrt{z}\right)^2}{4(d-f)}\right)+\right.$$

$$\left.\left.\left.2\sqrt{-\frac{i\left(b-c+2(d-f)\sqrt{z}\right)^2}{d-f}}\,(d-f)\,i\,\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(b-c+2(d-f)\sqrt{z}\right)^2}{4(d-f)}\right)\right)\right)\right)\;/;\; n\in\mathbb{N}$$

Involving $z^n \sin(d\,z)\sin\left(c\,z^r + f\,z + g\right)$

01.06.21.1110.01

$$\int z^n \sin(d\,z)\sin\left(c\,z^2+f\,z+g\right)dz = \frac{1}{8}\,i\,c^{-2n-1}\,e^{-\frac{i\left(d^2+2 f d+f^2+4 c g\right)}{4c}}$$
$$\left(e^{i\left(\frac{d f}{c}+2 g\right)}\left(\sum_{j=0}^{n} 2^{j-n}\,(i\,(d-f))^{n-j}\,(i\,(-d+f+2\,c\,z))^{j+1}\left(-\frac{i\,(-d+f+2\,c\,z)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i\,(-d+f+2\,c\,z)^2}{4\,c}\right)\right)\right.$$
$$(-i\,c)^n - e^{2\,i\,g}\left(\sum_{j=0}^{n} 2^{j-n}\,(-i\,(d+f))^{n-j}\,(i\,(d+f+2\,c\,z))^{j+1}\left(-\frac{i\,(d+f+2\,c\,z)^2}{c}\right)^{\frac{1}{2}(-j-1)}\right.$$
$$\left.\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i\,(d+f+2\,c\,z)^2}{4\,c}\right)\right)(-i\,c)^n - (i\,c)^n\,e^{\frac{i\left(d^2+f^2\right)}{2c}}$$
$$\sum_{j=0}^{n} 2^{j-n}\,(-i\,(d-f))^{n-j}\,(-i\,(-d+f+2\,c\,z))^{j+1}\left(\frac{i\,(-d+f+2\,c\,z)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i\,(-d+f+2\,c\,z)^2}{4\,c}\right)+(i\,c)^n$$
$$\left.e^{\frac{i(d+f)^2}{2c}}\sum_{j=0}^{n} 2^{j-n}\,(i\,(d+f))^{n-j}\,(-i\,(d+f+2\,c\,z))^{j+1}\left(\frac{i\,(d+f+2\,c\,z)^2}{c}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i\,(d+f+2\,c\,z)^2}{4\,c}\right)\right)\,/;\,n\in\mathbb{N}$$

01.06.21.1111.01

$$\int z^n \sin(d\,z)\sin\left(\sqrt{z}\,c+f\,z+g\right)dz =$$
$$(-1)^n\,2^{-2n-3}\,e^{-i\,g}\left(e^{\frac{i\,c^2}{4f-4d}}\left(e^{\frac{1}{2}i\left(\frac{c^2}{d-f}+4g\right)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2n}\left(i\left(c+2\,(f-d)\sqrt{z}\right)\right)^{h+j}\left(\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}\right.\right.$$
$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2\,(f-d)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{4\,(d-f)}\right)+\right.$$
$$\left.2\sqrt{\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{d-f}}\,(d-f)\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{4\,(d-f)}\right)\right)+$$
$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2n}\left(i\left(2\,(d-f)\sqrt{z}-c\right)\right)^{h+j}\left(-\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}$$
$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2\,(f-d)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{4\,(d-f)}\right)-\right.$$

$$2\,i\,(d-f)\sqrt{-\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{d-f}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{4\,(d-f)}\right)\Bigg)\Bigg)(d-f)^{-2\,(n+1)}+$$

$$e^{-\frac{i\,c^2}{4\,(d+f)}}\,(d+f)^{-2\,(n+1)}\left(e^{2\,i\,g}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2\,n}\left(i\left(c+2\,(d+f)\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}\right.$$

$$\binom{j}{h}\binom{n}{j}\left(2\,i\,(d+f)\sqrt{-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{d+f}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)-\right.$$

$$\left.c\left(c+2\,(d+f)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)\right)-$$

$$e^{\frac{i\,c^2}{2\,(d+f)}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2\,n}\left(-i\left(c+2\,(d+f)\sqrt{z}\right)\right)^{h+j}\left(\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2\,(d+f)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)+\right.$$

$$\left.\left.2\sqrt{\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{d+f}}\;(d+f)\,i\,\Gamma\!\left(\frac{1}{2}(h+j+2),\,\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)\right)\right)\Bigg)\Bigg)\,/;\,n\in\mathbb{N}$$

Involving $z^n \sin(d\,z+e)\sin\left(c\,z^r+f\,z+g\right)$

01.06.21.1112.01

$$\int z^n \sin(d z+e)\sin\left(c z^2+f z+g\right) dz = \frac{1}{8c} i\, c^{-2n} e^{-\frac{i\left(d^2+2 f d+f^2+4c(e+g)\right)}{4c}}$$

$$\left(e^{i\left(\frac{d f}{c}+2g\right)}\left(\sum_{j=0}^{n} 2^{j-n} (i(d-f))^{n-j} (i(-d+f+2cz))^{j+1} \left(-\frac{i(-d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(-d+f+2cz)^2}{4c}\right)\right)\right.$$

$$(-i c)^n - e^{2i(e+g)}\left(\sum_{j=0}^{n} 2^{j-n} (-i(d+f))^{n-j} (i(d+f+2cz))^{j+1} \left(-\frac{i(d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)}\right.$$

$$\left.\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{i(d+f+2cz)^2}{4c}\right)\right)(-i c)^n - (i c)^n e^{\frac{i\left(d^2+f^2+4ce\right)}{2c}}$$

$$\sum_{j=0}^{n} 2^{j-n} (-i(d-f))^{n-j} (-i(-d+f+2cz))^{j+1} \left(\frac{i(-d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}\Gamma\left(\frac{j+1}{2}, \frac{i(-d+f+2cz)^2}{4c}\right) + (i c)^n$$

$$\left. e^{\frac{i(d+f)^2}{2c}} \sum_{j=0}^{n} 2^{j-n} (i(d+f))^{n-j} (-i(d+f+2cz))^{j+1} \left(\frac{i(d+f+2cz)^2}{c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}\Gamma\left(\frac{j+1}{2}, \frac{i(d+f+2cz)^2}{4c}\right)\right) /;\, n \in \mathbb{N}$$

01.06.21.1113.01

$$\int z^n \sin(d z+e)\sin\left(\sqrt{z}\, c+f z+g\right) dz =$$

$$(-1)^n 2^{-2n-3} e^{-i(e+g)}\left(\left(e^{\frac{1}{4} i\left(\frac{c^2}{d-f}+8g\right)} \sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h} 4^j (i c)^{-h-j+2n} \left(i\left(c+2(f-d)\sqrt{z}\right)\right)^{h+j} \left(\frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}\right.\right.$$

$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2(f-d)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{4(d-f)}\right)+\right.$$

$$\left.\left. 2\sqrt{\frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{d-f}}\,(d-f)\, i\, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{4(d-f)}\right)\right)\right)+$$

$$e^{-\frac{i\left(c^2+8e(f-d)\right)}{4(d-f)}} \sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c)^{-h-j+2n} \left(i\left(2(d-f)\sqrt{z}-c\right)\right)^{h+j} \left(-\frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2(f-d)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(c+2(f-d)\sqrt{z}\right)^2}{4(d-f)}\right)-\right.$$

$$2\,i\,(d-f)\sqrt{-\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{d-f}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(c+2\,(f-d)\sqrt{z}\right)^2}{4\,(d-f)}\right)\Bigg)\Bigg)(d-f)^{-2\,n-2}+$$

$$e^{-\frac{i\,c^2}{4\,(d+f)}}\,(d+f)^{-2\,n-2}\left(e^{2\,i\,(e+g)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c)^{-h-j+2\,n}\left(i\left(c+2\,(d+f)\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}\,(-h-j-1)}\right.$$

$$\binom{j}{h}\binom{n}{j}\left(2\,i\,(d+f)\sqrt{-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{d+f}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)-\right.$$

$$\left.c\left(c+2\,(d+f)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)\right)-$$

$$e^{\frac{i\,c^2}{2\,(d+f)}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c)^{-h-j+2\,n}\left(-i\left(c+2\,(d+f)\sqrt{z}\right)\right)^{h+j}\left(\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}\,(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(c\left(c+2\,(d+f)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)+\right.$$

$$\left.\left.2\sqrt{\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{d+f}}\;(d+f)\,i\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)\right)\right)\Bigg)\Bigg)\;/;\;n\in\mathbb{N}$$

Involving $z^n\sin(b\,z^r)\sin(c\,z^r+f\,z+g)$

01.06.21.1114.01

$$\int z^n \sin(b z^2) \sin(c z^2 + f z + g)\, dz = \frac{1}{8} e^{-i g} \left(-e^{\frac{1}{4} i \left(\frac{f^2}{b-c}+8 g\right)} \left(\sum_{j=0}^{n} 2^{j-n} (-i f)^{n-j} (i (f + 2 (c-b) z))^{j+1} \left(\frac{i (f + 2 (c-b) z)^2}{b-c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f + 2 (c-b) z)^2}{4 (b-c)}\right)\right) (-i (b-c))^{-n-1} - (i (b-c))^{-n-1} e^{\frac{i f^2}{4 c - 4 b}} \sum_{j=0}^{n} 2^{j-n} (i f)^{n-j} (-i (f + 2 (c-b) z))^{j+1} \left(-\frac{i (f + 2 (c-b) z)^2}{b-c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (f + 2 (c-b) z)^2}{4 (b-c)}\right) + (-i (b+c))^{-n-1} e^{\frac{i f^2}{4 (b+c)}} \sum_{j=0}^{n} 2^{j-n} (i f)^{n-j} (-i (f + 2 (b+c) z))^{j+1} \left(\frac{i (f + 2 (b+c) z)^2}{b+c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f + 2 (b+c) z)^2}{4 (b+c)}\right) + (i (b+c))^{-n-1} e^{2 i g - \frac{i f^2}{4 (b+c)}} \sum_{j=0}^{n} 2^{j-n} (-i f)^{n-j} (i (f + 2 (b+c) z))^{j+1} \left(-\frac{i (f + 2 (b+c) z)^2}{b+c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (f + 2 (b+c) z)^2}{4 (b+c)}\right)\right) /; n \in \mathbb{N}$$

01.06.21.1115.01

$$\int z^n \sin(\sqrt{z}\, b) \sin(\sqrt{z}\, c + f z + g)\, dz = -(-1)^n 2^{-2 n-3} e^{-i g} f^{-2 n-2} \left(e^{-\frac{i (b+c)^2}{4 f}} \left(-e^{\frac{i (b^2+c^2)}{2 f}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i (b-c))^{-h-j+2 n} \left(i \left(b - c - 2 f \sqrt{z}\right)\right)^{h+j} \left(\frac{i \left(-b + c + 2 f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left((b-c) \left(b - c - 2 f \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h + j + 1), \frac{i \left(-b + c + 2 f \sqrt{z}\right)^2}{4 f}\right) + 2 \sqrt{\frac{i \left(-b + c + 2 f \sqrt{z}\right)^2}{f}}\, f\, i\, \Gamma\left(\frac{1}{2} (h + j + 2), \frac{i \left(-b + c + 2 f \sqrt{z}\right)^2}{4 f}\right)\right) + e^{\frac{i (b+c)^2}{2 f}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i (b+c))^{-h-j+2 n} \left(-i \left(b + c + 2 f \sqrt{z}\right)\right)^{h+j} \left(\frac{i \left(b + c + 2 f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left((b+c) \left(b + c + 2 f \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h + j + 1), \frac{i \left(b + c + 2 f \sqrt{z}\right)^2}{4 f}\right) + \right.\right.$$

$$2\sqrt{\frac{i\left(b+c+2f\sqrt{z}\right)^2}{f}}\; f\, i\,\Gamma\!\left(\frac{1}{2}(h+j+2),\, \frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)\Bigg)+$$

$$e^{2ig}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i(b+c))^{-h-j+2n}\left(i\left(b+c+2f\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(b+c+2f\sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg((b+c)\left(b+c+2f\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\, -\frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)-$$

$$2\,i\,f\sqrt{-\frac{i\left(b+c+2f\sqrt{z}\right)^2}{f}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\, -\frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)\Bigg)\Bigg)-$$

$$e^{-\frac{i\left(b^2-2cb+c^2-8fg\right)}{4f}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i(b-c))^{-h-j+2n}\left(-i\left(b-c-2f\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg((b-c)\left(b-c-2f\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\, -\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{4f}\right)-$$

$$2\,i\,f\sqrt{-\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{f}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\, -\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{4f}\right)\Bigg)\Bigg)\Bigg)\;/;\; n\in\mathbb{N}$$

Involving $z^n \sin\left(b z^r + e\right) \sin\left(c z^r + f z + g\right)$

01.06.21.1116.01

$$\int z^n \sin\left(b z^2+e\right) \sin\left(c z^2+f z+g\right) dz = \frac{1}{8} e^{-i(e+g)} \left(-e^{\frac{1}{4} i \left(\frac{f^2}{b-c}+8 g\right)} \left(\sum_{j=0}^{n} 2^{j-n} (-i f)^{n-j} (i (f+2 (c-b) z))^{j+1} \left(\frac{i (f+2 (c-b) z)^2}{b-c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f+2 (c-b) z)^2}{4 (b-c)}\right)\right) (-i (b-c))^{-n-1} - (i (b-c))^{-n-1} e^{-\frac{i\left(f^2-8 b e+8 c e\right)}{4(b-c)}} \sum_{j=0}^{n} 2^{j-n} (i f)^{n-j} (-i (f+2 (c-b) z))^{j+1} \left(-\frac{i (f+2 (c-b) z)^2}{b-c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (f+2 (c-b) z)^2}{4 (b-c)}\right) + (-i (b+c))^{-n-1} e^{\frac{i f^2}{4(b+c)}} \sum_{j=0}^{n} 2^{j-n} (i f)^{n-j} (-i (f+2 (b+c) z))^{j+1} \left(\frac{i (f+2 (b+c) z)^2}{b+c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f+2 (b+c) z)^2}{4 (b+c)}\right) + (i (b+c))^{-n-1} e^{\frac{i\left(-f^2+8 b (e+g)+8 c (e+g)\right)}{4(b+c)}} \sum_{j=0}^{n} 2^{j-n} (-i f)^{n-j} (i (f+2 (b+c) z))^{j+1} \left(-\frac{i (f+2 (b+c) z)^2}{b+c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (f+2 (b+c) z)^2}{4 (b+c)}\right)\right) /; n \in \mathbb{N}$$

01.06.21.1117.01

$$\int z^n \sin\left(\sqrt{z}\, b+e\right) \sin\left(\sqrt{z}\, c+f z+g\right) dz = -(-1)^n 2^{-2n-3} e^{-i(e+g)} f^{-2(n+1)} \left(-e^{\frac{i\left(b^2-2 c b+c^2+8 e f\right)}{4 f}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i (b-c))^{-h-j+2n} \left(i \left(b-c-2 f \sqrt{z}\right)\right)^{h+j} \left(\frac{i \left(-b+c+2 f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left((b-c) \left(b-c-2 f \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i \left(-b+c+2 f \sqrt{z}\right)^2}{4 f}\right) + 2 \sqrt{\frac{i \left(-b+c+2 f \sqrt{z}\right)^2}{f}}\, f\, i\, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i \left(-b+c+2 f \sqrt{z}\right)^2}{4 f}\right)\right) + e^{-\frac{i (b+c)^2}{4 f}} \left(e^{\frac{i (b+c)^2}{2 f}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i (b+c))^{-h-j+2n} \left(-i \left(b+c+2 f \sqrt{z}\right)\right)^{h+j} \left(\frac{i \left(b+c+2 f \sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)}\right.\right.$$

$$\binom{j}{h}\binom{n}{j}\left((b+c)\left(b+c+2f\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)+\right.$$

$$\left.\left.2\sqrt{\frac{i\left(b+c+2f\sqrt{z}\right)^2}{f}}\; f\,i\,\Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)\right)\right)+$$

$$e^{2i(e+g)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i(b+c))^{-h-j+2n}\left(i\left(b+c+2f\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(b+c+2f\sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((b+c)\left(b+c+2f\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)-\right.$$

$$\left.\left.2\,i\,f\sqrt{-\frac{i\left(b+c+2f\sqrt{z}\right)^2}{f}}\;\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(b+c+2f\sqrt{z}\right)^2}{4f}\right)\right)\right)-$$

$$e^{-\frac{i\left(b^2-2cb+c^2-8fg\right)}{4f}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i(b-c))^{-h-j+2n}\left(-i\left(b-c-2f\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((b-c)\left(b-c-2f\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{4f}\right)-\right.$$

$$\left.\left.2\,i\,f\sqrt{-\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{f}}\;\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(-b+c+2f\sqrt{z}\right)^2}{4f}\right)\right)\right)\;/;\; n\in\mathbb{N}$$

Involving $z^n \sin\left(b z^r + d z\right) \sin\left(c z^r + f z + g\right)$

01.06.21.1118.01

$$\int z^n \sin(b z^2 + d z) \sin(c z^2 + f z + g) \, dz = \frac{1}{8} e^{-i g} \left(-e^{\frac{i(d^2 - 2 f d + f^2 + 8 (b-c) g)}{4 (b-c)}} \left(\sum_{j=0}^{n} 2^{j-n} (i (d-f))^{n-j} (-i (d - f + 2 b z - 2 c z))^{j+1} \left(\frac{i (d - f + 2 b z - 2 c z)^2}{b - c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (d - f + 2 b z - 2 c z)^2}{4 (b-c)} \right) \right) (-i (b-c))^{-n-1} - (i (b-c))^{-n-1} e^{-\frac{i (d-f)^2}{4 (b-c)}} \sum_{j=0}^{n} 2^{j-n} (-i (d-f))^{n-j} (i (d - f + 2 b z - 2 c z))^{j+1} \left(-\frac{i (d - f + 2 b z - 2 c z)^2}{b - c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (d - f + 2 b z - 2 c z)^2}{4 (b-c)} \right) + (-i (b+c))^{-n-1} e^{\frac{i (d+f)^2}{4 (b+c)}} \sum_{j=0}^{n} 2^{j-n} (i (d+f))^{n-j} (-i (d + f + 2 (b+c) z))^{j+1} \left(\frac{i (d + f + 2 (b+c) z)^2}{b+c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (d + f + 2 (b+c) z)^2}{4 (b+c)} \right) + (i (b+c))^{-n-1} e^{-\frac{i(d^2 + 2 f d + f^2 - 8 (b+c) g)}{4 (b+c)}} \sum_{j=0}^{n} 2^{j-n} (-i (d+f))^{n-j} (i (d + f + 2 (b+c) z))^{j+1} \left(-\frac{i (d + f + 2 (b+c) z)^2}{b+c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (d + f + 2 (b+c) z)^2}{4 (b+c)} \right) \right) /; n \in \mathbb{N}$$

01.06.21.1119.01

$$\int z^n \sin(\sqrt{z}\, b + d z) \sin(\sqrt{z}\, c + f z + g) \, dz = -(-1)^n 2^{-2n-3} e^{-i g} \left(e^{\frac{i(b^2 - 2 c b + c^2 + 8 d g - 8 f g)}{4 (d-f)}} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i (b-c))^{-h-j+2n} \left(-i \left(b - c + 2 (d-f) \sqrt{z} \right) \right)^{h+j} \left(\frac{i \left(b - c + 2 (d-f) \sqrt{z} \right)^2}{d-f} \right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left((c-b) \left(b - c + 2 (d-f) \sqrt{z} \right) \Gamma\left(\frac{1}{2} (h+j+1), \frac{i \left(b - c + 2 (d-f) \sqrt{z} \right)^2}{4 (d-f)} \right) - 2 i (d-f) \sqrt{\frac{i \left(b - c + 2 (d-f) \sqrt{z} \right)^2}{d-f}} \, \Gamma\left(\frac{1}{2} (h+j+2), \frac{i \left(b - c + 2 (d-f) \sqrt{z} \right)^2}{4 (d-f)} \right) \right) \right) (d-f)^{-2(n+1)} + \right.$$

$$e^{-\frac{i(b-c)^2}{4(d-f)}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,(b-c))^{-h-j+2n}\left(i\left(b-c+2\,(d-f)\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(b-c+2\,(d-f)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)}\right.$$

$$\binom{j}{h}\binom{n}{j}\left((c-b)\left(b-c+2\,(d-f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(b-c+2\,(d-f)\sqrt{z}\right)^2}{4\,(d-f)}\right)+\right.$$

$$\left.\left.2\sqrt{-\frac{i\left(b-c+2\,(d-f)\sqrt{z}\right)^2}{d-f}}\,(d-f)\,i\,\Gamma\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(b-c+2\,(d-f)\sqrt{z}\right)^2}{4\,(d-f)}\right)\right)\right)(d-f)^{-2\,(n+1)}-$$

$$e^{-\frac{i(b+c)^2}{4(d+f)}}\,(d+f)^{-2\,(n+1)}\left(e^{\frac{i(b+c)^2}{2(d+f)}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,(b+c))^{-h-j+2n}\left(-i\left(b+c+2\,(d+f)\sqrt{z}\right)\right)^{h+j}\right.$$

$$\left(\frac{i\left(b+c+2\,(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((-b-c)\left(b+c+2\,(d+f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(b+c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)-\right.$$

$$\left.2\,i\,(d+f)\sqrt{\frac{i\left(b+c+2\,(d+f)\sqrt{z}\right)^2}{d+f}}\,\Gamma\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(b+c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)\right)+$$

$$e^{2\,i\,g}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,(b+c))^{-h-j+2n}\left(i\left(b+c+2\,(d+f)\sqrt{z}\right)\right)^{h+j}\left(-\frac{i\left(b+c+2\,(d+f)\sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((-b-c)\left(b+c+2\,(d+f)\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(b+c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)+\right.$$

$$\left.\left.\left.2\sqrt{-\frac{i\left(b+c+2\,(d+f)\sqrt{z}\right)^2}{d+f}}\,(d+f)\,i\,\Gamma\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(b+c+2\,(d+f)\sqrt{z}\right)^2}{4\,(d+f)}\right)\right)\right)\right)\Bigg)\Bigg)\,/;\,n\in\mathbb{N}$$

Involving $z^n \sin(b z^r + d z + e) \sin(c z^r + f z + g)$

01.06.21.1120.01

$$\int z^n \sin(b z^2 + d z + e) \sin(c z^2 + f z + g)\, dz = \frac{1}{8} e^{-i(e+g)} \left(-(-i(b-c))^{-n-1} e^{\frac{i(d^2-2fd+f^2+8(b-c)g)}{4(b-c)}} \sum_{j=0}^{n} 2^{j-n} (i(d-f))^{n-j} (-i(d-f+2bz-2cz))^{j+1} \left(\frac{i(d-f+2bz-2cz)^2}{b-c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(d-f+2bz-2cz)^2}{4(b-c)}\right) - (i(b-c))^{-n-1} e^{-\frac{i(d^2-2fd+f^2-8be+8ce)}{4(b-c)}} \sum_{j=0}^{n} 2^{j-n} (-i(d-f))^{n-j} (i(d-f+2bz-2cz))^{j+1} \left(-\frac{i(d-f+2bz-2cz)^2}{b-c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(d-f+2bz-2cz)^2}{4(b-c)}\right) + (-i(b+c))^{-n-1} e^{\frac{i(d+f)^2}{4(b+c)}} \sum_{j=0}^{n} 2^{j-n} (i(d+f))^{n-j} (-i(d+f+2(b+c)z))^{j+1} \left(\frac{i(d+f+2(b+c)z)^2}{b+c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(d+f+2(b+c)z)^2}{4(b+c)}\right) + (i(b+c))^{-n-1} e^{-\frac{i(d^2+2fd+f^2-8ce-8cg-8b(e+g))}{4(b+c)}} \sum_{j=0}^{n} 2^{j-n} (-i(d+f))^{n-j} (i(d+f+2(b+c)z))^{j+1} \left(-\frac{i(d+f+2(b+c)z)^2}{b+c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(d+f+2(b+c)z)^2}{4(b+c)}\right) \right) /; n \in \mathbb{N}$$

01.06.21.1121.01

$$\int z^n \sin(\sqrt{z}\, b + d z + e) \sin(\sqrt{z}\, c + f z + g)\, dz = -(-1)^n 2^{-2n-3} e^{-i(e+g)} \left(\frac{1}{(d-f)^{2n+2}} \left(e^{\frac{i(b^2-2cb+c^2+8dg-8fg)}{4(d-f)}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i(b-c))^{-h-j+2n} \left(-i\left(b-c+2(d-f)\sqrt{z}\right)\right)^{h+j} \left(\frac{i\left(b-c+2(d-f)\sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(-(b-c)\left(b-c+2(d-f)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(b-c+2(d-f)\sqrt{z}\right)^2}{4(d-f)}\right) - \right.\right.\right.$$

$$2\, i\, (d-f) \sqrt{\frac{i \left(b-c+2\, (d-f) \sqrt{z}\right)^2}{d-f}}\; \Gamma\!\left(\frac{1}{2}(h+j+2),\, \frac{i \left(b-c+2\, (d-f) \sqrt{z}\right)^2}{4\, (d-f)}\right)\Bigg)\Bigg)\Bigg) +$$

$$\frac{1}{(d-f)^{2n+2}} \Bigg(e^{-\frac{i\left(b^2-2 c b+c^2-8 d e+8 e f\right)}{4 (d-f)}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, (b-c))^{-h-j+2n} \left(i \left(b-c+2\, (d-f) \sqrt{z}\right)\right)^{h+j}$$

$$\left(-\frac{i \left(b-c+2\, (d-f) \sqrt{z}\right)^2}{d-f}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\Bigg(2\, i\, (d-f) \sqrt{-\frac{i \left(b-c+2\, (d-f) \sqrt{z}\right)^2}{d-f}}\; \Gamma\!\left(\frac{1}{2}(h+j+2),\, -\frac{i \left(b-c+2\, (d-f) \sqrt{z}\right)^2}{4\, (d-f)}\right) -$$

$$(b-c) \left(b-c+2\, (d-f) \sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+j+1),\, -\frac{i \left(b-c+2\, (d-f) \sqrt{z}\right)^2}{4\, (d-f)}\right)\Bigg)\Bigg)\Bigg) - \frac{1}{(d+f)^{2n+2}} \Bigg(e^{-\frac{i (b+c)^2}{4 (d+f)}}$$

$$\Bigg(e^{\frac{i (b+c)^2}{2 (d+f)}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i\, (b+c))^{-h-j+2n} \left(-i \left(b+c+2\, (d+f) \sqrt{z}\right)\right)^{h+j} \left(\frac{i \left(b+c+2\, (d+f) \sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg(-(b+c) \left(b+c+2\, (d+f) \sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+j+1),\, \frac{i \left(b+c+2\, (d+f) \sqrt{z}\right)^2}{4\, (d+f)}\right) -$$

$$2\, i\, (d+f) \sqrt{\frac{i \left(b+c+2\, (d+f) \sqrt{z}\right)^2}{d+f}}\; \Gamma\!\left(\frac{1}{2}(h+j+2),\, \frac{i \left(b+c+2\, (d+f) \sqrt{z}\right)^2}{4\, (d+f)}\right)\Bigg) +$$

$$e^{2 i (e+g)} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, (b+c))^{-h-j+2n} \left(i \left(b+c+2\, (d+f) \sqrt{z}\right)\right)^{h+j} \left(-\frac{i \left(b+c+2\, (d+f) \sqrt{z}\right)^2}{d+f}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg(2\, i\, (d+f) \sqrt{-\frac{i \left(b+c+2\, (d+f) \sqrt{z}\right)^2}{d+f}}\; \Gamma\!\left(\frac{1}{2}(h+j+2),\, -\frac{i \left(b+c+2\, (d+f) \sqrt{z}\right)^2}{4\, (d+f)}\right) -$$

Involving products of several direct functions and a power function

Involving $z^{\alpha-1}\sin(a z)\sin(b z)\sin(c z)$

01.06.21.1122.01

$$\int z^{\alpha-1}\sin(a z)\sin(b z)\sin(c z)\,dz = \frac{1}{8} i z^{\alpha}\Big(-(-i(a-b-c)z)^{-\alpha}\,\Gamma(\alpha,-i(a-b-c)z)+(i(a-b-c)z)^{-\alpha}\,\Gamma(\alpha,i(a-b-c)z)+(-i(a+b-c)z)^{-\alpha}\,\Gamma(\alpha,-i(a+b-c)z)-(i(a+b-c)z)^{-\alpha}\,\Gamma(\alpha,i(a+b-c)z)+(-i(a-b+c)z)^{-\alpha}\,\Gamma(\alpha,-i(a-b+c)z)-(i(a-b+c)z)^{-\alpha}\,\Gamma(\alpha,i(a-b+c)z)-(-i(a+b+c)z)^{-\alpha}\,\Gamma(\alpha,-i(a+b+c)z)+(i(a+b+c)z)^{-\alpha}\,\Gamma(\alpha,i(a+b+c)z)\Big)$$

01.06.21.1123.01

$$\int \frac{\sin(a z)\sin(b z)\sin(c z)}{z}\,dz = \frac{1}{4}\left(-\mathrm{Si}((a-b-c)z)+\mathrm{Si}((a+b-c)z)+\mathrm{Si}((a-b+c)z)-\mathrm{Si}((a+b+c)z)\right)$$

Involving $z^{\alpha-1}\prod_{k=1}^{n}\sin(a_k z)$

01.06.21.1124.01

$$\int z^{\alpha-1}\prod_{k=1}^{n}\sin(a_k z)\,dz = (-2)^{-n-1} z^{\alpha} \sum_{\substack{k_1=-1\\ \Delta k_1=2}}^{1}\sum_{\substack{k_2=-1\\ \Delta k_2=2}}^{1}\cdots\sum_{\substack{k_n=-1\\ \Delta k_n=2}}^{1}\left(\left(e^{\frac{1}{2}\pi i\sum_{j=1}^{n}k_j}\,\Gamma\!\left(\alpha,-i z\sum_{j=1}^{n}k_j a_j\right)\left(-i a\sum_{j=1}^{n}k_j a_j\right)^{-\alpha}+e^{-\frac{1}{2}\pi i\sum_{j=1}^{n}k_j}\,\Gamma\!\left(\alpha,i z\sum_{j=1}^{n}k_j a_j\right)\left(i z\sum_{j=1}^{n}k_j a_j\right)^{-\alpha}\right)\right)$$

01.06.21.1125.01

$$\int \frac{1}{z}\prod_{k=1}^{n}\sin(a_k z)\,dz = (-2)^{-n}\sum_{\substack{k_1=-1\\ \Delta k_1=2}}^{1}\sum_{\substack{k_2=-1\\ \Delta k_2=2}}^{1}\cdots\sum_{\substack{k_n=-1\\ \Delta k_n=2}}^{1}\left(\cos\!\left(\frac{1}{2}\pi\sum_{j=1}^{n}k_j\right)\mathrm{Ci}\!\left(z\sum_{j=1}^{n}k_j a_j\right)-\sin\!\left(\frac{1}{2}\pi\sum_{j=1}^{n}k_j\right)\mathrm{Si}\!\left(z\sum_{j=1}^{n}k_j a_j\right)\right)$$

Involving products of powers of the direct function and a power function

Involving product of power of the direct function, the direct function and a power function

Involving $z^{\alpha-1}\sin(c z)\sin^{\nu}(a z)$

01.06.21.1126.01

$$\int z^{\alpha-1}\sin(c\,z)\sin^{\nu}(a\,z)\,dz = 2^{-\nu-1}z^{\alpha}\left(i\binom{\nu}{\frac{\nu}{2}}\left((-i\,c\,z)^{-\alpha}\,\Gamma(\alpha,-i\,c\,z)-(i\,c\,z)^{-\alpha}\,\Gamma(\alpha,i\,c\,z)\right)(1-\nu \bmod 2)-\right.$$
$$i^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(\Gamma(\alpha,-i\,(c-2\,a\,s+a\,\nu)\,z)\,(-i\,(c-2\,a\,s+a\,\nu)\,z)^{-\alpha}-\right.$$
$$e^{i\,\pi\,\nu}\,(i\,(c-2\,a\,s+a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(c-2\,a\,s+a\,\nu)\,z)+e^{i\,\pi\,\nu}\,(-i\,(c+2\,a\,s-a\,\nu)\,z)^{-\alpha}$$
$$\left.\left.\Gamma(\alpha,-i\,(c+2\,a\,s-a\,\nu)\,z)-(i\,(c+2\,a\,s-a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(c+2\,a\,s-a\,\nu)\,z)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.1127.01

$$\int z^n\sin(c\,z)\sin^{\nu}(a\,z)\,dz = -\frac{i\,n!}{2}\sin^{\nu}(a\,z)\left(1-e^{2\,i\,a\,z}\right)^{-\nu}$$
$$\left(e^{i\,c\,z}\sum_{p=0}^{n}\frac{(-1)^p\,z^{n-p}}{(n-p)!\,(i\,c-i\,a\,\nu)^{p+1}}\;{}_{p+2}F_{p+1}\!\left(\frac{c-a\,\nu}{2\,a},\ldots,\frac{c-a\,\nu}{2\,a},-\nu;\frac{c-a\,\nu}{2\,a}+1,\ldots,\frac{c-a\,\nu}{2\,a}+1;e^{2\,i\,a\,z}\right)-\right.$$
$$\left.e^{-i\,c\,z}\sum_{p=0}^{n}\frac{(-1)^p\,z^{n-p}}{(n-p)!\,(-i\,c-i\,a\,\nu)^{p+1}}\;{}_{p+2}F_{p+1}\!\left(-\frac{c+a\,\nu}{2\,a},\ldots,-\frac{c+a\,\nu}{2\,a},-\nu;1-\frac{c+a\,\nu}{2\,a},\ldots,1-\frac{c+a\,\nu}{2\,a};e^{2\,i\,a\,z}\right)\right)\;/;\;n\in\mathbb{N}$$

Involving $z^{\alpha-1}\sin(c\,z+d)\sin^{\nu}(a\,z)$

01.06.21.1128.01

$$\int z^{\alpha-1}\sin(d+c\,z)\sin^{\nu}(a\,z)\,dz =$$
$$2^{-\nu-1}z^{\alpha}\left(i\,e^{i\,d}\binom{\nu}{\frac{\nu}{2}}\left((-i\,c\,z)^{-\alpha}\,\Gamma(\alpha,-i\,c\,z)-e^{-2\,i\,d}\,(i\,c\,z)^{-\alpha}\,\Gamma(\alpha,i\,c\,z)\right)(1-\nu \bmod 2)-i^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\,e^{i\,d}\binom{\nu}{s}\right.$$
$$\left(\Gamma(\alpha,-i\,(c-2\,a\,s+a\,\nu)\,z)\,(-i\,(c-2\,a\,s+a\,\nu)\,z)^{-\alpha}-e^{i\,(\pi\,\nu-2\,d)}\,(i\,(c-2\,a\,s+a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(c-2\,a\,s+a\,\nu)\,z)+\right.$$
$$e^{i\,\pi\,\nu}\,(-i\,(c+2\,a\,s-a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,-i\,(c+2\,a\,s-a\,\nu)\,z)-$$
$$\left.\left.e^{-2\,i\,d}\,(i\,(c+2\,a\,s-a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(c+2\,a\,s-a\,\nu)\,z)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.1129.01

$$\int z^n\sin(c\,z+d)\sin^{\nu}(a\,z)\,dz = \frac{1}{2}\,i\left(1-e^{2\,i\,a\,z}\right)^{-\nu}n!\,\sin^{\nu}(a\,z)$$
$$\left(e^{-i\,(d+c\,z)}\sum_{j=0}^{n}\frac{(-1)^j\,z^{n-j}\,(-i\,c-i\,a\,\nu)^{-j-1}}{(n-j)!}\;{}_{j+2}F_{j+1}\!\left(-\frac{c+a\,\nu}{2\,a},\ldots,-\frac{c+a\,\nu}{2\,a},-\nu;1-\frac{c+a\,\nu}{2\,a},\ldots,1-\frac{c+a\,\nu}{2\,a};e^{2\,i\,a\,z}\right)-\right.$$
$$\left.e^{i\,(d+c\,z)}\sum_{j=0}^{n}\frac{(-1)^j\,z^{n-j}\,(i\,c-i\,a\,\nu)^{-j-1}}{(n-j)!}\;{}_{j+2}F_{j+1}\!\left(\frac{c-a\,\nu}{2\,a},\ldots,\frac{c-a\,\nu}{2\,a},-\nu;\frac{c-a\,\nu}{2\,a}+1,\ldots,\frac{c-a\,\nu}{2\,a}+1;e^{2\,i\,a\,z}\right)\right)\;/;\;n\in\mathbb{N}$$

Involving $z^{\alpha-1}\sin(c\,z)\sin^{\nu}(a\,z+b)$

01.06.21.1130.01

$$\int z^{\alpha-1}\sin(c\,z)\sin^{\nu}(b+a\,z)\,dz = 2^{-\nu-1}z^{\alpha}\left(i\binom{\nu}{\frac{\nu}{2}}\left((-i\,c\,z)^{-\alpha}\,\Gamma(\alpha,-i\,c\,z)-(i\,c\,z)^{-\alpha}\,\Gamma(\alpha,i\,c\,z)\right)(1-\nu\bmod 2)-\right.$$
$$i^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s}e^{-i\,b\,(2s+\nu)}\binom{\nu}{s}\left(e^{2\,i\,b\,\nu}\,\Gamma(\alpha,-i\,(c-2\,a\,s+a\,\nu)\,z)\,(-i\,(c-2\,a\,s+a\,\nu)\,z)^{-\alpha}-\right.$$
$$e^{i\,(4\,b\,s+\pi\,\nu)}\,(i\,(c-2\,a\,s+a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(c-2\,a\,s+a\,\nu)\,z)+e^{i\,(4\,b\,s+\pi\,\nu)}\,(-i\,(c+2\,a\,s-a\,\nu)\,z)^{-\alpha}$$
$$\left.\left.\Gamma(\alpha,-i\,(c+2\,a\,s-a\,\nu)\,z)-e^{2\,i\,b\,\nu}\,(i\,(c+2\,a\,s-a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(c+2\,a\,s-a\,\nu)\,z)\right)\right)\;/;\;\nu\in\mathbb{N}^{+}$$

01.06.21.1131.01

$$\int z^{n}\sin(c\,z)\sin^{\nu}(a\,z+b)\,dz = \frac{1}{2}\,i\left(1-e^{2\,i\,(b+a\,z)}\right)^{-\nu}n!\,\sin^{\nu}(a\,z+b)$$
$$\left(e^{-i\,c\,z}\sum_{j=0}^{n}\frac{(-1)^{j}z^{n-j}\,(-i\,c-i\,a\,\nu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\left(-\frac{c+a\,\nu}{2\,a},\ldots,-\frac{c+a\,\nu}{2\,a},-\nu;1-\frac{c+a\,\nu}{2\,a},\ldots,1-\frac{c+a\,\nu}{2\,a};e^{2\,i\,(b+a\,z)}\right)-\right.$$
$$\left.e^{i\,c\,z}\sum_{j=0}^{n}\frac{(-1)^{j}z^{n-j}\,(i\,c-i\,a\,\nu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\left(\frac{c-a\,\nu}{2\,a},\ldots,\frac{c-a\,\nu}{2\,a},-\nu;\frac{c-a\,\nu}{2\,a}+1,\ldots,\frac{c-a\,\nu}{2\,a}+1;e^{2\,i\,(b+a\,z)}\right)\right)\;/;\;n\in\mathbb{N}$$

Involving $z^{\alpha-1}\sin(c\,z+d)\sin^{\nu}(a\,z+b)$

01.06.21.1132.01

$$\int z^{\alpha-1}\sin(d+c\,z)\sin^{\nu}(b+a\,z)\,dz =$$
$$2^{-\nu-1}z^{\alpha}\left(i\,e^{i\,d}\binom{\nu}{\frac{\nu}{2}}\left((-i\,c\,z)^{-\alpha}\,\Gamma(\alpha,-i\,c\,z)-e^{-2\,i\,d}\,(i\,c\,z)^{-\alpha}\,\Gamma(\alpha,i\,c\,z)\right)(1-\nu\bmod 2)-i^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{s}e^{i\,(d-b\,(2s+\nu))}\right.$$
$$\binom{\nu}{s}\left(e^{2\,i\,b\,\nu}\,\Gamma(\alpha,-i\,(c-2\,a\,s+a\,\nu)\,z)\,(-i\,(c-2\,a\,s+a\,\nu)\,z)^{-\alpha}-e^{i\,(-2\,d+4\,b\,s+\pi\,\nu)}\,(i\,(c-2\,a\,s+a\,\nu)\,z)^{-\alpha}\right.$$
$$\Gamma(\alpha,i\,(c-2\,a\,s+a\,\nu)\,z)+e^{i\,(4\,b\,s+\pi\,\nu)}\,(-i\,(c+2\,a\,s-a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,-i\,(c+2\,a\,s-a\,\nu)\,z)-$$
$$\left.\left.e^{2\,i\,(b\,\nu-d)}\,(i\,(c+2\,a\,s-a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(c+2\,a\,s-a\,\nu)\,z)\right)\right)\;/;\;\nu\in\mathbb{N}^{+}$$

01.06.21.1133.01

$$\int z^n \sin(c z + d) \sin^\nu(a z + b)\, dz = \frac{1}{2} i \left(1 - e^{2 i (b + a z)}\right)^{-\nu} n! \sin^\nu(a z + b) \left(e^{-i (d + c z)} \sum_{j=0}^{n} \frac{(-1)^j z^{n-j} (-i c - i a \nu)^{-j-1}}{(n-j)!} {}_{j+2}F_{j+1}\left(-\frac{c + a \nu}{2 a}, \ldots, -\frac{c + a \nu}{2 a}, -\nu; 1 - \frac{c + a \nu}{2 a}, \ldots, 1 - \frac{c + a \nu}{2 a}; e^{2 i (b + a z)}\right) - e^{i (d + c z)} \sum_{j=0}^{n} \frac{(-1)^j z^{n-j} (i c - i a \nu)^{-j-1}}{(n-j)!} {}_{j+2}F_{j+1}\left(\frac{c - a \nu}{2 a}, \ldots, \frac{c - a \nu}{2 a}, -\nu; \frac{c - a \nu}{2 a} + 1, \ldots, \frac{c - a \nu}{2 a} + 1; e^{2 i (b + a z)}\right)\right) /; n \in \mathbb{N}$$

Involving $z^n \sin(b z^r) \sin^\nu(c z)$

01.06.21.1134.01

$$\int z^n \sin(b z^2) \sin^\nu(c z)\, dz = 2^{-\nu-2} \left(i \binom{\nu}{\frac{\nu}{2}} \left(\left(-i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, -i b z^2\right) - \left(i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i b z^2\right)\right) (1 - \nu \bmod 2) z^{n+1} + \frac{1}{b^{2n+1}} \left(i^{-\nu} \sum_{j=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^j e^{-\frac{i c^2 (\nu - 2j)^2}{4 b}} \binom{\nu}{j} \left(\left(\sum_{h=0}^{n} 2^{h-n} (-i c (\nu - 2j))^{n-h} (i (-2 c j + c \nu + 2 b z))^{h+1} \left(-\frac{i (-2 c j + c \nu + 2 b z)^2}{b}\right)^{\frac{1}{2}(-h-1)} \binom{n}{h} \Gamma\left(\frac{h+1}{2}, -\frac{i (-2 c j + c \nu + 2 b z)^2}{4 b}\right)\right) (-i b)^n + (-1)^\nu \left(\sum_{h=0}^{n} 2^{h-n} (i c (\nu - 2j))^{n-h} (i (2 c j - c \nu + 2 b z))^{h+1} \left(-\frac{i (2 c j - c \nu + 2 b z)^2}{b}\right)^{\frac{1}{2}(-h-1)} \binom{n}{h} \Gamma\left(\frac{h+1}{2}, -\frac{i (2 c j - c \nu + 2 b z)^2}{4 b}\right)\right) (-i b)^n + (-1)^\nu (i b)^n e^{\frac{i c^2 (\nu - 2j)^2}{2 b}} \sum_{h=0}^{n} 2^{h-n} (i c (\nu - 2j))^{n-h} (-i (-2 c j + c \nu + 2 b z))^{h+1} \left(\frac{i (-2 c j + c \nu + 2 b z)^2}{b}\right)^{\frac{1}{2}(-h-1)} \binom{n}{h} \Gamma\left(\frac{h+1}{2}, \frac{i (-2 c j + c \nu + 2 b z)^2}{4 b}\right) + (i b)^n e^{\frac{i c^2 (\nu - 2j)^2}{2 b}} \sum_{h=0}^{n} 2^{h-n} (-i c (\nu - 2j))^{n-h} (i (-2 c j + c \nu - 2 b z))^{h+1} \left(\frac{i (2 c j - c \nu + 2 b z)^2}{b}\right)^{\frac{1}{2}(-h-1)} \binom{n}{h} \Gamma\left(\frac{h+1}{2}, \frac{i (2 c j - c \nu + 2 b z)^2}{4 b}\right)\right)\right)\right) /; \nu \in \mathbb{N}^+ \land n \in \mathbb{N}$$

01.06.21.1135.01

$$\int z^n \sin\left(b\sqrt{z}\right)\sin^{\nu}(c\,z)\,dz = i\,2^{-\nu} z^{n+1}\binom{\nu}{\frac{\nu}{2}}\left(\left(-i\,b\sqrt{z}\right)^{-2(n+1)}\Gamma\left(2(n+1),-i\,b\sqrt{z}\right)-\left(i\,b\sqrt{z}\right)^{-2(n+1)}\Gamma\left(2(n+1),i\,b\sqrt{z}\right)\right)(1-\nu \bmod 2)+$$

$$2^{-2n-\nu-2}\,i^{-\nu-1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left((-1)^{\nu+1}e^{-\frac{i\,b^2}{4c(2k-\nu)}}\right.$$

$$\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(-i\,b)^{-h-j+2n}\left(-i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)^{h+j}\left(\frac{i\left(-i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)^2}{c(2k-\nu)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\right.$$

$$\left(2\,i\,c(2k-\nu)\sqrt{\frac{i\left(-i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)^2}{c(2k-\nu)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(-i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)^2}{4c(2k-\nu)}\right)-i\,b\right.$$

$$\left.\left.\left(-i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\frac{i\left(-i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)^2}{4c(2k-\nu)}\right)\right)\right)(i\,c(2k-\nu))^{-2n-2}+$$

$$(-1)^{\nu}e^{-\frac{i\,b^2}{4c(2k-\nu)}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(i\,b)^{-h-j+2n}\left(i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)^{h+j}\left(\frac{i\left(i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)^2}{c(2k-\nu)}\right)^{\frac{1}{2}(-h-j-1)}\right.$$

$$\binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\frac{i\left(i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)^2}{4c(2k-\nu)}\right)+2\,c\,i\right.$$

$$\left.\left.(2k-\nu)\sqrt{\frac{i\left(i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)^2}{c(2k-\nu)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(i\,b+2\,i\,c(2k-\nu)\sqrt{z}\right)^2}{4c(2k-\nu)}\right)\right)\right)$$

$$(i\,c(2k-\nu))^{-2n-2}-e^{-\frac{i\,b^2}{4c(\nu-2k)}}(i\,c(\nu-2k))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(-i\,b)^{-h-j+2n}$$

$$\left(-i\,b+2\,i\,c(\nu-2k)\sqrt{z}\right)^{h+j}\left(\frac{i\left(-i\,b+2\,i\,c(\nu-2k)\sqrt{z}\right)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(2\, i\, c\,(v-2k)\sqrt{\frac{i\left(-i\, b+2\, i\, c\,(v-2k)\sqrt{z}\right)^2}{c\,(v-2k)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\, \frac{i\left(-i\, b+2\, i\, c\,(v-2k)\sqrt{z}\right)^2}{4\, c\,(v-2k)}\right)-\right.$$

$$\left.\left. i\, b\left(-i\, b+2\, i\, c\,(v-2k)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\, \frac{i\left(-i\, b+2\, i\, c\,(v-2k)\sqrt{z}\right)^2}{4\, c\,(v-2k)}\right)\right)\right)+$$

$$e^{-\frac{i\, b^2}{4\, c\,(v-2k)}}\,(i\, c\,(v-2k))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(i\, b)^{-h-j+2n}\left(i\, b+2\, i\, c\,(v-2k)\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\, b+2\, i\, c\,(v-2k)\sqrt{z}\right)^2}{c\,(v-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(b\, i\left(i\, b+2\, i\, c\,(v-2k)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\, \frac{i\left(i\, b+2\, i\, c\,(v-2k)\sqrt{z}\right)^2}{4\, c\,(v-2k)}\right)+2\, c\, i\,(v-2k)\right.$$

$$\left.\left.\sqrt{\frac{i\left(i\, b+2\, i\, c\,(v-2k)\sqrt{z}\right)^2}{c\,(v-2k)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\, \frac{i\left(i\, b+2\, i\, c\,(v-2k)\sqrt{z}\right)^2}{4\, c\,(v-2k)}\right)\right)\right)\;/;\; n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin\left(b\, z^r+e\right)\sin^v(c\, z)$

01.06.21.1136.01

$$\int z^n \sin\left(b z^2 + e\right) \sin^\nu(c z)\, dz = i\, 2^{-\nu-2} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \left(e^{i e} \left(-i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, -i b z^2\right) - e^{-i e} \left(i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i b z^2\right)\right) (1 - \nu \bmod 2) - 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{1}{4} i \left(-\frac{c^2 (\nu-2s)^2}{b} + 4e - 2\pi(\nu+1)\right)} \left(\sum_{j=0}^{n} 2^{j-n} (i c (\nu - 2 s))^{n-j} (-i c (\nu - 2 s) - 2 i b z)^{j+1} \left(-\frac{i (-i c (\nu - 2 s) - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i c (\nu - 2 s) - 2 i b z)^2}{4 b}\right)\right) (-i b)^{-n-1} + e^{-\frac{1}{4} i \left(-\frac{c^2 (\nu-2s)^2}{b} + 4e - 2\pi(1-\nu)\right)} \left(\sum_{j=0}^{n} 2^{j-n} (-i c (\nu - 2 s))^{n-j} (i c (\nu - 2 s) - 2 i b z)^{j+1} \left(-\frac{i (i c (\nu - 2 s) - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (i c (\nu - 2 s) - 2 i b z)^2}{4 b}\right)\right) (-i b)^{-n-1} + (i b)^{-n-1} e^{\frac{1}{4} i \left(-\frac{c^2 (\nu-2s)^2}{b} + 4e + 2\pi(\nu-1)\right)} \sum_{j=0}^{n} 2^{j-n} (i c (\nu - 2 s))^{n-j} (2 i b z - i c (\nu - 2 s))^{j+1} \left(\frac{i (2 i b z - i c (\nu - 2 s))^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (2 i b z - i c (\nu - 2 s))^2}{4 b}\right) + (i b)^{-n-1} e^{\frac{1}{4} i \left(-\frac{c^2 (\nu-2s)^2}{b} + 4e - 2\pi(\nu+1)\right)} \sum_{j=0}^{n} 2^{j-n} (-i c (\nu - 2 s))^{n-j} (c i (\nu - 2 s) + 2 i b z)^{j+1} \left(\frac{i (c i (\nu - 2 s) + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (c i (\nu - 2 s) + 2 i b z)^2}{4 b}\right)\right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1137.01

$$\int z^n \sin\left(\sqrt{z}\, b + e\right) \sin^\nu(c z)\, dz = (-1)^n 2^{-\nu} i \binom{\nu}{\frac{\nu}{2}} \left(e^{-i e} \Gamma\left(2(n+1), i b \sqrt{z}\right) - e^{i e} \Gamma\left(2(n+1), -i b \sqrt{z}\right)\right) (1 - \nu \bmod 2)\, b^{-2(n+1)} + 2^{-2n-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{\frac{i b^2}{4 c (\nu - 2 s)} - i e + \frac{1}{2} i \pi (\nu+1)} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b)^{-h-j+2n} \left(-i b - 2 i c (\nu - 2 s) \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i b - 2 i c (\nu - 2 s) \sqrt{z}\right)^2}{c (\nu - 2 s)}\right)^{\frac{1}{2}(-h-j-1)} \right. \right.$$

$$\binom{j}{h}\binom{n}{j}\left(-i\,b\left(-i\,b-2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(-i\,b-2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,c\,(v-2\,s)}\right)-2\,i\,c\right.$$

$$\left.\left.(v-2\,s)\,\sqrt{-\frac{i\left(-i\,b-2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{c\,(v-2\,s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(-i\,b-2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,c\,(v-2\,s)}\right)\right)\right)$$

$$(-i\,c\,(v-2\,s))^{-2\,(n+1)}+e^{\frac{i\,b^2}{4\,c\,(v-2\,s)}+i\,e+\frac{1}{2}\,i\,\pi\,(v-1)}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}\left(i\,b-2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{i\left(i\,b-2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(i\,b\left(i\,b-2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(i\,b-2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,c\,(v-2\,s)}\right)-2\,i\,c\,(v-2\,s)\right.$$

$$\left.\left.\sqrt{-\frac{i\left(i\,b-2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{c\,(v-2\,s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(i\,b-2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,c\,(v-2\,s)}\right)\right)\right)$$

$$(-i\,c\,(v-2\,s))^{-2\,(n+1)}+e^{-\frac{i\,b^2}{4\,c\,(v-2\,s)}-i\,e+\frac{1}{2}\,i\,\pi\,(1-v)}\,(i\,c\,(v-2\,s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}$$

$$\left(-i\,b+2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(-i\,b+2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(2\,i\,c\,(v-2\,s)\,\sqrt{\frac{i\left(-i\,b+2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{c\,(v-2\,s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(-i\,b+2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,c\,(v-2\,s)}\right)-\right.$$

$$\left.i\,b\left(-i\,b+2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(-i\,b+2\,i\,c\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,c\,(v-2\,s)}\right)\right)+$$

$$e^{-\frac{i b^2}{4 c (v-2 s)}+i e-\frac{1}{2} i \pi (v+1)} (i c (v-2 s))^{-2 (n+1)} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i b)^{-h-j+2 n} \left(i b+2 i c (v-2 s) \sqrt{z}\right)^{h+j}$$

$$\left(\frac{i \left(i b+2 i c (v-2 s) \sqrt{z}\right)^2}{c (v-2 s)}\right)^{\frac{1}{2} (-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\left(b i \left(i b+2 i c (v-2 s) \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h+j+1), \frac{i \left(i b+2 i c (v-2 s) \sqrt{z}\right)^2}{4 c (v-2 s)}\right)+2 c i (v-2 s)\right.$$

$$\left.\sqrt{\frac{i \left(i b+2 i c (v-2 s) \sqrt{z}\right)^2}{c (v-2 s)}} \Gamma\left(\frac{1}{2} (h+j+2), \frac{i \left(i b+2 i c (v-2 s) \sqrt{z}\right)^2}{4 c (v-2 s)}\right)\right)\Bigg) /; n \in \mathbb{N} \land v \in \mathbb{N}^+$$

Involving $z^n \sin\left(b z^r + d z\right) \sin^v(c v z)$

01.06.21.1138.01

$$\int z^n \sin\left(b z^2 + d z\right) \sin^\nu(c z)\, dz = i\, 2^{-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)$$

$$\left((i b)^{-n-1} e^{-\frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 i b z)^{j+1} \left(\frac{i (i d + 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + 2 i b z)^2}{4 b} \right) - \right.$$

$$\left. (-i b)^{-n-1} e^{\frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d - 2 i b z)^{j+1} \left(-\frac{i (-i d - 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - 2 i b z)^2}{4 b} \right) \right) -$$

$$i^{-\nu-1} 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(-e^{-\frac{i (-i d + i c (\nu - 2 s))^2}{4 b}} \left(\sum_{j=0}^{n} 2^{j-n} (i d - i c (\nu - 2 s))^{n-j} (-i d + i c (\nu - 2 s) - 2 i b z)^{j+1} \right. \right.$$

$$\left. \left(-\frac{i (-i d + i c (\nu - 2 s) - 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d + i c (\nu - 2 s) - 2 i b z)^2}{4 b} \right) \right) (-i b)^{-n-1} +$$

$$(-1)^{\nu+1} e^{-\frac{i (-i d - i c (\nu - 2 s))^2}{4 b}} \left(\sum_{j=0}^{n} 2^{j-n} (i d + i c (\nu - 2 s))^{n-j} (-i d - i c (\nu - 2 s) - 2 i b z)^{j+1} \right.$$

$$\left. \left(-\frac{i (-i d - i c (\nu - 2 s) - 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - i c (\nu - 2 s) - 2 i b z)^2}{4 b} \right) \right) (-i b)^{-n-1} +$$

$$(i b)^{-n-1} e^{\frac{i (i d + i c (\nu - 2 s))^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-i d - i c (\nu - 2 s))^{n-j} (i d + i c (\nu - 2 s) + 2 i b z)^{j+1}$$

$$\left(\frac{i (i d + i c (\nu - 2 s) + 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + i c (\nu - 2 s) + 2 i b z)^2}{4 b} \right) +$$

$$(-1)^\nu (i b)^{-n-1} e^{\frac{i (i d - i c (\nu - 2 s))^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-i d + i c (\nu - 2 s))^{n-j} (i d - i c (\nu - 2 s) + 2 i b z)^{j+1}$$

$$\left. \left(\frac{i (i d - i c (\nu - 2 s) + 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d - i c (\nu - 2 s) + 2 i b z)^2}{4 b} \right) \right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1139.01

$$\int z^n \sin\left(\sqrt{z}\, b + d z\right) \sin^\nu(c z)\, dz =$$

$$2^{-2 n-\nu-2} i \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(e^{\frac{i b^2}{4 d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b)^{-h-j+2 n} \left(-i b - 2 i d \sqrt{z} \right)^{h+j} \left(-\frac{i \left(-i b - 2 i d \sqrt{z} \right)^2}{d} \right)^{\frac{1}{2}(-h-j-1)} \right.$$

$$\binom{j}{h}\binom{n}{j}\left(-i\,b\left(-i\,b-2\,i\,d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,b-2\,i\,d\sqrt{z}\right)^2}{4\,d}\right)-\right.$$

$$\left.2\,i\,d\sqrt{-\frac{i\left(-i\,b-2\,i\,d\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(-i\,b-2\,i\,d\sqrt{z}\right)^2}{4\,d}\right)\right)-$$

$$e^{-\frac{i\,b^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}\left(i\,b+2\,i\,d\sqrt{z}\right)^{h+j}\left(\frac{i\left(i\,b+2\,i\,d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(b\,i\left(i\,b+2\,i\,d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+2\,i\,d\sqrt{z}\right)^2}{4\,d}\right)+\right.$$

$$\left.\left.2\sqrt{\frac{i\left(i\,b+2\,i\,d\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+2\,i\,d\sqrt{z}\right)^2}{4\,d}\right)\right)\right)(i\,d)^{-2\,n-2}+$$

$$2^{-2\,n-\nu-2}\,i^{-\nu-1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left((-1)^{\nu+1}\,e^{\frac{b^2}{4(-i\,d+i\,c\,(2\,k-\nu))}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}\right.\right.$$

$$\left(-i\,b+2\,(-i\,d+i\,c\,(2\,k-\nu))\sqrt{z}\right)^{h+j}\left(-\frac{\left(-i\,b+2\,(-i\,d+i\,c\,(2\,k-\nu))\sqrt{z}\right)^2}{-i\,d+i\,c\,(2\,k-\nu)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\,(-i\,d+i\,c\,(2\,k-\nu))\sqrt{-\frac{\left(-i\,b+2\,(-i\,d+i\,c\,(2\,k-\nu))\sqrt{z}\right)^2}{-i\,d+i\,c\,(2\,k-\nu)}}\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{\left(-i\,b+2\,(-i\,d+i\,c\,(2\,k-\nu))\sqrt{z}\right)^2}{4\,(-i\,d+i\,c\,(2\,k-\nu))}\right)-i\,b\left(-i\,b+2\,(-i\,d+i\,c\,(2\,k-\nu))\sqrt{z}\right)$$

$$\left.\left.\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{\left(-i\,b+2\,(-i\,d+i\,c\,(2\,k-\nu))\sqrt{z}\right)^2}{4\,(-i\,d+i\,c\,(2\,k-\nu))}\right)\right)\right)(-i\,d+i\,c\,(2\,k-\nu))^{-2\,n-2}+$$

$$(-1)^{\nu}\, e^{\frac{b^2}{4(i d+i c(2k-\nu))}}\,(i d+i c(2k-\nu))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i b)^{-h-j+2n}\left(i b+2(i d+i c(2k-\nu))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i b+2(i d+i c(2k-\nu))\sqrt{z}\right)^2}{i d+i c(2k-\nu)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(b\,i\left(i b+2(i d+i c(2k-\nu))\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\,-\frac{\left(i b+2(i d+i c(2k-\nu))\sqrt{z}\right)^2}{4(i d+i c(2k-\nu))}\Bigg)+2\sqrt{-\frac{\left(i b+2(i d+i c(2k-\nu))\sqrt{z}\right)^2}{i d+i c(2k-\nu)}}$$

$$(i d+i c(2k-\nu))\,\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{\left(i b+2(i d+i c(2k-\nu))\sqrt{z}\right)^2}{4(i d+i c(2k-\nu))}\right)\Bigg)-$$

$$e^{\frac{b^2}{4(-i d+i c(\nu-2k))}}\,(-i d+i c(\nu-2k))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i b)^{-h-j+2n}\left(-i b+2(-i d+i c(\nu-2k))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i b+2(-i d+i c(\nu-2k))\sqrt{z}\right)^2}{-i d+i c(\nu-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(2(-i d+i c(\nu-2k))$$

$$\sqrt{-\frac{\left(-i b+2(-i d+i c(\nu-2k))\sqrt{z}\right)^2}{-i d+i c(\nu-2k)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{\left(-i b+2(-i d+i c(\nu-2k))\sqrt{z}\right)^2}{4(-i d+i c(\nu-2k))}\right)-$$

$$i b\left(-i b+2(-i d+i c(\nu-2k))\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{\left(-i b+2(-i d+i c(\nu-2k))\sqrt{z}\right)^2}{4(-i d+i c(\nu-2k))}\right)\Bigg)+$$

$$e^{\frac{b^2}{4(i d+i c(\nu-2k))}}\,(i d+i c(\nu-2k))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i b)^{-h-j+2n}\left(i b+2(i d+i c(\nu-2k))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i b+2(i d+i c(\nu-2k))\sqrt{z}\right)^2}{i d+i c(\nu-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(b\,i\left(i b+2(i d+i c(\nu-2k))\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\,-\frac{\left(i b+2(i d+i c(\nu-2k))\sqrt{z}\right)^2}{4(i d+i c(\nu-2k))}\Bigg)+2\sqrt{-\frac{\left(i b+2(i d+i c(\nu-2k))\sqrt{z}\right)^2}{i d+i c(\nu-2k)}}$$

$$\Bigg(\frac{1}{}\qquad\left(i b+2(i d+i c(\nu-2k))\sqrt{z}\right)^2\Bigg)\Bigg)$$

Involving $z^n \sin\left(b z^r + d z + e\right) \sin^v(c v z)$

01.06.21.1140.01

$$\int z^n \sin\left(b z^2 + d z + e\right) \sin^\nu(c z)\, dz = i\, 2^{-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)$$

$$\left((i b)^{-n-1} e^{i e - \frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 i b z)^{j+1} \left(\frac{i (i d + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + 2 i b z)^2}{4 b}\right) - \right.$$

$$\left. (-i b)^{-n-1} e^{\frac{i d^2}{4 b} - i e} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d - 2 i b z)^{j+1} \left(-\frac{i (-i d - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - 2 i b z)^2}{4 b}\right)\right) -$$

$$2^{-\nu-2}\, i^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(-e^{-\frac{i (-i d + i c (\nu - 2 s))^2}{4 b} - i e} \left(\sum_{j=0}^{n} 2^{j-n} (i d - i c (\nu - 2 s))^{n-j} (-i d + i c (\nu - 2 s) - 2 i b z)^{j+1}\right.\right.$$

$$\left.\left(-\frac{i (-i d + i c (\nu - 2 s) - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d + i c (\nu - 2 s) - 2 i b z)^2}{4 b}\right)\right) (-i b)^{-n-1} +$$

$$(-1)^{\nu+1} e^{-\frac{i (-i d - i c (\nu - 2 s))^2}{4 b} - i e} \left(\sum_{j=0}^{n} 2^{j-n} (i d + i c (\nu - 2 s))^{n-j} (-i d - i c (\nu - 2 s) - 2 i b z)^{j+1}\right.$$

$$\left.\left(-\frac{i (-i d - i c (\nu - 2 s) - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - i c (\nu - 2 s) - 2 i b z)^2}{4 b}\right)\right) (-i b)^{-n-1} +$$

$$(i b)^{-n-1} e^{\frac{i (i d + i c (\nu - 2 s))^2}{4 b} + i e} \sum_{j=0}^{n} 2^{j-n} (-i d - i c (\nu - 2 s))^{n-j} (i d + i c (\nu - 2 s) + 2 i b z)^{j+1}$$

$$\left(\frac{i (i d + i c (\nu - 2 s) + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + i c (\nu - 2 s) + 2 i b z)^2}{4 b}\right) +$$

$$(-1)^\nu (i b)^{-n-1} e^{\frac{i (i d - i c (\nu - 2 s))^2}{4 b} + i e} \sum_{j=0}^{n} 2^{j-n} (-i d + i c (\nu - 2 s))^{n-j} (i d - i c (\nu - 2 s) + 2 i b z)^{j+1}$$

$$\left.\left(\frac{i (i d - i c (\nu - 2 s) + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d - i c (\nu - 2 s) + 2 i b z)^2}{4 b}\right)\right) /;\, n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1141.01

$$\int z^n \sin\left(\sqrt{z}\, b + d\, z + e\right) \sin^\nu(c\, z)\, dz =$$

$$2^{-2n-\nu-2}\, i \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(e^{\frac{i b^2}{4 d} - i e} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i\, b)^{-h-j+2n} \left(-i\, b - 2\, i\, d \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i\, b - 2\, i\, d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \right.$$

$$\binom{j}{h} \binom{n}{j} \left(-i\, b \left(-i\, b - 2\, i\, d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h + j + 1), -\frac{i \left(-i\, b - 2\, i\, d \sqrt{z}\right)^2}{4\, d}\right) - \right.$$

$$\left.\left. 2\, i\, d \sqrt{-\frac{i \left(-i\, b - 2\, i\, d \sqrt{z}\right)^2}{d}}\; \Gamma\left(\frac{1}{2}(h + j + 2), -\frac{i \left(-i\, b - 2\, i\, d \sqrt{z}\right)^2}{4\, d}\right)\right)\right. -$$

$$e^{i e - \frac{i b^2}{4 d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, b)^{-h-j+2n} \left(i\, b + 2\, i\, d \sqrt{z}\right)^{h+j} \left(\frac{i \left(i\, b + 2\, i\, d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}$$

$$\binom{n}{j} \left(b\, i \left(i\, b + 2\, i\, d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h + j + 1), \frac{i \left(i\, b + 2\, i\, d \sqrt{z}\right)^2}{4\, d}\right) + \right.$$

$$\left.\left. 2 \sqrt{\frac{i \left(i\, b + 2\, i\, d \sqrt{z}\right)^2}{d}}\; d\, i\, \Gamma\left(\frac{1}{2}(h + j + 2), \frac{i \left(i\, b + 2\, i\, d \sqrt{z}\right)^2}{4\, d}\right)\right)\right) (i\, d)^{-2n-2} +$$

$$2^{-2n-\nu-2}\, i^{-\nu-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^{\nu+1}\, e^{\frac{b^2}{4(-i d + i c (2k-\nu))} - i e} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i\, b)^{-h-j+2n} \right.\right.$$

$$\left(-i\, b + 2\,(-i\, d + i\, c\,(2\, k - \nu)) \sqrt{z}\right)^{h+j} \left(-\frac{\left(-i\, b + 2\,(-i\, d + i\, c\,(2\, k - \nu)) \sqrt{z}\right)^2}{-i\, d + i\, c\,(2\, k - \nu)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left(2\,(-i\, d + i\, c\,(2\, k - \nu)) \sqrt{-\frac{\left(-i\, b + 2\,(-i\, d + i\, c\,(2\, k - \nu)) \sqrt{z}\right)^2}{-i\, d + i\, c\,(2\, k - \nu)}} \right.$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(-i\,b+2\,(-i\,d+i\,c\,(2\,k-v))\sqrt{z}\right)^2}{4\,(-i\,d+i\,c\,(2\,k-v))}\right) - i\,b\left(-i\,b+2\,(-i\,d+i\,c\,(2\,k-v))\sqrt{z}\right)$$

$$\left.\left.\left.\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(-i\,b+2\,(-i\,d+i\,c\,(2\,k-v))\sqrt{z}\right)^2}{4\,(-i\,d+i\,c\,(2\,k-v))}\right)\right)\right)\right)(-i\,d+i\,c\,(2\,k-v))^{-2\,n-2} +$$

$$(-1)^v\, e^{\frac{b^2}{4\,(i\,d+i\,c\,(2\,k-v))}+i\,e}\,(i\,d+i\,c\,(2\,k-v))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}\left(i\,b+2\,(i\,d+i\,c\,(2\,k-v))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\,b+2\,(i\,d+i\,c\,(2\,k-v))\sqrt{z}\right)^2}{i\,d+i\,c\,(2\,k-v)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,(i\,d+i\,c\,(2\,k-v))\sqrt{z}\right)\Gamma\left(\right.\right.$$

$$\left.\frac{1}{2}(h+j+1), -\frac{\left(i\,b+2\,(i\,d+i\,c\,(2\,k-v))\sqrt{z}\right)^2}{4\,(i\,d+i\,c\,(2\,k-v))}\right)+2\sqrt{-\frac{\left(i\,b+2\,(i\,d+i\,c\,(2\,k-v))\sqrt{z}\right)^2}{i\,d+i\,c\,(2\,k-v)}}$$

$$\left.(i\,d+i\,c\,(2\,k-v))\,\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(i\,b+2\,(i\,d+i\,c\,(2\,k-v))\sqrt{z}\right)^2}{4\,(i\,d+i\,c\,(2\,k-v))}\right)\right) -$$

$$e^{\frac{b^2}{4\,(-i\,d+i\,c\,(v-2\,k))}-i\,e}\,(-i\,d+i\,c\,(v-2\,k))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}\left(-i\,b+2\,(-i\,d+i\,c\,(v-2\,k))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i\,b+2\,(-i\,d+i\,c\,(v-2\,k))\sqrt{z}\right)^2}{-i\,d+i\,c\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(2\,(-i\,d+i\,c\,(v-2\,k))\right.$$

$$\sqrt{-\frac{\left(-i\,b+2\,(-i\,d+i\,c\,(v-2\,k))\sqrt{z}\right)^2}{-i\,d+i\,c\,(v-2\,k)}}\;\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(-i\,b+2\,(-i\,d+i\,c\,(v-2\,k))\sqrt{z}\right)^2}{4\,(-i\,d+i\,c\,(v-2\,k))}\right) -$$

$$\left.i\,b\left(-i\,b+2\,(-i\,d+i\,c\,(v-2\,k))\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(-i\,b+2\,(-i\,d+i\,c\,(v-2\,k))\sqrt{z}\right)^2}{4\,(-i\,d+i\,c\,(v-2\,k))}\right)\right) +$$

$$e^{\frac{b^2}{4\,(i\,d+i\,c\,(v-2\,k))}+i\,e}\,(i\,d+i\,c\,(v-2\,k))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}\left(i\,b+2\,(i\,d+i\,c\,(v-2\,k))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\, b+2\,(i\, d+i\, c\,(v-2\, k))\,\sqrt{z}\,\right)^2}{i\, d+i\, c\,(v-2\, k)}\right)^{\frac{1}{2}\,(-h-j-1)} \binom{j}{h}\binom{n}{j}\left(b\, i\left(i\, b+2\,(i\, d+i\, c\,(v-2\, k))\,\sqrt{z}\,\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\, -\frac{\left(i\, b+2\,(i\, d+i\, c\,(v-2\, k))\,\sqrt{z}\,\right)^2}{4\,(i\, d+i\, c\,(v-2\, k))}\right)+2\,\sqrt{-\frac{\left(i\, b+2\,(i\, d+i\, c\,(v-2\, k))\,\sqrt{z}\,\right)^2}{i\, d+i\, c\,(v-2\, k)}}\,(i\, d+i\, c\,(v-2\, k))\,\Gamma\left(\frac{1}{2}\,(h+j+2),\, -\frac{\left(i\, b+2\,(i\, d+i\, c\,(v-2\, k))\,\sqrt{z}\,\right)^2}{4\,(i\, d+i\, c\,(v-2\, k))}\right)\right)\right) /;\, n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin\left(b\, z^r\right) \sin^v(f\, z+g)$

01.06.21.1142.01

$$\int z^n \sin(b z^2) \sin^v(f z + g)\, dz = i\, 2^{-v-2} z^{n+1} \binom{v}{\frac{v}{2}} \left((-i b z^2)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, -i b z^2\right) - (i b z^2)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i b z^2\right) \right) (1 - v \bmod 2) - 2^{-v-2} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Bigg(e^{-\frac{1}{4} i \left(-\frac{f^2 (v-2s)^2}{b} + 4 g (v-2s) - 2\pi (v+1)\right)} \Bigg(\sum_{j=0}^{n} 2^{j-n} (i f (v-2s))^{n-j} (-i f (v-2s) - 2 i b z)^{j+1} \left(-\frac{i (-i f (v-2s) - 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i f (v-2s) - 2 i b z)^2}{4b} \right) \Bigg) (-i b)^{-n-1} + e^{-\frac{1}{4} i \left(-\frac{f^2 (v-2s)^2}{b} - 4 g (v-2s) - 2\pi (1-v)\right)} \Bigg(\sum_{j=0}^{n} 2^{j-n} (-i f (v-2s))^{n-j} (i f (v-2s) - 2 i b z)^{j+1} \left(-\frac{i (i f (v-2s) - 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (i f (v-2s) - 2 i b z)^2}{4b} \right) \Bigg) (-i b)^{-n-1} + (i b)^{-n-1} e^{\frac{1}{4} i \left(-\frac{f^2 (v-2s)^2}{b} - 4 g (v-2s) + 2\pi (v-1)\right)} \sum_{j=0}^{n} 2^{j-n} (i f (v-2s))^{n-j} (2 i b z - i f (v-2s))^{j+1} \left(\frac{i (2 i b z - i f (v-2s))^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (2 i b z - i f (v-2s))^2}{4b} \right) + (i b)^{-n-1} e^{\frac{1}{4} i \left(-\frac{f^2 (v-2s)^2}{b} + 4 g (v-2s) - 2\pi (v+1)\right)} \sum_{j=0}^{n} 2^{j-n} (-i f (v-2s))^{n-j} (f i (v-2s) + 2 i b z)^{j+1} \left(\frac{i (f i (v-2s) + 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f i (v-2s) + 2 i b z)^2}{4b} \right) \Bigg) /; n \in \mathbb{N} \land v \in \mathbb{N}^+$$

01.06.21.1143.01

$$\int z^n \sin(b \sqrt{z}) \sin^v(g + f z)\, dz = (-1)^n 2^{-v} i \binom{v}{\frac{v}{2}} \left(\Gamma\left(2(n+1), i b \sqrt{z}\right) - \Gamma\left(2(n+1), -i b \sqrt{z}\right) \right) (1 - v \bmod 2)\, b^{-2(n+1)} + 2^{-2n-v-2} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Bigg(e^{\frac{i b^2}{4 f (v-2s)} + \frac{1}{2} i \pi (v+1) - i g (v-2s)} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b)^{-h-j+2n} \left(-i b - 2 i f (v-2s) \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i b - 2 i f (v-2s) \sqrt{z}\right)^2}{f (v-2s)} \right)^{\frac{1}{2}(-h-j-1)} \right.$$

$$\binom{j}{h}\binom{n}{j}\left(-i\, b\left(-i\, b-2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(-i\, b-2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, f\,(v-2\, s)}\right)-2\, i\, f\right.$$

$$\left.(v-2\, s)\sqrt{-\frac{i\left(-i\, b-2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{f\,(v-2\, s)}}\;\Gamma\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(-i\, b-2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, f\,(v-2\, s)}\right)\right)\Bigg)$$

$$(-i\, f\,(v-2\, s))^{-2\,(n+1)}+e^{\frac{i\, b^2}{4\, f\,(v-2\, s)}+\frac{1}{2}\, i\,\pi\,(v-1)-i\, g\,(v-2\, s)}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(i\, b)^{-h-j+2\, n}\right.$$

$$\left(i\, b-2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^{h+j}\left(-\frac{i\left(i\, b-2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{f\,(v-2\, s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(i\, b\left(i\, b-2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(i\, b-2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, f\,(v-2\, s)}\right)-2\, i\, f\,(v-2\, s)\right.$$

$$\left.\sqrt{-\frac{i\left(i\, b-2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{f\,(v-2\, s)}}\;\Gamma\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(i\, b-2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, f\,(v-2\, s)}\right)\right)\Bigg)$$

$$(-i\, f\,(v-2\, s))^{-2\,(n+1)}+e^{-\frac{i\, b^2}{4\, f\,(v-2\, s)}+\frac{1}{2}\, i\,\pi\,(1-v)+g\, i\,(v-2\, s)}\,(i\, f\,(v-2\, s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(-i\, b)^{-h-j+2\, n}\left(-i\, b+2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(-i\, b+2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{f\,(v-2\, s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\left(2\, i\, f\,(v-2\, s)\sqrt{\frac{i\left(-i\, b+2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{f\,(v-2\, s)}}\;\Gamma\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(-i\, b+2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, f\,(v-2\, s)}\right)-\right.$$

$$\left.i\, b\left(-i\, b+2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(-i\, b+2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, f\,(v-2\, s)}\right)\right)+$$

$$e^{-\frac{i\, b^2}{4\, f\,(v-2\, s)}-\frac{1}{2}\, i\,\pi\,(v+1)+g\, i\,(v-2\, s)}\,(i\, f\,(v-2\, s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(i\, b)^{-h-j+2\, n}\left(i\, b+2\, i\, f\,(v-2\, s)\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}$$

$$\left(b\,i\left(i\,b+2\,i\,f\,(v-2\,s)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+2\,f\,i\,(v-2\,s)\right.$$

$$\left.\left.\sqrt{\frac{i\left(i\,b+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)\right) /;\, n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin\left(b\,z^r+e\right)\sin^v(f\,z+g)$

01.06.21.1144.01

$$\int z^n \sin\left(b z^2 + e\right) \sin^\nu(g + f z)\, dz = $$

$$i\, 2^{-\nu-2} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \left(e^{i e} \left(-i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, -i b z^2\right) - e^{-i e} \left(i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i b z^2\right)\right) (1 - \nu \bmod 2) -$$

$$2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{1}{4} i \left(-\frac{f^2 (\nu-2s)^2}{b} + 4 g (\nu-2s) + 4e - 2\pi(\nu+1)\right)} \left(\sum_{j=0}^{n} 2^{j-n} (i f (\nu - 2s))^{n-j} (-i f (\nu-2s) - 2 i b z)^{j+1} \right.\right.$$

$$\left.\left(-\frac{i (-i f (\nu-2s) - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i f (\nu-2s) - 2 i b z)^2}{4b}\right)\right) (-i b)^{-n-1} +$$

$$e^{-\frac{1}{4} i \left(-\frac{f^2 (\nu-2s)^2}{b} - 4 g (\nu-2s) + 4e - 2\pi(1-\nu)\right)} \left(\sum_{j=0}^{n} 2^{j-n} (-i f (\nu - 2s))^{n-j} (i f (\nu-2s) - 2 i b z)^{j+1} \right.$$

$$\left.\left(-\frac{i (i f (\nu-2s) - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (i f (\nu-2s) - 2 i b z)^2}{4b}\right)\right) (-i b)^{-n-1} +$$

$$(i b)^{-n-1} e^{\frac{1}{4} i \left(-\frac{f^2 (\nu-2s)^2}{b} - 4 g (\nu-2s) + 4e + 2\pi(\nu-1)\right)} \sum_{j=0}^{n} 2^{j-n} (i f (\nu - 2s))^{n-j} (2 i b z - i f (\nu-2s))^{j+1}$$

$$\left(\frac{i (2 i b z - i f (\nu-2s))^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (2 i b z - i f (\nu-2s))^2}{4b}\right) +$$

$$(i b)^{-n-1} e^{\frac{1}{4} i \left(-\frac{f^2 (\nu-2s)^2}{b} + 4 g (\nu-2s) + 4e - 2\pi(\nu+1)\right)} \sum_{j=0}^{n} 2^{j-n} (-i f (\nu - 2s))^{n-j} (f i (\nu-2s) + 2 i b z)^{j+1}$$

$$\left.\left(\frac{i (f i (\nu-2s) + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f i (\nu-2s) + 2 i b z)^2}{4b}\right)\right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1145.01

$$\int z^n \sin\left(\sqrt{z}\, b + e\right) \sin^\nu(f z + g)\, dz = $$

$$(-1)^n 2^{-\nu} i \binom{\nu}{\frac{\nu}{2}} \left(e^{-i e} \Gamma\left(2(n+1), i b \sqrt{z}\right) - e^{i e} \Gamma\left(2(n+1), -i b \sqrt{z}\right)\right) (1 - \nu \bmod 2)\, b^{-2(n+1)} +$$

$$2^{-2n-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{\frac{i b^2}{4 f (\nu-2s)} - i e + \frac{1}{2} i \pi (\nu+1) - i g (\nu - 2s)} \right.$$

$$\left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b)^{-h-j+2n} \left(-i b - 2 i f (\nu-2s) \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i b - 2 i f (\nu - 2s) \sqrt{z}\right)^2}{f (\nu-2s)}\right)^{\frac{1}{2}(-h-j-1)} \right.$$

$$\binom{j}{h}\binom{n}{j}\left(-i\,b\left(-i\,b-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),-\frac{i\left(-i\,b-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)-2\,i\,f\right.$$

$$\left.\left.(v-2\,s)\sqrt{-\frac{i\left(-i\,b-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}\,(h+j+2),-\frac{i\left(-i\,b-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)\right)$$

$$(-i\,f\,(v-2\,s))^{-2\,(n+1)}+e^{\frac{i\,b^2}{4\,f\,(v-2\,s)}+i\,e+\frac{1}{2}\,i\,\pi\,(v-1)-i\,g\,(v-2\,s)}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}\right.$$

$$\left(i\,b-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}\left(-\frac{i\left(i\,b-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(i\,b\left(i\,b-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),-\frac{i\left(i\,b-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)-2\,i\,f\,(v-2\,s)\right.$$

$$\left.\left.\sqrt{-\frac{i\left(i\,b-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}\,(h+j+2),-\frac{i\left(i\,b-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)\right)$$

$$(-i\,f\,(v-2\,s))^{-2\,(n+1)}+e^{-\frac{i\,b^2}{4\,f\,(v-2\,s)}-i\,e+\frac{1}{2}\,i\,\pi\,(1-v)+g\,i\,(v-2\,s)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}\left(-i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(-i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\left(2\,i\,f\,(v-2\,s)\sqrt{\frac{i\left(-i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}\,(h+j+2),\frac{i\left(-i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)-\right.$$

$$\left.\left.i\,b\left(-i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\frac{i\left(-i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)\right)+$$

$$e^{-\frac{i\,b^2}{4\,f\,(v-2\,s)}+i\,e-\frac{1}{2}\,i\,\pi\,(v+1)+g\,i\,(v-2\,s)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}$$

$$\left(i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(b\,i\left(i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+2\,f\,i\,(v-2\,s)\right.$$

$$\left.\left.\sqrt{\frac{i\left(i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(i\,b+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)\right)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n\sin\left(b\,z^r+d\,z\right)\sin^v(f\,z+g)$

01.06.21.1146.01

$$\int z^n \sin\left(b z^2 + d z\right) \sin^\nu(f z + g)\, dz = i\, 2^{-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)$$

$$\left((i b)^{-n-1} e^{-\frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 i b z)^{j+1} \left(\frac{i (i d + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + 2 i b z)^2}{4 b}\right) - \right.$$

$$\left.(-i b)^{-n-1} e^{\frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d - 2 i b z)^{j+1} \left(-\frac{i (-i d - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - 2 i b z)^2}{4 b}\right)\right) -$$

$$i^{-\nu-1} 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu+1} e^{i g (2 s-\nu) - \frac{i (-i d + i f (2 s-\nu))^2}{4 b}} \left(\sum_{j=0}^{n} 2^{j-n} (i d - i f (2 s - \nu))^{n-j} (-i d + i f (2 s - \nu) - 2 i b z)^{j+1}\right.\right.$$

$$\left.\left(-\frac{i (-i d + i f (2 s - \nu) - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d + i f (2 s - \nu) - 2 i b z)^2}{4 b}\right)\right) (-i b)^{-n-1} -$$

$$e^{i g (\nu-2 s) - \frac{i (-i d + i f (\nu-2 s))^2}{4 b}} \left(\sum_{j=0}^{n} 2^{j-n} (i d - i f (\nu - 2 s))^{n-j} (-i d + i f (\nu - 2 s) - 2 i b z)^{j+1}\right.$$

$$\left.\left(-\frac{i (-i d + i f (\nu - 2 s) - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d + i f (\nu - 2 s) - 2 i b z)^2}{4 b}\right)\right) (-i b)^{-n-1} +$$

$$(-1)^\nu (i b)^{-n-1} e^{\frac{i (i d + i f (2 s-\nu))^2}{4 b} + g i (2 s-\nu)} \sum_{j=0}^{n} 2^{j-n} (-i d - i f (2 s - \nu))^{n-j} (i d + i f (2 s - \nu) + 2 i b z)^{j+1}$$

$$\left(\frac{i (i d + i f (2 s - \nu) + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + i f (2 s - \nu) + 2 i b z)^2}{4 b}\right) +$$

$$(i b)^{-n-1} e^{\frac{i (i d + i f (\nu-2 s))^2}{4 b} + g i (\nu-2 s)} \sum_{j=0}^{n} 2^{j-n} (-i d - i f (\nu - 2 s))^{n-j} (i d + i f (\nu - 2 s) + 2 i b z)^{j+1}$$

$$\left.\left(\frac{i (i d + i f (\nu - 2 s) + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + i f (\nu - 2 s) + 2 i b z)^2}{4 b}\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1147.01

$$\int z^n \sin\left(\sqrt{z}\, b + d z\right) \sin^\nu(f z + g)\, dz =$$

$$(-1)^n 2^{-2 n-\nu-2} i \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(e^{-\frac{i b^2}{4 d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i b)^{-h-j+2 n} \left(i b + 2 i d \sqrt{z}\right)^{h+j}\right.$$

$$\left(\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+\right.$$

$$\left.2\sqrt{\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)-$$

$$e^{\frac{i\,b^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^{h+j}\left(-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\left(-i\,b\left(-i\,b-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-\right.$$

$$\left.\left.2\,i\,d\sqrt{-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)d^{-2\,n-2}+$$

$$2^{-2\,n-\nu-2}\,i^{-\nu-1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left((-1)^{\nu+1}\,e^{\frac{b^2}{4(-i\,d+i\,f\,(2\,k-\nu))}+g\,i\,(2\,k-\nu)}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}\right.\right.$$

$$\left(-i\,b+2\,(-i\,d+i\,f\,(2\,k-\nu))\,\sqrt{z}\right)^{h+j}\left(-\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(2\,k-\nu))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(2\,k-\nu)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\,(-i\,d+i\,f\,(2\,k-\nu))\sqrt{-\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(2\,k-\nu))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(2\,k-\nu)}}\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(2\,k-\nu))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(2\,k-\nu))}\right)-i\,b$$

$$\left.\left.\left(-i\,b+2\,(-i\,d+i\,f\,(2\,k-\nu))\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(2\,k-\nu))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(2\,k-\nu))}\right)\right)\right)$$

$$(-i\,d+i\,f\,(2\,k-\nu))^{-2\,n-2}+(-1)^{\nu}\,e^{\frac{b^2}{4(i\,d+i\,f\,(2\,k-\nu))}+g\,i\,(2\,k-\nu)}\,(i\,d+i\,f\,(2\,k-\nu))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2n}\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^{h+j}\left(-\frac{\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(2\,k-v)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,-\frac{\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(2\,k-v))}\right)+\right.$$

$$2\,\sqrt{-\frac{\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(2\,k-v)}}\;(i\,d+i\,f\,(2\,k-v))\,\Gamma\left(\frac{1}{2}\,(h+j+2),\right.$$

$$\left.\left.-\frac{\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(2\,k-v))}\right)\right)\right)-e^{\frac{b^2}{4\,(-i\,d+i\,f\,(v-2\,k))}+g\,i\,(v-2\,k)}$$

$$(-i\,d+i\,f\,(v-2\,k))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2n}\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(2\,(-i\,d+i\,f\,(v-2\,k))\right.$$

$$\sqrt{-\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(v-2\,k)}}\;\Gamma\left(\frac{1}{2}\,(h+j+2),\,-\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(v-2\,k))}\right)-$$

$$\left.\left.i\,b\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,-\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(v-2\,k))}\right)\right)\right)+$$

$$e^{\frac{b^2}{4\,(i\,d+i\,f\,(v-2\,k))}+g\,i\,(v-2\,k)}\,(i\,d+i\,f\,(v-2\,k))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2n}\left(i\,b+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\,b+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)\Gamma\left(\right.\right.$$

$$\left.\frac{1}{2}\,(h+j+1),\,-\frac{\left(i\,b+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(v-2\,k))}\right)+2\,\sqrt{-\frac{\left(i\,b+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(v-2\,k)}}$$

Involving $z^n \sin(b z^r + d z + e) \sin^v(f z + g)$

01.06.21.1148.01

$$\int z^n \sin(b z^2 + d z + e) \sin^v(f z + g)\, dz = i\, 2^{-v-2} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)$$

$$\Bigg((i b)^{-n-1} e^{i e - \frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 i b z)^{j+1} \left(\frac{i (i d + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + 2 i b z)^2}{4 b}\right) -$$

$$(-i b)^{-n-1} e^{\frac{i d^2}{4 b} - i e} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d - 2 i b z)^{j+1} \left(-\frac{i (-i d - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - 2 i b z)^2}{4 b}\right)\Bigg) -$$

$$i^{-v-1} 2^{-v-2} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Bigg((-1)^{v+1} e^{-\frac{i (-i d + i f (2 s - v))^2}{4 b} - i e + g i (2 s - v)} \Bigg(\sum_{j=0}^{n} 2^{j-n} (i d - i f (2 s - v))^{n-j} (-i d + i f (2 s - v) - 2 i b z)^{j+1}$$

$$\left(-\frac{i (-i d + i f (2 s - v) - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d + i f (2 s - v) - 2 i b z)^2}{4 b}\right)\Bigg) (-i b)^{-n-1} -$$

$$e^{-\frac{i (-i d + i f (v - 2 s))^2}{4 b} - i e + g i (v - 2 s)} \Bigg(\sum_{j=0}^{n} 2^{j-n} (i d - i f (v - 2 s))^{n-j} (-i d + i f (v - 2 s) - 2 i b z)^{j+1}$$

$$\left(-\frac{i (-i d + i f (v - 2 s) - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d + i f (v - 2 s) - 2 i b z)^2}{4 b}\right)\Bigg) (-i b)^{-n-1} +$$

$$(-1)^v (i b)^{-n-1} e^{\frac{i (i d + i f (2 s - v))^2}{4 b} + i e + g i (2 s - v)} \sum_{j=0}^{n} 2^{j-n} (-i d - i f (2 s - v))^{n-j} (i d + i f (2 s - v) + 2 i b z)^{j+1}$$

$$\left(\frac{i (i d + i f (2 s - v) + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + i f (2 s - v) + 2 i b z)^2}{4 b}\right) +$$

$$(i b)^{-n-1} e^{\frac{i (i d + i f (v - 2 s))^2}{4 b} + i e + g i (v - 2 s)} \sum_{j=0}^{n} 2^{j-n} (-i d - i f (v - 2 s))^{n-j} (i d + i f (v - 2 s) + 2 i b z)^{j+1}$$

$$\left(\frac{i (i d + i f (v - 2 s) + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + i f (v - 2 s) + 2 i b z)^2}{4 b}\right)\Bigg) /;\ n \in \mathbb{N} \land v \in \mathbb{N}^+$$

01.06.21.1149.01

$$\int z^n \sin\left(\sqrt{z}\, b + d\, z + e\right) \sin^{\nu}(f\, z + g)\, dz ==$$

$$(-1)^n\, 2^{-2n-\nu-2}\, i \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(e^{i e - \frac{i b^2}{4 d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, b)^{-h-j+2n} \left(i\, b + 2\, i\, d \sqrt{z}\right)^{h+j} \right.$$

$$\left(\frac{i \left(i\, b + 2\, i\, d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(b\, i \left(i\, b + 2\, i\, d \sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+j+1), \frac{i \left(i\, b + 2\, i\, d \sqrt{z}\right)^2}{4 d}\right) + \right.$$

$$\left. 2 \sqrt{\frac{i \left(i\, b + 2\, i\, d \sqrt{z}\right)^2}{d}}\; d\, i\, \Gamma\!\left(\frac{1}{2}(h+j+2), \frac{i \left(i\, b + 2\, i\, d \sqrt{z}\right)^2}{4 d}\right)\right) -$$

$$e^{\frac{i b^2}{4 d} - i e} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i\, b)^{-h-j+2n} \left(-i\, b - 2\, i\, d \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i\, b - 2\, i\, d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left(-i\, b \left(-i\, b - 2\, i\, d \sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+j+1), -\frac{i \left(-i\, b - 2\, i\, d \sqrt{z}\right)^2}{4 d}\right) - \right.$$

$$\left.\left. 2\, i\, d \sqrt{-\frac{i \left(-i\, b - 2\, i\, d \sqrt{z}\right)^2}{d}}\; \Gamma\!\left(\frac{1}{2}(h+j+2), -\frac{i \left(-i\, b - 2\, i\, d \sqrt{z}\right)^2}{4 d}\right)\right)\right) d^{-2n-2} +$$

$$2^{-2n-\nu-2}\, i^{-\nu-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^{\nu+1}\, e^{\frac{b^2}{4(-i d + i f (2k-\nu))} - i e + g\, i (2k-\nu)} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i\, b)^{-h-j+2n} \right.\right.$$

$$\left(-i\, b + 2\,(-i\, d + i\, f\,(2k-\nu)) \sqrt{z}\right)^{h+j} \left(-\frac{\left(-i\, b + 2\,(-i\, d + i\, f\,(2k-\nu)) \sqrt{z}\right)^2}{-i\, d + i\, f\,(2k-\nu)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left(2\,(-i\, d + i\, f\,(2k-\nu)) \sqrt{-\frac{\left(-i\, b + 2\,(-i\, d + i\, f\,(2k-\nu)) \sqrt{z}\right)^2}{-i\, d + i\, f\,(2k-\nu)}} \right.$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(2\,k-v))}\right)-i\,b$$

$$\left.\left.\left(-i\,b+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(2\,k-v))}\right)\right)\right)$$

$$(-i\,d+i\,f\,(2\,k-v))^{-2\,n-2}+(-1)^{v}\,e^{\frac{b^2}{4\,(i\,d+i\,f\,(2\,k-v))}+i\,e+g\,i\,(2\,k-v)}\,(i\,d+i\,f\,(2\,k-v))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^{h+j}\left(-\frac{\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(2\,k-v)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(2\,k-v))}\right)+\right.$$

$$2\sqrt{-\frac{\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(2\,k-v)}}\;(i\,d+i\,f\,(2\,k-v))\,\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.-\frac{\left(i\,b+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(2\,k-v))}\right)\right)-e^{\frac{b^2}{4\,(-i\,d+i\,f\,(v-2\,k))}-i\,e+g\,i\,(v-2\,k)}$$

$$(-i\,d+i\,f\,(v-2\,k))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(2\,(-i\,d+i\,f\,(v-2\,k))\right.$$

$$\sqrt{-\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(v-2\,k)}}\;\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(v-2\,k))}\right)-$$

$$\left.i\,b\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(-i\,b+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(v-2\,k))}\right)\right)+$$

$$e^{\frac{b^2}{4(i d+i f(v-2k))}+i e+g i(v-2k)} (i d + i f (v-2k))^{-2n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i b)^{-h-j+2n} \left(i b + 2 (i d + i f (v-2k)) \sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i b + 2 (i d + i f (v-2k)) \sqrt{z}\right)^2}{i d + i f (v-2k)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(b i \left(i b + 2 (i d + i f (v-2k)) \sqrt{z}\right) \Gamma\left(\right.\right.$$

$$\left.\frac{1}{2}(h+j+1), -\frac{\left(i b + 2 (i d + i f (v-2k)) \sqrt{z}\right)^2}{4 (i d + i f (v-2k))}\right) + 2 \sqrt{-\frac{\left(i b + 2 (i d + i f (v-2k)) \sqrt{z}\right)^2}{i d + i f (v-2k)}}$$

$$\left.\left.(i d + i f (v-2k)) \Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(i b + 2 (i d + i f (v-2k)) \sqrt{z}\right)^2}{4 (i d + i f (v-2k))}\right)\right)\right) /; n \in \mathbb{N} \bigwedge v \in \mathbb{N}^+$$

Involving $z^n \sin(b z) \sin^v(c z^r)$

01.06.21.1150.01

$$\int z^n \sin(b\,z)\sin^\nu(c\,z^2)\,dz = i\,2^{-\nu-1}\binom{\nu}{\frac{\nu}{2}}\left((-i\,b)^{-n-1}\,\Gamma(n+1,-i\,b\,z)-(i\,b)^{-n-1}\,\Gamma(n+1,i\,b\,z)\right)(1-\nu \bmod 2)-$$
$$i^{-\nu-1}\,2^{-\nu-2}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\Bigg((-1)^{\nu+1}\,e^{-\frac{i\,b^2}{4c(2s-\nu)}}\Bigg(\sum_{j=0}^{n}2^{j-n}\,(i\,b)^{n-j}\,(-i\,b+2\,i\,c\,(2\,s-\nu)\,z)^{j+1}$$
$$\left(\frac{i\,(-i\,b+2\,i\,c\,(2\,s-\nu)\,z)^2}{c\,(2\,s-\nu)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i\,(-i\,b+2\,i\,c\,(2\,s-\nu)\,z)^2}{4\,c\,(2\,s-\nu)}\right)\Bigg)(i\,c\,(2\,s-\nu))^{-n-1}+$$
$$(-1)^\nu\,e^{-\frac{i\,b^2}{4c(2s-\nu)}}\Bigg(\sum_{j=0}^{n}2^{j-n}\,(-i\,b)^{n-j}\,(i\,b+2\,i\,c\,(2\,s-\nu)\,z)^{j+1}\left(\frac{i\,(i\,b+2\,i\,c\,(2\,s-\nu)\,z)^2}{c\,(2\,s-\nu)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$
$$\Gamma\left(\frac{j+1}{2},\frac{i\,(i\,b+2\,i\,c\,(2\,s-\nu)\,z)^2}{4\,c\,(2\,s-\nu)}\right)\Bigg)(i\,c\,(2\,s-\nu))^{-n-1}-e^{-\frac{i\,b^2}{4c(\nu-2s)}}\,(i\,c\,(\nu-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(i\,b)^{n-j}$$
$$(-i\,b+2\,i\,c\,(\nu-2\,s)\,z)^{j+1}\left(\frac{i\,(-i\,b+2\,i\,c\,(\nu-2\,s)\,z)^2}{c\,(\nu-2\,s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i\,(-i\,b+2\,i\,c\,(\nu-2\,s)\,z)^2}{4\,c\,(\nu-2\,s)}\right)+$$
$$e^{-\frac{i\,b^2}{4c(\nu-2s)}}\,(i\,c\,(\nu-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,b)^{n-j}\,(i\,b+2\,i\,c\,(\nu-2\,s)\,z)^{j+1}\left(\frac{i\,(i\,b+2\,i\,c\,(\nu-2\,s)\,z)^2}{c\,(\nu-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$
$$\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i\,(i\,b+2\,i\,c\,(\nu-2\,s)\,z)^2}{4\,c\,(\nu-2\,s)}\right)\Bigg)\;/;\;n\in\mathbb{N}\land\nu\in\mathbb{N}^+$$

01.06.21.1151.01

$$\int z^n \sin(b\,z)\sin^\nu\left(c\sqrt{z}\right)dz =$$
$$i^{-\nu-1}\,2^{-2n-\nu-2}\,(i\,b)^{-2n-2}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\Bigg((-1)^\nu\,e^{-\frac{i\,c^2(\nu-2s)^2}{4b}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(\nu-2\,s))^{-h-j+2n}\left(-i\,c\,(\nu-2\,s)+2\,i\,b\sqrt{z}\right)^{h+j}$$
$$\left(\frac{i\left(-i\,c\,(\nu-2\,s)+2\,i\,b\sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$
$$\left(2\,i\,b\sqrt{\frac{i\left(-i\,c\,(\nu-2\,s)+2\,i\,b\sqrt{z}\right)^2}{b}}\;\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(-i\,c\,(\nu-2\,s)+2\,i\,b\sqrt{z}\right)^2}{4\,b}\right)-\right.$$

$$i\, c\, (v-2 s) \left(-i\, c\, (v-2 s)+2\, i\, b \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h+j+1), \frac{i \left(-i\, c\, (v-2 s)+2\, i\, b \sqrt{z}\right)^2}{4 b}\right)\Bigg)+$$

$$e^{-\frac{i c^2 (v-2 s)^2}{4 b}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, c\, (v-2 s))^{-h-j+2 n} \left(i\, c\, (v-2 s)+2\, i\, b \sqrt{z}\right)^{h+j} \left(\frac{i \left(i\, c\, (v-2 s)+2\, i\, b \sqrt{z}\right)^2}{b}\right)^{\frac{1}{2} (-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg(c\, i\, (v-2 s) \left(i\, c\, (v-2 s)+2\, i\, b \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h+j+1), \frac{i \left(i\, c\, (v-2 s)+2\, i\, b \sqrt{z}\right)^2}{4 b}\right)+$$

$$2 \sqrt{\frac{i \left(i\, c\, (v-2 s)+2\, i\, b \sqrt{z}\right)^2}{b}}\; b\, i\, \Gamma\left(\frac{1}{2} (h+j+2), \frac{i \left(i\, c\, (v-2 s)+2\, i\, b \sqrt{z}\right)^2}{4 b}\right)\Bigg)+(-1)^{v+1} e^{\frac{i c^2 (v-2 s)^2}{4 b}}$$

$$\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i\, c\, (v-2 s))^{-h-j+2 n} \left(-i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right)^2}{b}\right)^{\frac{1}{2} (-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg(-i\, c\, (v-2 s) \left(-i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h+j+1), -\frac{i \left(-i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right)^2}{4 b}\right)-$$

$$2\, i\, b \sqrt{-\frac{i \left(-i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right)^2}{b}}\; \Gamma\left(\frac{1}{2} (h+j+2), -\frac{i \left(-i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right)^2}{4 b}\right)\Bigg)-e^{\frac{i c^2 (v-2 s)^2}{4 b}}$$

$$\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, c\, (v-2 s))^{-h-j+2 n} \left(i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right)^{h+j} \left(-\frac{i \left(i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right)^2}{b}\right)^{\frac{1}{2} (-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg(i\, c\, (v-2 s) \left(i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h+j+1), -\frac{i \left(i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right)^2}{4 b}\right)-$$

$$2\, i\, b \sqrt{-\frac{i \left(i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right)^2}{b}}\; \Gamma\left(\frac{1}{2} (h+j+2), -\frac{i \left(i\, c\, (v-2 s)-2\, i\, b \sqrt{z}\right)^2}{4 b}\right)\Bigg)\Bigg)-$$

$$\frac{2^{-\nu-1}(1-\nu \bmod 2)}{b} z^n \binom{\nu}{\frac{\nu}{2}} \left(\Gamma(n+1, -i b z)(-i b z)^{-n} + (i b z)^{-n} \Gamma(n+1, i b z)\right) /; n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

Involving $z^n \sin(d z + e) \sin^\nu(c z^r)$

01.06.21.1152.01

$$\int z^n \sin(e + d z) \sin^\nu(c z^2) \, dz = i\, 2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} \left((-i d)^{-n-1} e^{i e} \Gamma(n+1, -i d z) - (i d)^{-n-1} e^{-i e} \Gamma(n+1, i d z)\right)(1-\nu \bmod 2) - i^{-\nu-1} 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu+1} e^{-\frac{i d^2}{4 c (2 s-\nu)} - i e} \left(\sum_{j=0}^n 2^{j-n} (i d)^{n-j} (-i d + 2 i c (2 s - \nu) z)^{j+1} \left(\frac{i(-i d + 2 i c (2 s-\nu) z)^2}{c (2 s - \nu)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(-i d + 2 i c (2 s - \nu) z)^2}{4 c (2 s - \nu)}\right)\right)(i c (2 s - \nu))^{-n-1} + (-1)^\nu e^{i e - \frac{i d^2}{4 c (2 s - \nu)}} \left(\sum_{j=0}^n 2^{j-n} (-i d)^{n-j} (i d + 2 i c (2 s - \nu) z)^{j+1} \left(\frac{i(i d + 2 i c (2 s - \nu) z)^2}{c (2 s - \nu)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(i d + 2 i c (2 s - \nu) z)^2}{4 c (2 s - \nu)}\right)\right)(i c (2 s - \nu))^{-n-1} - e^{-\frac{i d^2}{4 c (\nu - 2 s)} - i e} (i c (\nu - 2 s))^{-n-1} \sum_{j=0}^n 2^{j-n} (i d)^{n-j} (-i d + 2 i c (\nu - 2 s) z)^{j+1} \left(\frac{i(-i d + 2 i c (\nu - 2 s) z)^2}{c (\nu - 2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(-i d + 2 i c (\nu - 2 s) z)^2}{4 c (\nu - 2 s)}\right) + e^{i e - \frac{i d^2}{4 c (\nu - 2 s)}} (i c (\nu - 2 s))^{-n-1} \sum_{j=0}^n 2^{j-n} (-i d)^{n-j} (i d + 2 i c (\nu - 2 s) z)^{j+1} \left(\frac{i(i d + 2 i c (\nu - 2 s) z)^2}{c (\nu - 2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(i d + 2 i c (\nu - 2 s) z)^2}{4 c (\nu - 2 s)}\right)\right) /; n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

01.06.21.1153.01

$$\int z^n \sin(e + d z) \sin^\nu\left(c \sqrt{z}\right) dz = \frac{2^{-\nu-1} e^{i e} (1 - \nu \bmod 2)}{d} z^n \binom{\nu}{\frac{\nu}{2}} \left(-(-i d z)^{-n} \Gamma(n+1, -i d z) - e^{-2 i e} (i d z)^{-n} \Gamma(n+1, i d z)\right) + 2^{-2 n - \nu - 2} (i d)^{-2 n - 2}$$

$$i^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\Bigg((-1)^\nu e^{i e-\frac{i c^2(\nu-2s)^2}{4d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(-i c(\nu-2s))^{-h-j+2n}\left(-i c(\nu-2s)+2 i d\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(-i c(\nu-2s)+2 i d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg(2 i d\sqrt{\frac{i\left(-i c(\nu-2s)+2 i d\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(-i c(\nu-2s)+2 i d\sqrt{z}\right)^2}{4d}\right)-i c(\nu-2s)$$

$$\left(-i c(\nu-2s)+2 i d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\frac{i\left(-i c(\nu-2s)+2 i d\sqrt{z}\right)^2}{4d}\right)\Bigg)+e^{i e-\frac{i c^2(\nu-2s)^2}{4d}}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(i c(\nu-2s))^{-h-j+2n}\left(i c(\nu-2s)+2 i d\sqrt{z}\right)^{h+j}\left(\frac{i\left(i c(\nu-2s)+2 i d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg(c\, i(\nu-2s)\left(i c(\nu-2s)+2 i d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\frac{i\left(i c(\nu-2s)+2 i d\sqrt{z}\right)^2}{4d}\right)+$$

$$2\sqrt{\frac{i\left(i c(\nu-2s)+2 i d\sqrt{z}\right)^2}{d}}\;d\, i\,\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(i c(\nu-2s)+2 i d\sqrt{z}\right)^2}{4d}\right)\Bigg)\Bigg)+$$

$$(-1)^{\nu+1}e^{\frac{i c^2(\nu-2s)^2}{4d}-i e}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(-i c(\nu-2s))^{-h-j+2n}\left(-i c(\nu-2s)-2 i d\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(-i c(\nu-2s)-2 i d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg(-i c(\nu-2s)\left(-i c(\nu-2s)-2 i d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(-i c(\nu-2s)-2 i d\sqrt{z}\right)^2}{4d}\right)-2 i d$$

$$\sqrt{-\frac{i\left(-i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(-i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)\Bigg)-e^{\frac{i\,c^2\,(v-2\,s)^2}{4\,d}-i\,e}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s))^{-h-j+2\,n}\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^{h+j}\left(-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg(i\,c\,(v-2\,s)\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-2\,i\,d$$

$$\sqrt{-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)\Bigg)\Bigg)\;/;\;n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\sin(b\,z^r)\sin^v(c\,z^r)$

01.06.21.1154.01

$$\int z^{\alpha-1}\sin(b\,z^r)\sin^v(c\,z^r)\,dz = \frac{i\,2^{-v-1}\,(1-v\bmod 2)}{r}\,z^\alpha\binom{v}{\frac{v}{2}}\left((-i\,b\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,-i\,b\,z^r\right)-(i\,b\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,i\,b\,z^r\right)\right)-$$

$$\frac{2^{-v-1}\,z^\alpha\,i^{-v-1}}{r}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg((-1)^v\,\Gamma\!\left(\frac{\alpha}{r},\,(-i\,b-2\,i\,c\,s+i\,c\,v)\,z^r\right)((-i\,b-2\,i\,c\,s+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}+$$

$$(-1)^{v+1}\,((i\,b-2\,i\,c\,s+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(i\,b-2\,i\,c\,s+i\,c\,v)\,z^r\right)+((-i\,b+2\,i\,c\,s-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}$$

$$\Gamma\!\left(\frac{\alpha}{r},\,(-i\,b+2\,i\,c\,s-i\,c\,v)\,z^r\right)-((i\,b+2\,i\,c\,s-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(i\,b+2\,i\,c\,s-i\,c\,v)\,z^r\right)\Bigg)\;/;\;v\in\mathbb{N}^+$$

01.06.21.1155.01

$$\int z^n\sin(b\,z^2)\sin^v(c\,z^2)\,dz =$$

$$i\,2^{-v-2}\,z^{n+1}\binom{v}{\frac{v}{2}}\left(\left(-i\,b\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\!\left(\frac{n+1}{2},\,-i\,b\,z^2\right)-\left(i\,b\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\!\left(\frac{n+1}{2},\,i\,b\,z^2\right)\right)(1-v\bmod 2)-2^{-v-2}\,z^{n+1}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}$$

$$\Bigg(e^{-\frac{1}{2}i\pi(1-v)}\,\Gamma\!\left(\frac{n+1}{2},\,(-i\,b+i\,c\,(v-2\,s))\,z^2\right)\left((-i\,b+i\,c\,(v-2\,s))\,z^2\right)^{\frac{1}{2}(-n-1)}+e^{\frac{1}{2}i\pi(v+1)}\left((i\,b+i\,c\,(v-2\,s))\,z^2\right)^{\frac{1}{2}(-n-1)}$$

$$\Gamma\!\left(\frac{n+1}{2},\,(i\,b+i\,c\,(v-2\,s))\,z^2\right)+e^{-\frac{1}{2}i\pi(v+1)}\left((-i\,b-i\,c\,(v-2\,s))\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\!\left(\frac{n+1}{2},\,(-i\,b-i\,c\,(v-2\,s))\,z^2\right)+$$

$$e^{\frac{1}{2}i\pi(1-v)}\left((i\,b-i\,c\,(v-2\,s))\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\!\left(\frac{n+1}{2},\,(i\,b-i\,c\,(v-2\,s))\,z^2\right)\Bigg)\;/;\;n\in\mathbb{N}\land v\in\mathbb{N}^+$$

01.06.21.1156.01

$$\int z^n \sin\left(b\sqrt{z}\right)\sin^\nu\left(c\sqrt{z}\right)dz = (-1)^n\, i\, 2^{-\nu}\, b^{-2(n+1)}\binom{\nu}{\frac{\nu}{2}}\left(\Gamma\left(2(n+1),\, i\,b\sqrt{z}\right)-\Gamma\left(2(n+1),\, -i\,b\sqrt{z}\right)\right)(1-\nu \bmod 2) - 2^{-\nu}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{-\frac{1}{2}i\pi(1-\nu)}\,\Gamma\left(2(n+1),\,(-i\,b+i\,c\,(\nu-2s))\sqrt{z}\right)(-i\,b+i\,c\,(\nu-2s))^{-2(n+1)} + e^{\frac{1}{2}i\pi(\nu+1)}\,(i\,b+i\,c\,(\nu-2s))^{-2(n+1)}\,\Gamma\left(2(n+1),\,(i\,b+i\,c\,(\nu-2s))\sqrt{z}\right) + e^{-\frac{1}{2}i\pi(\nu+1)}\,(-i\,b-i\,c\,(\nu-2s))^{-2(n+1)}\,\Gamma\left(2(n+1),\,(-i\,b-i\,c\,(\nu-2s))\sqrt{z}\right) + e^{\frac{1}{2}i\pi(1-\nu)}\,(i\,b-i\,c\,(\nu-2s))^{-2(n+1)}\,\Gamma\left(2(n+1),\,(i\,b-i\,c\,(\nu-2s))\sqrt{z}\right)\right)\,/;\, n\in\mathbb{N}\land \nu\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\sin\left(b\,z^r+e\right)\sin^\nu\left(c\,z^r\right)$

01.06.21.1157.01

$$\int z^{\alpha-1}\sin(b\,z^r+e)\sin^\nu(c\,z^r)\,dz = \frac{i\,2^{-\nu-1}(1-\nu \bmod 2)}{r}\, z^\alpha \binom{\nu}{\frac{\nu}{2}}\left(e^{i\,e}\,(-i\,b\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,-i\,b\,z^r\right)-e^{-i\,e}\,(i\,b\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,i\,b\,z^r\right)\right) - \frac{1}{r}\left((2\,i)^{-\nu-1}\,z^\alpha\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^\nu\,e^{i\,e}\,\Gamma\left(\frac{\alpha}{r},\,(-i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r\right)((-i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r)^{-\frac{\alpha}{r}} + (-1)^{\nu+1}\,e^{-i\,e}\,((i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,(i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r\right) + e^{i\,e}\,((-i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,(-i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r\right) - e^{-i\,e}\,((i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,(i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r\right)\right)\right)\,/;\,\nu\in\mathbb{N}^+$$

01.06.21.1158.01

$$\int z^n\sin\left(b\,z^2+e\right)\sin^\nu\left(c\,z^2\right)dz = -2^{-\nu-2}\binom{\nu}{\frac{\nu}{2}}\left(e^{i\,e-\frac{i\pi}{2}}\,\Gamma\left(\frac{n+1}{2},\,-i\,b\,z^2\right)\left(-i\,b\,z^2\right)^{\frac{1}{2}(-n-1)} + e^{-i\,e+\frac{i\pi}{2}}\left(i\,b\,z^2\right)^{\frac{1}{2}(-n-1)}\,\Gamma\left(\frac{n+1}{2},\,i\,b\,z^2\right)\right)(1-\nu \bmod 2)\,z^{n+1} - 2^{-\nu-2}\,z^{n+1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{i\,e-\frac{1}{2}i\pi(1-\nu)}\,\Gamma\left(\frac{n+1}{2},\,(-i\,b+i\,c\,(\nu-2s))\,z^2\right)\left((-i\,b+i\,c\,(\nu-2s))\,z^2\right)^{\frac{1}{2}(-n-1)} + e^{-i\,e+\frac{1}{2}i\pi(\nu+1)}\left((i\,b+i\,c\,(\nu-2s))\,z^2\right)^{\frac{1}{2}(-n-1)}\,\Gamma\left(\frac{n+1}{2},\,(i\,b+i\,c\,(\nu-2s))\,z^2\right) + e^{i\,e-\frac{1}{2}i\pi(\nu+1)}\left((-i\,b-i\,c\,(\nu-2s))\,z^2\right)^{\frac{1}{2}(-n-1)}\,\Gamma\left(\frac{n+1}{2},\,(-i\,b-i\,c\,(\nu-2s))\,z^2\right) + e^{-i\,e+\frac{1}{2}i\pi(1-\nu)}\left((i\,b-i\,c\,(\nu-2s))\,z^2\right)^{\frac{1}{2}(-n-1)}\,\Gamma\left(\frac{n+1}{2},\,(i\,b-i\,c\,(\nu-2s))\,z^2\right)\right)\,/;\, n\in\mathbb{N}\land\nu\in\mathbb{N}^+$$

01.06.21.1159.01

$$\int z^n \sin\left(\sqrt{z}\, b + e\right) \sin^v\left(c\sqrt{z}\right) dz = (-1)^n 2^{-v} b^{-2(n+1)} \binom{v}{\frac{v}{2}} \left(e^{i e - \frac{i\pi}{2}} \Gamma\left(2(n+1), -i b\sqrt{z}\right) + e^{-i e + \frac{i\pi}{2}} \Gamma\left(2(n+1), i b\sqrt{z}\right)\right)(1 - v \bmod 2) - 2^{-v} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(e^{i e - \frac{1}{2} i\pi(1-v)} \Gamma\left(2(n+1), (-i b + i c(v-2s))\sqrt{z}\right)(-i b + i c(v-2s))^{-2(n+1)} + e^{-i e + \frac{1}{2} i\pi(v+1)} (i b + i c(v-2s))^{-2(n+1)} \Gamma\left(2(n+1), (i b + i c(v-2s))\sqrt{z}\right) + e^{i e - \frac{1}{2} i\pi(v+1)} (-i b - i c(v-2s))^{-2(n+1)} \Gamma\left(2(n+1), (-i b - i c(v-2s))\sqrt{z}\right) + e^{-i e + \frac{1}{2} i\pi(1-v)} (i b - i c(v-2s))^{-2(n+1)} \Gamma\left(2(n+1), (i b - i c(v-2s))\sqrt{z}\right)\right) /; n \in \mathbb{N} \land v \in \mathbb{N}^+$$

Involving $z^n \sin\left(b z^r + d z\right) \sin^v\left(c z^r\right)$

01.06.21.1160.01

$$\int z^n \sin\left(b z^2 + d z\right) \sin^\nu\left(c z^2\right) dz = i\, 2^{-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left((i b)^{-n-1} e^{-\frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 i b z)^{j+1} \left(\frac{i (i d + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + 2 i b z)^2}{4 b}\right) - (-i b)^{-n-1} e^{\frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d - 2 i b z)^{j+1} \left(-\frac{i (-i d - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - 2 i b z)^2}{4 b}\right)\right) - i^{-\nu-1} 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu+1} e^{\frac{d^2}{4(-i b + i c (2 s - \nu))}} \left(\sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d + 2 (-i b + i c (2 s - \nu)) z)^{j+1} \left(-\frac{(-i d + 2 (-i b + i c (2 s - \nu)) z)^2}{-i b + i c (2 s - \nu)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i d + 2 (-i b + i c (2 s - \nu)) z)^2}{4 (-i b + i c (2 s - \nu))}\right)\right) (-i b + i c (2 s - \nu))^{-n-1} + (-1)^\nu e^{\frac{d^2}{4(i b + i c (2 s - \nu))}} (i b + i c (2 s - \nu))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 (i b + i c (2 s - \nu)) z)^{j+1} \left(-\frac{(i d + 2 (i b + i c (2 s - \nu)) z)^2}{i b + i c (2 s - \nu)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i d + 2 (i b + i c (2 s - \nu)) z)^2}{4 (i b + i c (2 s - \nu))}\right) - e^{\frac{d^2}{4(-i b + i c (\nu - 2 s))}} (-i b + i c (\nu - 2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d + 2 (-i b + i c (\nu - 2 s)) z)^{j+1} \left(-\frac{(-i d + 2 (-i b + i c (\nu - 2 s)) z)^2}{-i b + i c (\nu - 2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i d + 2 (-i b + i c (\nu - 2 s)) z)^2}{4 (-i b + i c (\nu - 2 s))}\right) + e^{\frac{d^2}{4(i b + i c (\nu - 2 s))}} (i b + i c (\nu - 2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 (i b + i c (\nu - 2 s)) z)^{j+1} \left(-\frac{(i d + 2 (i b + i c (\nu - 2 s)) z)^2}{i b + i c (\nu - 2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i d + 2 (i b + i c (\nu - 2 s)) z)^2}{4 (i b + i c (\nu - 2 s))}\right)\right) /;\ n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

01.06.21.1161.01

$$\int z^n \sin\left(\sqrt{z}\, b + d z\right) \sin^\nu\left(c \sqrt{z}\right) dz = i\, 2^{-2 n-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left((-i d)^{-2 n-2} e^{\frac{i b^2}{4 d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b)^{-h-j+2 n} \left(-i b - 2 i d \sqrt{z}\right)^{h+j} \right.$$

$$\left(-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(-i\,b\left(-i\,b-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-\right.$$

$$\left.\left.2\,i\,d\sqrt{-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)-$$

$$(i\,d)^{-2n-2}\,e^{-\frac{i\,b^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2n}\left(i\,b+2\,i\,d\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+\right.$$

$$\left.\left.\left.2\sqrt{\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)\right)+2^{-2n-\nu-2}\,i^{-\nu-1}$$

$$\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left((-1)^{\nu+1}\,e^{-\frac{i(-i\,b+i\,c\,(2k-\nu))^2}{4\,d}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(2\,k-\nu))^{-h-j+2n}\left(-i\,b+i\,c\,(2\,k-\nu)-2\,i\,d\,\sqrt{z}\right)^{h+j}\right.\right.$$

$$\left(-\frac{i\left(-i\,b+i\,c\,(2\,k-\nu)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Big((-i\,b+i\,c\,(2\,k-\nu))$$

$$\left(-i\,b+i\,c\,(2\,k-\nu)-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(-i\,b+i\,c\,(2\,k-\nu)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-2\,i\,d$$

$$\left.\left.\sqrt{-\frac{i\left(-i\,b+i\,c\,(2\,k-\nu)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),-\frac{i\left(-i\,b+i\,c\,(2\,k-\nu)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)$$

$$(-i\,d)^{-2n-2}-e^{-\frac{i(-i\,b+i\,c\,(\nu-2k))^2}{4\,d}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(\nu-2\,k))^{-h-j+2n}\left(-i\,b+i\,c\,(\nu-2\,k)-2\,i\,d\,\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((-i\,b+i\,c\,(v-2\,k))$$

$$\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-2\,i\,d$$

$$\sqrt{-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)\Bigg)$$

$$(-i\,d)^{-2\,n-2}+(-1)^v\,(i\,d)^{-2\,n-2}\,e^{\frac{i\,(i\,b+i\,c\,(2\,k-v))^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(2\,k-v))^{-h-j+2\,n}$$

$$\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\,b+i\,c\,(2\,k-v))\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+$$

$$2\sqrt{\frac{i\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)+$$

$$(i\,d)^{-2\,n-2}\,e^{\frac{i\,(i\,b+i\,c\,(v-2\,k))^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(v-2\,k))^{-h-j+2\,n}\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((i\,b+i\,c\,(v-2\,k))\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\Bigg)+2\sqrt{\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{d}}$$

$$d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)\Bigg)\;/;\;n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n \sin(b z^r + d z + e) \sin^\nu(c z^r)$

01.06.21.1162.01

$$\int z^n \sin(b z^2 + d z + e) \sin^\nu(c z^2)\, dz = i\, 2^{-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \Bigg((i b)^{-n-1} e^{i e - \frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 i b z)^{j+1} \left(\frac{i (i d + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + 2 i b z)^2}{4 b}\right) - (-i b)^{-n-1} e^{\frac{i d^2}{4 b} - i e} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d - 2 i b z)^{j+1} \left(-\frac{i (-i d - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - 2 i b z)^2}{4 b}\right)\Bigg) - i^{-\nu-1} 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \Bigg((-1)^{\nu+1} e^{\frac{d^2}{4(-i b + i c (2 s - \nu))} - i e} \left(\sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d + 2 (-i b + i c (2 s - \nu)) z)^{j+1} \left(-\frac{(-i d + 2 (-i b + i c (2 s - \nu)) z)^2}{-i b + i c (2 s - \nu)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i d + 2 (-i b + i c (2 s - \nu)) z)^2}{4 (-i b + i c (2 s - \nu))}\right)\right) (-i b + i c (2 s - \nu))^{-n-1} + (-1)^\nu e^{\frac{d^2}{4 (i b + i c (2 s - \nu))} + i e} (i b + i c (2 s - \nu))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 (i b + i c (2 s - \nu)) z)^{j+1} \left(-\frac{(i d + 2 (i b + i c (2 s - \nu)) z)^2}{i b + i c (2 s - \nu)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i d + 2 (i b + i c (2 s - \nu)) z)^2}{4 (i b + i c (2 s - \nu))}\right) - e^{\frac{d^2}{4 (-i b + i c (\nu - 2 s))} - i e} (-i b + i c (\nu - 2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d + 2 (-i b + i c (\nu - 2 s)) z)^{j+1} \left(-\frac{(-i d + 2 (-i b + i c (\nu - 2 s)) z)^2}{-i b + i c (\nu - 2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i d + 2 (-i b + i c (\nu - 2 s)) z)^2}{4 (-i b + i c (\nu - 2 s))}\right) + e^{\frac{d^2}{4 (i b + i c (\nu - 2 s))} + i e} (i b + i c (\nu - 2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 (i b + i c (\nu - 2 s)) z)^{j+1} \left(-\frac{(i d + 2 (i b + i c (\nu - 2 s)) z)^2}{i b + i c (\nu - 2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i d + 2 (i b + i c (\nu - 2 s)) z)^2}{4 (i b + i c (\nu - 2 s))}\right)\Bigg) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1163.01

$$\int z^n \sin\left(\sqrt{z}\, b + d\, z + e\right) \sin^{\nu}\left(c\sqrt{z}\right) dz =$$

$$i\, 2^{-2n-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \Bigg((-i\, d)^{-2n-2}\, e^{\frac{i b^2}{4 d} - i e} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i\, b)^{-h-j+2n} \left(-i\, b - 2\, i\, d\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(-i\, b - 2\, i\, d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \Bigg(-i\, b\left(-i\, b - 2\, i\, d\sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+j+1), -\frac{i\left(-i\, b - 2\, i\, d\sqrt{z}\right)^2}{4 d}\right) -$$

$$2\, i\, d \sqrt{-\frac{i\left(-i\, b - 2\, i\, d\sqrt{z}\right)^2}{d}}\; \Gamma\!\left(\frac{1}{2}(h+j+2), -\frac{i\left(-i\, b - 2\, i\, d\sqrt{z}\right)^2}{4 d}\right)\Bigg) -$$

$$(i\, d)^{-2n-2}\, e^{i e - \frac{i b^2}{4 d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, b)^{-h-j+2n} \left(i\, b + 2\, i\, d\sqrt{z}\right)^{h+j} \left(\frac{i\left(i\, b + 2\, i\, d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg(b\, i\left(i\, b + 2\, i\, d\sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+j+1), \frac{i\left(i\, b + 2\, i\, d\sqrt{z}\right)^2}{4 d}\right) +$$

$$2 \sqrt{\frac{i\left(i\, b + 2\, i\, d\sqrt{z}\right)^2}{d}}\; d\, i\, \Gamma\!\left(\frac{1}{2}(h+j+2), \frac{i\left(i\, b + 2\, i\, d\sqrt{z}\right)^2}{4 d}\right)\Bigg)\Bigg) +$$

$$2^{-2n-\nu-2}\, i^{-\nu-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \Bigg((-1)^{\nu+1}\, e^{-\frac{i(-i\, b + i\, c(2k-\nu))^2}{4 d} - i e} \Bigg(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i\, b + i\, c\,(2k-\nu))^{-h-j+2n}$$

$$\left(-i\, b + i\, c\,(2k-\nu) - 2\, i\, d\sqrt{z}\right)^{h+j} \left(-\frac{i\left(-i\, b + i\, c\,(2k-\nu) - 2\, i\, d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg((-i\, b + i\, c\,(2k-\nu)) \left(-i\, b + i\, c\,(2k-\nu) - 2\, i\, d\sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+j+1),\right.$$

$$-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\Bigg)-2\,i\,d\,\sqrt{-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{d}}$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)\Bigg)(-i\,d)^{-2\,n-2}-$$

$$e^{-\frac{i\,(-i\,b+i\,c\,(v-2\,k))^2}{4\,d}-i\,e}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(v-2\,k))^{-h-j+2\,n}\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((-i\,b+i\,c\,(v-2\,k))$$

$$\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-2\,i\,d$$

$$\sqrt{-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)\Bigg)$$

$$(-i\,d)^{-2\,n-2}+(-1)^{v}\,(i\,d)^{-2\,n-2}\,e^{\frac{i\,(i\,b+i\,c\,(2\,k-v))^2}{4\,d}+i\,e}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(2\,k-v))^{-h-j+2\,n}$$

$$\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\,b+i\,c\,(2\,k-v))\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+$$

$$2\,\sqrt{\frac{i\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)+$$

$$(i\,d)^{-2\,n-2}\,e^{\frac{i\,(i\,b+i\,c\,(v-2\,k))^2}{4\,d}+i\,e}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(v-2\,k))^{-h-j+2\,n}\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}\Bigg((i\,b+i\,c\,(v-2\,k))\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\Bigg)+2\sqrt{\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{d}}\,d\,i\,\Gamma\Bigg(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\Bigg)\Bigg)\Bigg)\Bigg)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin(d\,z) \sin^v(c\,z^r+g)$

01.06.21.1164.01

$$\int z^n \sin(d\,z)\sin^v(c\,z^2+g)\,dz ==$$

$$i\,(-1)^n\,2^{-v-1}\binom{v}{\frac{v}{2}}\left((-i\,d)^{-n-1}\,\Gamma(n+1,\,i\,d\,z)-(i\,d)^{-n-1}\,\Gamma(n+1,\,-i\,d\,z)\right)(1-v \bmod 2)-2^{-v-2}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}$$

$$\Bigg(e^{\frac{i\,d^2}{4\,c\,(v-2\,s)}+\frac{i\,\pi\,v}{2}-i\,g\,(v-2\,s)+\frac{i\,\pi}{2}}\Bigg(\sum_{j=0}^{n}2^{j-n}\,(i\,d)^{n-j}\,(-i\,d-2\,i\,c\,(v-2\,s)\,z)^{j+1}\left(-\frac{i\,(-i\,d-2\,i\,c\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2},\,-\frac{i\,(-i\,d-2\,i\,c\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\Bigg)(-i\,c\,(v-2\,s))^{-n-1}+e^{\frac{i\,d^2}{4\,c\,(v-2\,s)}+\frac{i\,\pi\,v}{2}-i\,g\,(v-2\,s)-\frac{i\,\pi}{2}}\Bigg(\sum_{j=0}^{n}2^{j-n}\,(-i\,d)^{n-j}$$

$$(i\,d-2\,i\,c\,(v-2\,s)\,z)^{j+1}\left(-\frac{i\,(i\,d-2\,i\,c\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,-\frac{i\,(i\,d-2\,i\,c\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\Bigg)$$

$$(-i\,c\,(v-2\,s))^{-n-1}+e^{-\frac{i\,d^2}{4\,c\,(v-2\,s)}+g\,i\,(v-2\,s)-\frac{i\,\pi\,v}{2}+\frac{i\,\pi}{2}}\,(i\,c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(i\,d)^{n-j}\,(-i\,d+2\,i\,c\,(v-2\,s)\,z)^{j+1}$$

$$\left(\frac{i\,(-i\,d+2\,i\,c\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,\frac{i\,(-i\,d+2\,i\,c\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)+$$

$$e^{-\frac{i\,d^2}{4\,c\,(v-2\,s)}+g\,i\,(v-2\,s)-\frac{i\,\pi\,v}{2}-\frac{i\,\pi}{2}}\,(i\,c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,d)^{n-j}\,(i\,d+2\,i\,c\,(v-2\,s)\,z)^{j+1}$$

$$\left(\frac{i\,(i\,d+2\,i\,c\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,\frac{i\,(i\,d+2\,i\,c\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\Bigg)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

01.06.21.1165.01

$$\int z^n \sin(d\,z)\sin^{\nu}\left(\sqrt{z}\;c+g\right)dz = (-1)^n\,2^{-\nu-1}\,i\binom{\nu}{\frac{\nu}{2}}\left((-i\,d)^{-n-1}\,\Gamma(n+1,\,i\,d\,z)-(i\,d)^{-n-1}\,\Gamma(n+1,\,-i\,d\,z)\right)(1-\nu\bmod 2)+$$

$$2^{-2n-\nu-2}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\Bigg(e^{\frac{c^2\,i\,(\nu-2s)^2}{4d}-i\,g\,(\nu-2s)+\frac{i\pi\nu}{2}+\frac{i\pi}{2}}$$

$$\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(\nu-2s))^{-h-j+2n}\left(-i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)^{h+j}\left(-\frac{i\left(-i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\right.$$

$$\binom{j}{h}\binom{n}{j}\left(-i\,c\,(\nu-2s)\left(-i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)^2}{4d}\right)-2\right.$$

$$\left.\left.i\,d\sqrt{-\frac{i\left(-i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(-i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)^2}{4d}\right)\right)\right)$$

$$(-i\,d)^{-2(n+1)}+e^{\frac{c^2\,i\,(\nu-2s)^2}{4d}+g\,i\,(\nu-2s)-\frac{i\pi\nu}{2}+\frac{i\pi}{2}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(\nu-2s))^{-h-j+2n}\right.$$

$$\left(i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)^{h+j}\left(-\frac{i\left(i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(i\,c\,(\nu-2s)\left(i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)^2}{4d}\right)-2\,i\right.$$

$$\left.\left.d\sqrt{-\frac{i\left(i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(i\,c\,(\nu-2s)-2\,i\,d\,\sqrt{z}\right)^2}{4d}\right)\right)\right)$$

$$(-i\,d)^{-2(n+1)}+(i\,d)^{-2(n+1)}\,e^{-\frac{i\,c^2\,(\nu-2s)^2}{4d}-i\,g\,(\nu-2s)+\frac{i\pi\nu}{2}-\frac{i\pi}{2}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(\nu-2s))^{-h-j+2n}$$

$$\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(2\,i\,d\,\sqrt{\frac{i\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,\frac{i\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-\right.$$

$$\left.\left.i\,c\,(v-2\,s)\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,\frac{i\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)+$$

$$(i\,d)^{-2\,(n+1)}\,e^{-\frac{i\,c^2\,(v-2\,s)^2}{4\,d}+g\,i\,(v-2\,s)-\frac{i\,\pi\,v}{2}-\frac{i\,\pi}{2}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s))^{-h-j+2\,n}\left(i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(c\,i\,(v-2\,s)\left(i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+\right.$$

$$\left.\left.2\,\sqrt{\frac{i\left(i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\!\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin(d\,z+e)\sin^v\left(c\,z^r+g\right)$

01.06.21.1166.01

$$\int z^n \sin(d z+e)\sin^\nu(c z^2+g)\,dz = i(-1)^n 2^{-\nu-1}\binom{\nu}{\frac{\nu}{2}}\left((-i d)^{-n-1} e^{-i e}\,\Gamma(n+1, i d z)-(i d)^{-n-1} e^{i e}\,\Gamma(n+1,-i d z)\right)(1-\nu \bmod 2) - 2^{-\nu-2}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{\frac{i d^2}{4c(\nu-2s)}-i e+\frac{i\pi\nu}{2}-i g(\nu-2s)+\frac{i\pi}{2}}\left(\sum_{j=0}^{n} 2^{j-n}(i d)^{n-j}(-i d-2 i c(\nu-2s)z)^{j+1}\left(-\frac{i(-i d-2 i c(\nu-2s)z)^2}{c(\nu-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i(-i d-2 i c(\nu-2s)z)^2}{4c(\nu-2s)}\right)\right)(-i c(\nu-2s))^{-n-1} + e^{\frac{i d^2}{4c(\nu-2s)}+i e+\frac{i\pi\nu}{2}-i g(\nu-2s)-\frac{i\pi}{2}}\left(\sum_{j=0}^{n}2^{j-n}(-i d)^{n-j}(i d-2 i c(\nu-2s)z)^{j+1}\left(-\frac{i(i d-2 i c(\nu-2s)z)^2}{c(\nu-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i(i d-2 i c(\nu-2s)z)^2}{4c(\nu-2s)}\right)\right)(-i c(\nu-2s))^{-n-1} + e^{-\frac{i d^2}{4c(\nu-2s)}-i e+g i(\nu-2s)-\frac{i\pi\nu}{2}+\frac{i\pi}{2}}(i c(\nu-2s))^{-n-1}\sum_{j=0}^{n}2^{j-n}(i d)^{n-j}(-i d+2 i c(\nu-2s)z)^{j+1}\left(\frac{i(-i d+2 i c(\nu-2s)z)^2}{c(\nu-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i(-i d+2 i c(\nu-2s)z)^2}{4c(\nu-2s)}\right) + e^{-\frac{i d^2}{4c(\nu-2s)}+i e+g i(\nu-2s)-\frac{i\pi\nu}{2}-\frac{i\pi}{2}}(i c(\nu-2s))^{-n-1}\sum_{j=0}^{n}2^{j-n}(-i d)^{n-j}(i d+2 i c(\nu-2s)z)^{j+1}\left(\frac{i(i d+2 i c(\nu-2s)z)^2}{c(\nu-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i(i d+2 i c(\nu-2s)z)^2}{4c(\nu-2s)}\right)\right)\;/;\; n\in\mathbb{N}\land \nu\in\mathbb{N}^+$$

01.06.21.1167.01

$$\int z^n \sin(d z+e)\sin^\nu\left(\sqrt{z}\,c+g\right)dz = (-1)^n 2^{-\nu-1} i\binom{\nu}{\frac{\nu}{2}}\left((-i d)^{-n-1}e^{-i e}\,\Gamma(n+1, i d z)-(i d)^{-n-1}e^{i e}\,\Gamma(n+1,-i d z)\right)(1-\nu \bmod 2) + 2^{-2n-\nu-2}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{\frac{c^2 i(\nu-2s)^2}{4d}-i g(\nu-2s)-i e+\frac{i\pi\nu}{2}+\frac{i\pi}{2}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(-i c(\nu-2s))^{-h-j+2n}\left(-i c(\nu-2s)-2 i d\sqrt{z}\right)^{h+j}\left(-\frac{i\left(-i c(\nu-2s)-2 i d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\right.\right.$$

$$\binom{j}{h}\binom{n}{j}\left(-i\,c\,(v-2\,s)\left(-i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-2\right.$$

$$\left.\left.i\,d\,\sqrt{-\frac{i\left(-i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(-i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)$$

$$(-i\,d)^{-2\,(n+1)}+e^{\frac{c^2\,i\,(v-2\,s)^2}{4\,d}+g\,i\,(v-2\,s)-i\,e-\frac{i\,\pi\,v}{2}+\frac{i\,\pi}{2}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s))^{-h-j+2\,n}\right.$$

$$\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^{h+j}\left(-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(i\,c\,(v-2\,s)\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-2\,i\,d\right.$$

$$\left.\left.\sqrt{-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)(-i\,d)^{-2\,(n+1)}+$$

$$(i\,d)^{-2\,(n+1)}\,e^{-\frac{i\,c^2\,(v-2\,s)^2}{4\,d}-i\,g\,(v-2\,s)+i\,e+\frac{i\,\pi\,v}{2}-\frac{i\,\pi}{2}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2\,s))^{-h-j+2\,n}$$

$$\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(2\,i\,d\,\sqrt{\frac{i\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-\right.$$

$$\left.i\,c\,(v-2\,s)\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(-i\,c\,(v-2\,s)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)+$$

$$(i\, d)^{-2(n+1)}\, e^{-\frac{i c^2 (v-2s)^2}{4d}+g\, i\,(v-2s)+i\, e-\frac{i\pi v}{2}-\frac{i\pi}{2}} \sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\, (i\, c\,(v-2s))^{-h-j+2n}$$
$$\left(i\, c\,(v-2s)+2\, i\, d\sqrt{z}\right)^{h+j} \left(\frac{i\left(i\, c\,(v-2s)+2\, i\, d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}$$
$$\left(c\, i\,(v-2s)\left(i\, c\,(v-2s)+2\, i\, d\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\, \frac{i\left(i\, c\,(v-2s)+2\, i\, d\sqrt{z}\right)^2}{4d}\right)+\right.$$
$$\left.2\sqrt{\frac{i\left(i\, c\,(v-2s)+2\, i\, d\sqrt{z}\right)^2}{d}}\; d\, i\, \Gamma\!\left(\frac{1}{2}(h+j+2),\, \frac{i\left(i\, c\,(v-2s)+2\, i\, d\sqrt{z}\right)^2}{4d}\right)\right)\Bigg)\Bigg) /;\, n\in\mathbb{N}\wedge v\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\sin(b\, z^r)\sin^v(c\, z^r+g)$

01.06.21.1168.01

$$\int z^{\alpha-1}\sin(b\, z^r)\sin^v(c\, z^r+g)\, dz = \frac{i\, 2^{-v-1}\,(1-v \bmod 2)}{r}\, z^\alpha \binom{v}{\frac{v}{2}}\left((-i\, b\, z^r)^{-\frac{\alpha}{r}}\, \Gamma\!\left(\frac{\alpha}{r},\, -i\, b\, z^r\right)-(i\, b\, z^r)^{-\frac{\alpha}{r}}\, \Gamma\!\left(\frac{\alpha}{r},\, i\, b\, z^r\right)\right)-$$
$$\frac{(2\, i)^{-v-1}\, z^\alpha}{r}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left((-1)^v\, e^{2 i g s-i g v}\, \Gamma\!\left(\frac{\alpha}{r},\, (-i\, b-2\, i\, c\, s+i\, c\, v)\, z^r\right)((-i\, b-2\, i\, c\, s+i\, c\, v)\, z^r)^{-\frac{\alpha}{r}}+\right.$$
$$(-1)^{v+1}\, e^{2 i g s-i g v}\, ((i\, b-2\, i\, c\, s+i\, c\, v)\, z^r)^{-\frac{\alpha}{r}}\, \Gamma\!\left(\frac{\alpha}{r},\, (i\, b-2\, i\, c\, s+i\, c\, v)\, z^r\right)+e^{i g v-2 i g s}\, ((-i\, b+2\, i\, c\, s-i\, c\, v)\, z^r)^{-\frac{\alpha}{r}}$$
$$\left.\Gamma\!\left(\frac{\alpha}{r},\, (-i\, b+2\, i\, c\, s-i\, c\, v)\, z^r\right)-e^{i g v-2 i g s}\, ((i\, b+2\, i\, c\, s-i\, c\, v)\, z^r)^{-\frac{\alpha}{r}}\, \Gamma\!\left(\frac{\alpha}{r},\, (i\, b+2\, i\, c\, s-i\, c\, v)\, z^r\right)\right) /;\, v\in\mathbb{N}^+$$

01.06.21.1169.01

$$\int z^n \sin\!\left(b\, z^2\right)\sin^v\!\left(c\, z^2+g\right) dz =$$
$$i\, 2^{-v-2}\, z^{n+1}\binom{v}{\frac{v}{2}}\left(\left(-i\, b\, z^2\right)^{\frac{1}{2}(-n-1)}\, \Gamma\!\left(\frac{n+1}{2},\, -i\, b\, z^2\right)-\left(i\, b\, z^2\right)^{\frac{1}{2}(-n-1)}\, \Gamma\!\left(\frac{n+1}{2},\, i\, b\, z^2\right)\right)(1-v \bmod 2)-$$
$$2^{-v-2}\, z^{n+1}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left(e^{-\frac{1}{2} i\pi(1-v)-i g (v-2s)}\, \Gamma\!\left(\frac{n+1}{2},\, (-i\, b+i\, c\,(v-2s))\, z^2\right)\left((-i\, b+i\, c\,(v-2s))\, z^2\right)^{\frac{1}{2}(-n-1)}+\right.$$
$$e^{\frac{1}{2} i\pi(v+1)-i g (v-2s)}\left((i\, b+i\, c\,(v-2s))\, z^2\right)^{\frac{1}{2}(-n-1)}\, \Gamma\!\left(\frac{n+1}{2},\, (i\, b+i\, c\,(v-2s))\, z^2\right)+$$
$$e^{i g (v-2s)-\frac{1}{2} i\pi(v+1)}\left((-i\, b-i\, c\,(v-2s))\, z^2\right)^{\frac{1}{2}(-n-1)}\, \Gamma\!\left(\frac{n+1}{2},\, (-i\, b-i\, c\,(v-2s))\, z^2\right)+$$
$$\left.e^{\frac{1}{2} i\pi(1-v)+g\, i\,(v-2s)}\left((i\, b-i\, c\,(v-2s))\, z^2\right)^{\frac{1}{2}(-n-1)}\, \Gamma\!\left(\frac{n+1}{2},\, (i\, b-i\, c\,(v-2s))\, z^2\right)\right) /;\, n\in\mathbb{N}\wedge v\in\mathbb{N}^+$$

01.06.21.1170.01

$$\int z^n \sin\left(b\sqrt{z}\right)\sin^\nu\left(\sqrt{z}\,c+g\right)dz = (-1)^n\, i\, 2^{-\nu}\, b^{-2(n+1)}\binom{\nu}{\frac{\nu}{2}}\left(\Gamma\left(2(n+1),\, i\,b\sqrt{z}\right)-\Gamma\left(2(n+1),\,-i\,b\sqrt{z}\right)\right)(1-\nu \bmod 2)-$$
$$2^{-\nu} z^{n+1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{-\frac{1}{2}i\pi(1-\nu)-i g(\nu-2s)}\,\Gamma\left(2(n+1),\,(-i\,b+i\,c(\nu-2s))\sqrt{z}\right)\left((-i\,b+i\,c(\nu-2s))\sqrt{z}\right)^{-2(n+1)}+\right.$$
$$e^{\frac{1}{2}i\pi(\nu+1)-i g(\nu-2s)}\left((i\,b+i\,c(\nu-2s))\sqrt{z}\right)^{-2(n+1)}\Gamma\left(2(n+1),\,(i\,b+i\,c(\nu-2s))\sqrt{z}\right)+$$
$$e^{i g(\nu-2s)-\frac{1}{2}i\pi(\nu+1)}\left((-i\,b-i\,c(\nu-2s))\sqrt{z}\right)^{-2(n+1)}\Gamma\left(2(n+1),\,(-i\,b-i\,c(\nu-2s))\sqrt{z}\right)+$$
$$\left.e^{\frac{1}{2}i\pi(1-\nu)+g\,i(\nu-2s)}\left((i\,b-i\,c(\nu-2s))\sqrt{z}\right)^{-2(n+1)}\Gamma\left(2(n+1),\,(i\,b-i\,c(\nu-2s))\sqrt{z}\right)\right)/;\, n\in\mathbb{N}\land \nu\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\sin\left(b\,z^r+e\right)\sin^\nu\left(c\,z^r+g\right)$

01.06.21.1171.01

$$\int z^{\alpha-1}\sin(b\,z^r+e)\sin^\nu(c\,z^r+g)\,dz =$$
$$\frac{i\,2^{-\nu-1}z^\alpha}{r}\binom{\nu}{\frac{\nu}{2}}\left(e^{i e}(-i\,b\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,-i\,b\,z^r\right)-e^{-i e}(i\,b\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,i\,b\,z^r\right)\right)(1-\nu \bmod 2)-\frac{(2\,i)^{-\nu-1}z^\alpha}{r}$$
$$\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^\nu e^{i e+2 i g s-i g \nu}\,\Gamma\left(\frac{\alpha}{r},\,(-i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r\right)((-i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r)^{-\frac{\alpha}{r}}+(-1)^{\nu+1}e^{-i e+2 i g s-i g \nu}\right.$$
$$((i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,(i\,b-2\,i\,c\,s+i\,c\,\nu)\,z^r\right)+e^{i e-2 i g s+i g \nu}((-i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r)^{-\frac{\alpha}{r}}$$
$$\left.\Gamma\left(\frac{\alpha}{r},\,(-i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r\right)-e^{-i e-2 i g s+i g \nu}((i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,(i\,b+2\,i\,c\,s-i\,c\,\nu)\,z^r\right)\right)/;\,\nu\in\mathbb{N}^+$$

01.06.21.1172.01

$$\int z^n\sin\left(b\,z^2+e\right)\sin^\nu\left(c\,z^2+g\right)dz =$$
$$-2^{-\nu-2}\binom{\nu}{\frac{\nu}{2}}\left(e^{i e-\frac{i\pi}{2}}\,\Gamma\left(\frac{n+1}{2},\,-i\,b\,z^2\right)\left(-i\,b\,z^2\right)^{\frac{1}{2}(-n-1)}+e^{-i e+\frac{i\pi}{2}}\left(i\,b\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\left(\frac{n+1}{2},\,i\,b\,z^2\right)\right)(1-\nu \bmod 2)\,z^{n+1}-$$
$$2^{-\nu-2}z^{n+1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{i e-\frac{1}{2}i\pi(1-\nu)-i g(\nu-2s)}\,\Gamma\left(\frac{n+1}{2},\,(-i\,b+i\,c(\nu-2s))\,z^2\right)\left((-i\,b+i\,c(\nu-2s))\,z^2\right)^{\frac{1}{2}(-n-1)}+\right.$$
$$e^{-i e+\frac{1}{2}i\pi(\nu+1)-i g(\nu-2s)}\left((i\,b+i\,c(\nu-2s))\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\left(\frac{n+1}{2},\,(i\,b+i\,c(\nu-2s))\,z^2\right)+$$
$$e^{i e-\frac{1}{2}i\pi(\nu+1)+i g(\nu-2s)}\left((-i\,b-i\,c(\nu-2s))\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\left(\frac{n+1}{2},\,(-i\,b-i\,c(\nu-2s))\,z^2\right)+$$
$$\left.e^{-i e+\frac{1}{2}i\pi(1-\nu)+i g(\nu-2s)}\left((i\,b-i\,c(\nu-2s))\,z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\left(\frac{n+1}{2},\,(i\,b-i\,c(\nu-2s))\,z^2\right)\right)/;\,n\in\mathbb{N}\land\nu\in\mathbb{N}^+$$

01.06.21.1173.01

$$\int z^n \sin\left(\sqrt{z}\, b + e\right) \sin^\nu\left(\sqrt{z}\, c + g\right) dz ==$$

$$(-1)^n\, 2^{-\nu}\, b^{-2(n+1)} \binom{\nu}{\frac{\nu}{2}} \left(e^{i e - \frac{i\pi}{2}}\, \Gamma\left(2(n+1),\, -i\, b\sqrt{z}\right) + e^{-i e + \frac{i\pi}{2}}\, \Gamma\left(2(n+1),\, i\, b\sqrt{z}\right)\right)(1 - \nu \bmod 2) -$$

$$2^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{i e - \frac{1}{2} i\pi(1-\nu) - i g(\nu - 2s)}\, \Gamma\left(2(n+1),\, (-i\, b + i\, c(\nu - 2s))\sqrt{z}\right)(-i\, b + i\, c(\nu - 2s))^{-2(n+1)} +\right.$$

$$e^{-i e + \frac{1}{2} i\pi(\nu+1) - i g(\nu-2s)}\, (i\, b + i\, c(\nu - 2s))^{-2(n+1)}\, \Gamma\left(2(n+1),\, (i\, b + i\, c(\nu - 2s))\sqrt{z}\right) +$$

$$e^{i e - \frac{1}{2} i\pi(\nu+1) + i g(\nu-2s)}\, (-i\, b - i\, c(\nu - 2s))^{-2(n+1)}\, \Gamma\left(2(n+1),\, (-i\, b - i\, c(\nu - 2s))\sqrt{z}\right) +$$

$$\left. e^{-i e + \frac{1}{2} i\pi(1-\nu) + i g(\nu-2s)}\, (i\, b - i\, c(\nu - 2s))^{-2(n+1)}\, \Gamma\left(2(n+1),\, (i\, b - i\, c(\nu - 2s))\sqrt{z}\right)\right) /;\, n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

Involving $z^n \sin\left(b\, z^r + d\, z\right) \sin^\nu\left(c\, z^r + g\right)$

01.06.21.1174.01

$$\int z^n \sin\left(b z^2 + d z\right) \sin^\nu\left(c z^2 + g\right) dz = i\, 2^{-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left((i b)^{-n-1} e^{-\frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 i b z)^{j+1} \left(\frac{i (i d + 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + 2 i b z)^2}{4 b} \right) - (-i b)^{-n-1} e^{\frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d - 2 i b z)^{j+1} \left(-\frac{i (-i d - 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - 2 i b z)^2}{4 b} \right) \right) - i^{-\nu-1} 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu+1} e^{\frac{d^2}{4 (-i b + i c (2 s - \nu))} + g i (2 s - \nu)} \left(\sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d + 2 (-i b + i c (2 s - \nu)) z)^{j+1} \left(-\frac{(-i d + 2 (-i b + i c (2 s - \nu)) z)^2}{-i b + i c (2 s - \nu)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i d + 2 (-i b + i c (2 s - \nu)) z)^2}{4 (-i b + i c (2 s - \nu))} \right) \right) (-i b + i c (2 s - \nu))^{-n-1} + (-1)^\nu e^{\frac{d^2}{4 (i b + i c (2 s - \nu))} + g i (2 s - \nu)} (i b + i c (2 s - \nu))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 (i b + i c (2 s - \nu)) z)^{j+1} \left(-\frac{(i d + 2 (i b + i c (2 s - \nu)) z)^2}{i b + i c (2 s - \nu)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i d + 2 (i b + i c (2 s - \nu)) z)^2}{4 (i b + i c (2 s - \nu))} \right) - e^{\frac{d^2}{4 (-i b + i c (\nu - 2 s))} + g i (\nu - 2 s)} (-i b + i c (\nu - 2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d + 2 (-i b + i c (\nu - 2 s)) z)^{j+1} \left(-\frac{(-i d + 2 (-i b + i c (\nu - 2 s)) z)^2}{-i b + i c (\nu - 2 s)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i d + 2 (-i b + i c (\nu - 2 s)) z)^2}{4 (-i b + i c (\nu - 2 s))} \right) + e^{\frac{d^2}{4 (i b + i c (\nu - 2 s))} + g i (\nu - 2 s)} (i b + i c (\nu - 2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 (i b + i c (\nu - 2 s)) z)^{j+1} \left(-\frac{(i d + 2 (i b + i c (\nu - 2 s)) z)^2}{i b + i c (\nu - 2 s)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i d + 2 (i b + i c (\nu - 2 s)) z)^2}{4 (i b + i c (\nu - 2 s))} \right) \right) /;\, n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1175.01

$$\int z^n \sin\left(\sqrt{z}\, b + d z\right) \sin^\nu\left(\sqrt{z}\, c + g\right) dz = i (-1)^n 2^{-2 n-\nu-2} d^{-2 n-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(e^{-\frac{i b^2}{4 d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i b)^{-h-j+2 n} \left(i b + 2 i d \sqrt{z} \right)^{h+j} \right.$$

$$\left(\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+\right.$$

$$\left.2\sqrt{\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)-$$

$$e^{\frac{i\,b^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^{h+j}\left(-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\left(-i\,b\left(-i\,b-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-\right.$$

$$\left.\left.2\,i\,d\sqrt{-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)-$$

$$(-1)^n\,i^{-\nu-1}\,2^{-2\,n-\nu-2}\,d^{-2\,n-2}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left((-1)^\nu\,e^{\frac{i\,(i\,b+i\,c\,(2\,k-\nu))^2}{4\,d}+g\,i\,(2\,k-\nu)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(2\,k-\nu))^{-h-j+2\,n}\right.$$

$$\left(i\,b+i\,c\,(2\,k-\nu)+2\,i\,d\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(i\,b+i\,c\,(2\,k-\nu)+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\,b+i\,c\,(2\,k-\nu))\left(i\,b+i\,c\,(2\,k-\nu)+2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+i\,c\,(2\,k-\nu)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+\right.$$

$$\left.2\sqrt{\frac{i\left(i\,b+i\,c\,(2\,k-\nu)+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+i\,c\,(2\,k-\nu)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)+$$

$$e^{\frac{i\,(i\,b+i\,c\,(\nu-2\,k))^2}{4\,d}+g\,i\,(\nu-2\,k)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(\nu-2\,k))^{-h-j+2\,n}\left(i\,b+i\,c\,(\nu-2\,k)+2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\,b+i\,c\,(v-2\,k))\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+\right.$$

$$\left.2\sqrt{\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)+$$

$$(-1)^{v+1}\,e^{i\,g\,(2\,k-v)-\frac{i\,(-i\,b+i\,c\,(2\,k-v))^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(2\,k-v))^{-h-j+2\,n}\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left((-i\,b+i\,c\,(2\,k-v))\right.$$

$$\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-$$

$$\left.2\,i\,d\sqrt{-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)-$$

$$e^{i\,g\,(v-2\,k)-\frac{i\,(-i\,b+i\,c\,(v-2\,k))^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(v-2\,k))^{-h-j+2\,n}\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((-i\,b+i\,c\,(v-2\,k))\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\right.\right.$$

$$\left.-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-2\,i\,d\sqrt{-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\Bigg($$

Involving $z^n \sin(b z^r + d z + e) \sin^v(c z^r + g)$

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$$\int z^n \sin(b z^2 + d z + e) \sin^v(c z^2+g)\,dz = i\,2^{-v-2}\binom{v}{\frac{v}{2}}(1 - v \bmod 2) \Bigg((i b)^{-n-1} e^{i e - \frac{i d^2}{4b}} \sum_{j=0}^n 2^{j-n}(-i d)^{n-j}(i d + 2 i b z)^{j+1}\left(\frac{i(i d+2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2}, \frac{i(i d + 2 i b z)^2}{4b}\right) - (-i b)^{-n-1} e^{\frac{i d^2}{4b} - i e}\sum_{j=0}^n 2^{j-n}(i d)^{n-j}(-i d - 2 i b z)^{j+1}\left(-\frac{i(-i d - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{i(-i d-2 i b z)^2}{4b}\right)\Bigg) - i^{-v-1}2^{-v-2}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg((-1)^{v+1} e^{\frac{d^2}{4(-i b + i c(2s-v))} - i e + g i(2s-v)} \left(\sum_{j=0}^n 2^{j-n}(i d)^{n-j}(-i d + 2(-i b + i c(2s-v))z)^{j+1}\left(-\frac{(-i d+2(-i b+ i c(2s-v))z)^2}{-i b + i c(2s-v)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(-i d + 2(-i b + i c(2s-v))z)^2}{4(-i b + i c(2s-v))}\right)\right)(-i b + i c(2s-v))^{-n-1} + (-1)^v e^{\frac{d^2}{4(i b + i c(2s-v))} + i e + g i(2s-v)}(i b + i c(2s-v))^{-n-1}\sum_{j=0}^n 2^{j-n}(-i d)^{n-j}(i d + 2(i b + i c(2s-v))z)^{j+1}\left(-\frac{(i d+2(i b + i c(2s-v))z)^2}{i b + i c(2s-v)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(i d + 2(i b + i c(2s-v))z)^2}{4(i b + i c(2s-v))}\right) - e^{\frac{d^2}{4(-i b + i c(v-2s))} - i e + g i(v-2s)}(-i b + i c(v-2s))^{-n-1}\sum_{j=0}^n 2^{j-n}(i d)^{n-j}(-i d + 2(-i b + i c(v-2s))z)^{j+1}\left(-\frac{(-i d + 2(-i b + i c(v-2s))z)^2}{-i b + i c(v-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(-i d+2(-i b + i c(v-2s))z)^2}{4(-i b + i c(v-2s))}\right) + e^{\frac{d^2}{4(i b + i c(v-2s))} + i e + g i(v-2s)}(i b + i c(v-2s))^{-n-1}\sum_{j=0}^n 2^{j-n}(-i d)^{n-j}(i d + 2(i b + i c(v-2s))z)^{j+1}\left(-\frac{(i d+2(i b+i c(v-2s))z)^2}{i b+i c(v-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(i d+2(i b+i c(v-2s))z)^2}{4(i b+i c(v-2s))}\right)\Bigg) /; n\in\mathbb{N}\land v\in\mathbb{N}^+$$

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$$\int z^n \sin\left(\sqrt{z}\, b + d z + e\right) \sin^\nu\left(\sqrt{z}\, c + g\right) dz = = $$

$$(-1)^n 2^{-2n-\nu-2} i \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(e^{i e - \frac{i b^2}{4 d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i b)^{-h-j+2n} \left(i b + 2 i d \sqrt{z}\right)^{h+j} \right.$$

$$\left(\frac{i \left(i b + 2 i d \sqrt{z}\right)^2}{d} \right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(b\, i \left(i b + 2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i \left(i b + 2 i d \sqrt{z}\right)^2}{4 d} \right) + \right.$$

$$\left. 2 \sqrt{\frac{i \left(i b + 2 i d \sqrt{z}\right)^2}{d}}\, d\, i\, \Gamma\left(\frac{1}{2}(h+j+2), \frac{i \left(i b + 2 i d \sqrt{z}\right)^2}{4 d} \right) \right) -$$

$$e^{\frac{i b^2}{4 d} - i e} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b)^{-h-j+2n} \left(-i b - 2 i d \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{d} \right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left(-i b \left(-i b - 2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{4 d} \right) - \right.$$

$$\left.\left. 2 i d \sqrt{-\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{d}}\; \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{4 d} \right) \right) \right) d^{-2n-2} +$$

$$2^{-2n-\nu-2} (i d)^{-2n-2} i^{-\nu-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^\nu e^{\frac{i (i b + i c (2k-\nu))^2}{4 d} + i e + g i (2k-\nu)} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i b + i c (2k-\nu))^{-h-j+2n} \right.$$

$$\left(i b + i c (2k-\nu) + 2 i d \sqrt{z}\right)^{h+j} \left(\frac{i \left(i b + i c (2k-\nu) + 2 i d \sqrt{z}\right)^2}{d} \right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\left((i b + i c (2k-\nu)) \left(i b + i c (2k-\nu) + 2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i \left(i b + i c (2k-\nu) + 2 i d \sqrt{z}\right)^2}{4 d} \right) + \right.$$

$$2\sqrt{\frac{i\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(i\,b+i\,c\,(2\,k-v)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)+$$

$$e^{\frac{i\,(i\,b+i\,c\,(v-2\,k))^2}{4\,d}+i\,e+g\,i\,(v-2\,k)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(v-2\,k))^{-h-j+2\,n}\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\,b+i\,c\,(v-2\,k))\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+$$

$$2\sqrt{\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(i\,b+i\,c\,(v-2\,k)+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)+$$

$$(-1)^{v+1}\,e^{-\frac{i\,(-i\,b+i\,c\,(2\,k-v))^2}{4\,d}-i\,e+g\,i\,(2\,k-v)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(2\,k-v))^{-h-j+2\,n}\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((-i\,b+i\,c\,(2\,k-v))$$

$$\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-$$

$$2\,i\,d\sqrt{-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(-i\,b+i\,c\,(2\,k-v)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)-$$

$$e^{-\frac{i\,(-i\,b+i\,c\,(v-2\,k))^2}{4\,d}-i\,e+g\,i\,(v-2\,k)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(v-2\,k))^{-h-j+2\,n}\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((-i\,b+i\,c\,(v-2\,k))\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\right.\right.$$

$$\left.-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-2\,i\,d\,\sqrt{-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\right.$$

$$\left.\left.\left.\frac{1}{2}\,(h+j+2),\,-\frac{i\left(-i\,b+i\,c\,(v-2\,k)-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin(d\,z) \sin^v\left(c\,z^r+f\,z\right)$

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$$\int z^n \sin(d\,z) \sin^\nu\left(c\,z^2 + f\,z\right) dz = i\,(-1)^n\,2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} \left((-i\,d)^{-n-1}\,\Gamma(n+1,\,i\,d\,z) - (i\,d)^{-n-1}\,\Gamma(n+1,\,-i\,d\,z)\right)(1-\nu \bmod 2) - 2^{-\nu-2} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{\frac{1}{2}\,i\,\pi\,(\nu+1)-\frac{i\,(-i\,d-i\,f\,(\nu-2\,s))^2}{4\,c\,(\nu-2\,s)}} \left(\sum_{j=0}^{n} 2^{j-n}\,(i\,d+i\,f\,(\nu-2\,s))^{n-j} (-i\,d-i\,f\,(\nu-2\,s)-2\,i\,c\,(\nu-2\,s)\,z)^{j+1} \left(-\frac{i\,(-i\,d-i\,f\,(\nu-2\,s)-2\,i\,c\,(\nu-2\,s)\,z)^2}{c\,(\nu-2\,s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2},\,-\frac{i\,(-i\,d-i\,f\,(\nu-2\,s)-2\,i\,c\,(\nu-2\,s)\,z)^2}{4\,c\,(\nu-2\,s)}\right)\right)(-i\,c\,(\nu-2\,s))^{-n-1} + e^{\frac{1}{2}\,i\,\pi\,(\nu-1)-\frac{i\,(i\,d-i\,f\,(\nu-2\,s))^2}{4\,c\,(\nu-2\,s)}} \left(\sum_{j=0}^{n} 2^{j-n}\,(-i\,d+i\,f\,(\nu-2\,s))^{n-j}\,(i\,d-i\,f\,(\nu-2\,s)-2\,i\,c\,(\nu-2\,s)\,z)^{j+1} \left(-\frac{i\,(i\,d-i\,f\,(\nu-2\,s)-2\,i\,c\,(\nu-2\,s)\,z)^2}{c\,(\nu-2\,s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2},\,-\frac{i\,(i\,d-i\,f\,(\nu-2\,s)-2\,i\,c\,(\nu-2\,s)\,z)^2}{4\,c\,(\nu-2\,s)}\right)\right)(-i\,c\,(\nu-2\,s))^{-n-1} + e^{\frac{i\,(-i\,d+i\,f\,(\nu-2\,s))^2}{4\,c\,(\nu-2\,s)}+\frac{1}{2}\,i\,\pi\,(1-\nu)}\,(i\,c\,(\nu-2\,s))^{-n-1} \sum_{j=0}^{n} 2^{j-n}\,(i\,d-i\,f\,(\nu-2\,s))^{n-j} (-i\,d+i\,f\,(\nu-2\,s)+2\,i\,c\,(\nu-2\,s)\,z)^{j+1} \left(\frac{i\,(-i\,d+i\,f\,(\nu-2\,s)+2\,i\,c\,(\nu-2\,s)\,z)^2}{c\,(\nu-2\,s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2},\,\frac{i\,(-i\,d+i\,f\,(\nu-2\,s)+2\,i\,c\,(\nu-2\,s)\,z)^2}{4\,c\,(\nu-2\,s)}\right) + e^{\frac{i\,(i\,d+i\,f\,(\nu-2\,s))^2}{4\,c\,(\nu-2\,s)}-\frac{1}{2}\,i\,\pi\,(\nu+1)}\,(i\,c\,(\nu-2\,s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i\,d-i\,f\,(\nu-2\,s))^{n-j}\,(i\,d+i\,f\,(\nu-2\,s)+2\,i\,c\,(\nu-2\,s)\,z)^{j+1} \left(\frac{i\,(i\,d+i\,f\,(\nu-2\,s)+2\,i\,c\,(\nu-2\,s)\,z)^2}{c\,(\nu-2\,s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2},\,\frac{i\,(i\,d+i\,f\,(\nu-2\,s)+2\,i\,c\,(\nu-2\,s)\,z)^2}{4\,c\,(\nu-2\,s)}\right)\right) /;\; n \in \mathbb{N} \bigwedge m \in \mathbb{N}^+ \bigwedge \nu \in \mathbb{N}^+$$

01.06.21.1179.01

$$\int z^n \sin(d\,z) \sin^\nu\left(\sqrt{z}\;c + f\,z\right) dz = (-1)^n\,2^{-\nu-1}\,i \binom{\nu}{\frac{\nu}{2}} \left((-i\,d)^{-n-1}\,\Gamma(n+1,\,i\,d\,z) - (i\,d)^{-n-1}\,\Gamma(n+1,\,-i\,d\,z)\right)(1-\nu \bmod 2) + 2^{-2\,n-\nu-2} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{\frac{c^2\,(\nu-2\,s)^2}{4\,(-i\,d+i\,f\,(\nu-2\,s))}+\frac{1}{2}\,i\,\pi\,(1-\nu)} \left(\sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h}\,4^j\,(i\,c\,(\nu-2\,s))^{-h-j+2\,n} \left(c\,i\,(\nu-2\,s) + 2\,(-i\,d+i\,f\,(\nu-2\,s))\,\sqrt{z}\right)^{h+j}\right.\right.$$

$$\left(-\frac{\left(c\,i\,(v-2\,s)+2\,(-i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}\Bigg(c\,i\,(v-2\,s)\left(c\,i\,(v-2\,s)+\right.$$

$$\left.2\,(-i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{\left(c\,i\,(v-2\,s)+2\,(-i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(v-2\,s))}\right)+2$$

$$(-i\,d+i\,f\,(v-2\,s))\,\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{\left(c\,i\,(v-2\,s)+2\,(-i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(v-2\,s))}\right)$$

$$\left.\sqrt{-\frac{\left(c\,i\,(v-2\,s)+2\,(-i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(v-2\,s)}}\right)\Bigg)(-i\,d+i\,f\,(v-2\,s))^{-2\,(n+1)}+$$

$$e^{\frac{c^2\,(v-2\,s)^2}{4\,(i\,d+i\,f\,(v-2\,s))}-\frac{1}{2}\,i\,\pi\,(v+1)}\,(i\,d+i\,f\,(v-2\,s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s))^{-h-j+2\,n}$$

$$\left(c\,i\,(v-2\,s)+2\,(i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)^{h+j}\left(-\frac{\left(c\,i\,(v-2\,s)+2\,(i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg(c\,i\,(v-2\,s)\left(c\,i\,(v-2\,s)+2\,(i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\right.$$

$$\left.-\frac{\left(c\,i\,(v-2\,s)+2\,(i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(v-2\,s))}\right)+2\,\sqrt{-\frac{\left(c\,i\,(v-2\,s)+2\,(i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(v-2\,s)}}$$

$$\left.(i\,d+i\,f\,(v-2\,s))\,\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{\left(c\,i\,(v-2\,s)+2\,(i\,d+i\,f\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(v-2\,s))}\right)\right)\Bigg)+$$

$$e^{\frac{c^2\,(v-2\,s)^2}{4\,(-i\,d-i\,f\,(v-2\,s))}+\frac{1}{2}\,i\,\pi\,(v+1)}\,(-i\,d-i\,f\,(v-2\,s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2\,s))^{-h-j+2\,n}$$

$$\left(2\,(-i\,d-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^{h+j}\left(-\frac{\left(2\,(-i\,d-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{-i\,d-i\,f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2(-i\,d-i\,f(v-2s))\sqrt{-\frac{\left(2(-i\,d-i\,f(v-2s))\sqrt{z}-i\,c(v-2s)\right)^2}{-i\,d-i\,f(v-2s)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.\right.$$

$$\left.-\frac{\left(2(-i\,d-i\,f(v-2s))\sqrt{z}-i\,c(v-2s)\right)^2}{4(-i\,d-i\,f(v-2s))}\right)-i\,c(v-2s)\left(2(-i\,d-i\,f(v-2s))\sqrt{z}-\right.$$

$$\left.\left.i\,c(v-2s)\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{\left(2(-i\,d-i\,f(v-2s))\sqrt{z}-i\,c(v-2s)\right)^2}{4(-i\,d-i\,f(v-2s))}\right)\right)+$$

$$e^{\frac{c^2(v-2s)^2}{4(i\,d-i\,f(v-2s))}+\frac{1}{2}i\,\pi(v-1)}(i\,d-i\,f(v-2s))^{-2(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c(v-2s))^{-h-j+2n}$$

$$\left(2(i\,d-i\,f(v-2s))\sqrt{z}-i\,c(v-2s)\right)^{h+j}\left(-\frac{\left(2(i\,d-i\,f(v-2s))\sqrt{z}-i\,c(v-2s)\right)^2}{i\,d-i\,f(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2(i\,d-i\,f(v-2s))\sqrt{-\frac{\left(2(i\,d-i\,f(v-2s))\sqrt{z}-i\,c(v-2s)\right)^2}{i\,d-i\,f(v-2s)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.\right.$$

$$\left.-\frac{\left(2(i\,d-i\,f(v-2s))\sqrt{z}-i\,c(v-2s)\right)^2}{4(i\,d-i\,f(v-2s))}\right)-i\,c(v-2s)\left(2(i\,d-i\,f(v-2s))\sqrt{z}-i\,c(v-2s)\right)$$

$$\left.\left.\Gamma\left(\frac{1}{2}(h+j+1),-\frac{\left(2(i\,d-i\,f(v-2s))\sqrt{z}-i\,c(v-2s)\right)^2}{4(i\,d-i\,f(v-2s))}\right)\right)\right)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin(d\,z+e)\sin^v\left(c\,z^r+f\,z\right)$

01.06.21.1180.01

$$\int z^n \sin(d z + e) \sin^\nu\left(c z^2 + f z\right) dz = i (-1)^n 2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} \left((-i d)^{-n-1} e^{-i e} \Gamma(n+1, i d z) - (i d)^{-n-1} e^{i e} \Gamma(n+1, -i d z)\right) (1 - \nu \bmod 2) - 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{i(-i d - i f(\nu-2s))^2}{4c(\nu-2s)} - i e + \frac{1}{2} i \pi (\nu+1)} \left(\sum_{j=0}^n 2^{j-n} (i d + i f(\nu - 2s))^{n-j} (-i d - i f(\nu-2s) - 2 i c(\nu-2s) z)^{j+1} \left(-\frac{i(-i d - i f(\nu-2s) - 2 i c(\nu-2s) z)^2}{c(\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(-i d - i f(\nu-2s) - 2 i c(\nu-2s) z)^2}{4c(\nu-2s)}\right)\right) (-i c(\nu-2s))^{-n-1} + e^{-\frac{i(i d - i f(\nu-2s))^2}{4c(\nu-2s)} + i e + \frac{1}{2} i \pi (\nu-1)} \left(\sum_{j=0}^n 2^{j-n} (-i d + i f(\nu-2s))^{n-j} (i d - i f(\nu-2s) - 2 i c(\nu-2s) z)^{j+1} \left(-\frac{i(i d - i f(\nu-2s) - 2 i c(\nu-2s) z)^2}{c(\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(i d - i f(\nu-2s) - 2 i c(\nu-2s) z)^2}{4c(\nu-2s)}\right)\right) (-i c(\nu-2s))^{-n-1} + e^{\frac{i(-i d + i f(\nu-2s))^2}{4c(\nu-2s)} - i e + \frac{1}{2} i \pi (1-\nu)} (i c(\nu-2s))^{-n-1} \sum_{j=0}^n 2^{j-n} (i d - i f(\nu-2s))^{n-j} (-i d + i f(\nu-2s) + 2 i c(\nu-2s) z)^{j+1} \left(\frac{i(-i d + i f(\nu-2s) + 2 i c(\nu-2s) z)^2}{c(\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(-i d + i f(\nu-2s) + 2 i c(\nu-2s) z)^2}{4c(\nu-2s)}\right) + e^{\frac{i(i d + i f(\nu-2s))^2}{4c(\nu-2s)} + i e - \frac{1}{2} i \pi (\nu+1)} (i c(\nu-2s))^{-n-1} \sum_{j=0}^n 2^{j-n} (-i d - i f(\nu-2s))^{n-j} (i d + i f(\nu-2s) + 2 i c(\nu-2s) z)^{j+1} \left(\frac{i(i d + i f(\nu-2s) + 2 i c(\nu-2s) z)^2}{c(\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(i d + i f(\nu-2s) + 2 i c(\nu-2s) z)^2}{4c(\nu-2s)}\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1181.01

$$\int z^n \sin(d z + e) \sin^\nu\left(\sqrt{z}\, c + f z\right) dz = (-1)^n 2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} \left(e^{-i e + \frac{i\pi}{2}} \Gamma(n+1, i d z) (-i d)^{-n-1} + (i d)^{-n-1} e^{i e - \frac{i\pi}{2}} \Gamma(n+1, -i d z)\right) (1 - \nu \bmod 2) + 2^{-2n-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s}$$

$$\left(e^{\frac{c^2 (v-2 s)^2}{4 (-i d+i f (v-2 s))}-i e+\frac{1}{2} i \pi (1-v)} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i c (v-2 s))^{-h-j+2 n} \left(c i (v-2 s)+2 (-i d+i f (v-2 s)) \sqrt{z}\right)^{h+j}\right.\right.$$

$$\left(-\frac{\left(c i (v-2 s)+2 (-i d+i f (v-2 s)) \sqrt{z}\right)^2}{-i d+i f (v-2 s)}\right)^{\frac{1}{2} (-h-j-1)} \binom{j}{h} \binom{n}{j} \left(c i (v-2 s) \left(c i (v-2 s)+\right.\right.$$

$$\left.2 (-i d+i f (v-2 s)) \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h+j+1), -\frac{\left(c i (v-2 s)+2 (-i d+i f (v-2 s)) \sqrt{z}\right)^2}{4 (-i d+i f (v-2 s))}\right)+2$$

$$(-i d+i f (v-2 s)) \Gamma\left(\frac{1}{2} (h+j+2), -\frac{\left(c i (v-2 s)+2 (-i d+i f (v-2 s)) \sqrt{z}\right)^2}{4 (-i d+i f (v-2 s))}\right)$$

$$\left.\left.\sqrt{-\frac{\left(c i (v-2 s)+2 (-i d+i f (v-2 s)) \sqrt{z}\right)^2}{-i d+i f (v-2 s)}}\right)\right) (-i d+i f (v-2 s))^{-2 (n+1)}+$$

$$e^{\frac{c^2 (v-2 s)^2}{4 (i d+i f (v-2 s))}+i e-\frac{1}{2} i \pi (v+1)} (i d+i f (v-2 s))^{-2 (n+1)} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i c (v-2 s))^{-h-j+2 n}$$

$$\left(c i (v-2 s)+2 (i d+i f (v-2 s)) \sqrt{z}\right)^{h+j} \left(-\frac{\left(c i (v-2 s)+2 (i d+i f (v-2 s)) \sqrt{z}\right)^2}{i d+i f (v-2 s)}\right)^{\frac{1}{2} (-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left(c i (v-2 s) \left(c i (v-2 s)+2 (i d+i f (v-2 s)) \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h+j+1),\right.\right.$$

$$\left.-\frac{\left(c i (v-2 s)+2 (i d+i f (v-2 s)) \sqrt{z}\right)^2}{4 (i d+i f (v-2 s))}\right)+2 \sqrt{-\frac{\left(c i (v-2 s)+2 (i d+i f (v-2 s)) \sqrt{z}\right)^2}{i d+i f (v-2 s)}}$$

$$\left.(i d+i f (v-2 s)) \Gamma\left(\frac{1}{2} (h+j+2), -\frac{\left(c i (v-2 s)+2 (i d+i f (v-2 s)) \sqrt{z}\right)^2}{4 (i d+i f (v-2 s))}\right)\right)+$$

$$e^{\frac{c^2 (v-2 s)^2}{4 (-i d-i f (v-2 s))}-i e+\frac{1}{2} i \pi (v+1)} (-i d-i f (v-2 s))^{-2 (n+1)} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c (v-2 s))^{-h-j+2 n}$$

$$\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^{h+j}\left(-\frac{\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{-i\,d-i\,f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{-\frac{\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{-i\,d-i\,f\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.\right.$$

$$\left.-\frac{\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{4\left(-i\,d-i\,f\,(v-2\,s)\right)}\right)-i\,c\,(v-2\,s)\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-\right.$$

$$\left.\left.i\,c\,(v-2\,s)\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{4\left(-i\,d-i\,f\,(v-2\,s)\right)}\right)\right)+$$

$$e^{\frac{c^2(v-2\,s)^2}{4(i\,d-i\,f\,(v-2\,s))}+i\,e+\frac{1}{2}i\,\pi\,(v-1)}\left(i\,d-i\,f\,(v-2\,s)\right)^{-2(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\left(-i\,c\,(v-2\,s)\right)^{-h-j+2\,n}$$

$$\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^{h+j}\left(-\frac{\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{i\,d-i\,f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{-\frac{\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{i\,d-i\,f\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.\right.$$

$$\left.-\frac{\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{4\left(i\,d-i\,f\,(v-2\,s)\right)}\right)-i\,c\,(v-2\,s)\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)$$

$$\left.\left.\Gamma\left(\frac{1}{2}(h+j+1),-\frac{\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{4\left(i\,d-i\,f\,(v-2\,s)\right)}\right)\right)\right)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin\left(b\,z^r\right)\sin^v\left(c\,z^r+f\,z\right)$

01.06.21.1182.01

$$\int z^n \sin(b z^2) \sin^v(c z^2 + f z) \, dz = i\, 2^{-v-2} z^{n+1} \binom{v}{\frac{v}{2}} \left((-i b z^2)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, -i b z^2\right) - (i b z^2)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i b z^2\right) \right) (1 - v \bmod 2) - 2^{-v-2} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Bigg(e^{-\frac{1}{4} i \left(-\frac{f^2 (v-2s)^2}{b+2cs-cv} - 2\pi(1-v) \right)} \Bigg(\sum_{j=0}^{n} 2^{j-n} (-i f (v-2s))^{n-j} (f i (v-2s) + 2(-i b + i c (v-2s)) z)^{j+1} \left(-\frac{(f i (v-2s) + 2(-i b + i c (v-2s)) z)^2}{-i b + i c (v-2s)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(f i (v-2s) + 2(-i b + i c (v-2s)) z)^2}{4(-i b + i c (v-2s))} \right) \Bigg) (-i b + i c (v-2s))^{-n-1} + e^{\frac{1}{4} i \left(\frac{f^2 (v-2s)^2}{-b+2cs-cv} - 2\pi(v+1) \right)} (i b + i c (v-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i f (v-2s))^{n-j} (f i (v-2s) + 2(i b + i c (v-2s)) z)^{j+1} \left(-\frac{(f i (v-2s) + 2(i b + i c (v-2s)) z)^2}{i b + i c (v-2s)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(f i (v-2s) + 2(i b + i c (v-2s)) z)^2}{4(i b + i c (v-2s))} \right) + e^{-\frac{1}{4} i \left(\frac{f^2 (v-2s)^2}{-b+2cs-cv} - 2\pi(v+1) \right)} (-i b - i c (v-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i f (v-2s))^{n-j} (2(-i b - i c (v-2s)) z - i f (v-2s))^{j+1} \left(-\frac{(2(-i b - i c (v-2s)) z - i f (v-2s))^2}{-i b - i c (v-2s)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(2(-i b - i c (v-2s)) z - i f (v-2s))^2}{4(-i b - i c (v-2s))} \right) + e^{\frac{1}{4} i \left(2\pi(v-1) - \frac{f^2 (v-2s)^2}{b+2cs-cv} \right)} (i b - i c (v-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i f (v-2s))^{n-j} (2(i b - i c (v-2s)) z - i f (v-2s))^{j+1} \left(-\frac{(2(i b - i c (v-2s)) z - i f (v-2s))^2}{i b - i c (v-2s)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(2(i b - i c (v-2s)) z - i f (v-2s))^2}{4(i b - i c (v-2s))} \right) \Bigg) /;\, n \in \mathbb{N} \land v \in \mathbb{N}^+$$

01.06.21.1183.01

$$\int z^n \sin(b \sqrt{z}) \sin^v(\sqrt{z}\, c + f z) \, dz = (-1)^{n+1} 2^{-v} i \binom{v}{\frac{v}{2}} \left(\Gamma(2(n+1), -i b \sqrt{z}) - \Gamma(2(n+1), i b \sqrt{z}) \right) (1 - v \bmod 2) b^{-2(n+1)} + 2^{-2n-v-2} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s}$$

$$\Bigg(e^{\frac{1}{2}i\pi(v+1)-\frac{i(-ib-ic(v-2s))^2}{4f(v-2s)}}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(-ib-ic(v-2s))^{-h-j+2n}\left(-ib-ic(v-2s)-2if(v-2s)\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(-ib-ic(v-2s)-2if(v-2s)\sqrt{z}\right)^2}{f(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((-ib-ic(v-2s))\left(-ib-ic(v-2s)-2if(v-2s)\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(-ib-ic(v-2s)-2if(v-2s)\sqrt{z}\right)^2}{4f(v-2s)}\right)-2$$

$$if(v-2s)\sqrt{-\frac{i\left(-ib-ic(v-2s)-2if(v-2s)\sqrt{z}\right)^2}{f(v-2s)}}$$

$$\Gamma\left(\frac{1}{2}(h+j+2),-\frac{i\left(-ib-ic(v-2s)-2if(v-2s)\sqrt{z}\right)^2}{4f(v-2s)}\right)\Bigg)\Bigg)(-if(v-2s))^{-2(n+1)}+$$

$$e^{\frac{1}{2}i\pi(v-1)-\frac{i(ib-ic(v-2s))^2}{4f(v-2s)}}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(ib-ic(v-2s))^{-h-j+2n}\left(ib-ic(v-2s)-2if(v-2s)\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(ib-ic(v-2s)-2if(v-2s)\sqrt{z}\right)^2}{f(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((ib-ic(v-2s))\Big(ib-ic(v-2s)-$$

$$2if(v-2s)\sqrt{z}\Big)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(ib-ic(v-2s)-2if(v-2s)\sqrt{z}\right)^2}{4f(v-2s)}\right)-2$$

$$if(v-2s)\sqrt{-\frac{i\left(ib-ic(v-2s)-2if(v-2s)\sqrt{z}\right)^2}{f(v-2s)}}\;\Gamma\Bigg(\frac{1}{2}(h+j+2),$$

$$-\frac{i\left(i\,b-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\Bigg)\Bigg)\Bigg)\,(-i\,f\,(v-2\,s))^{-2\,(n+1)}+$$

$$e^{\frac{i\,(-i\,b+i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)}+\frac{1}{2}\,i\,\pi\,(1-v)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(v-2\,s))^{-h-j+2\,n}$$

$$\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg((-i\,b+i\,c\,(v-2\,s))\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}\,(h+j+1),\,\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\Bigg)+$$

$$2\,f\,i\,(v-2\,s)\sqrt{\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\Bigg(\frac{1}{2}\,(h+j+2),$$

$$\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\Bigg)\Bigg)+e^{\frac{i\,(i\,b+i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)}-\frac{1}{2}\,i\,\pi\,(v+1)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(v-2\,s))^{-h-j+2\,n}\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((i\,b+i\,c\,(v-2\,s))$$

$$\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+$$

$$2\,f\,i\,(v-2\,s)\sqrt{\frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\Bigg(\frac{1}{2}\,(h+j+2),$$

$$\frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\Bigg)\Bigg)\Bigg)\,/;\,n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n \sin(b z^r + e) \sin^\nu(c z^r + f z)$

01.06.21.1184.01

$$\int z^n \sin(b z^2 + e) \sin^\nu(c z^2 + f z)\, dz = i\, 2^{-\nu-2} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \left(e^{i e} \left(-i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, -i b z^2\right) - e^{-i e} \left(i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i b z^2\right)\right)(1 - \nu \bmod 2) -$$

$$2^{-\nu-2} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{1}{4} i \left(-\frac{f^2 (\nu-2s)^2}{b+2cs-c\nu} + 4e - 2\pi(1-\nu)\right)} \left(\sum_{j=0}^{n} 2^{j-n} (-i f (\nu - 2s))^{n-j}\right.\right.$$

$$(f i (\nu - 2s) + 2(-i b + i c(\nu - 2s)) z)^{j+1} \left(-\frac{(f i (\nu - 2s) + 2(-i b + i c(\nu - 2s)) z)^2}{-i b + i c(\nu - 2s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(f i(\nu - 2s) + 2(-i b + i c(\nu - 2s)) z)^2}{4(-i b + i c(\nu - 2s))}\right)\right) (-i b + i c(\nu - 2s))^{-n-1} +$$

$$e^{\frac{1}{4} i \left(\frac{f^2 (\nu-2s)^2}{-b+2cs-c\nu} + 4e - 2\pi(\nu+1)\right)} (i b + i c(\nu - 2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i f(\nu - 2s))^{n-j} (f i(\nu - 2s) + 2(i b + i c(\nu - 2s)) z)^{j+1}$$

$$\left(-\frac{(f i(\nu - 2s) + 2(i b + i c(\nu - 2s)) z)^2}{i b + i c(\nu - 2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(f i(\nu - 2s) + 2(i b + i c(\nu - 2s)) z)^2}{4(i b + i c(\nu - 2s))}\right) +$$

$$e^{-\frac{1}{4} i \left(\frac{f^2 (\nu-2s)^2}{-b+2cs-c\nu} + 4e - 2\pi(\nu+1)\right)} (-i b - i c(\nu - 2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i f(\nu - 2s))^{n-j}$$

$$(2(-i b - i c(\nu - 2s)) z - i f(\nu - 2s))^{j+1} \left(-\frac{(2(-i b - i c(\nu - 2s)) z - i f(\nu - 2s))^2}{-i b - i c(\nu - 2s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(2(-i b - i c(\nu - 2s)) z - i f(\nu - 2s))^2}{4(-i b - i c(\nu - 2s))}\right) +$$

$$e^{\frac{1}{4} i \left(-\frac{f^2 (\nu-2s)^2}{b+2cs-c\nu} + 4e + 2\pi(\nu-1)\right)} (i b - i c(\nu - 2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i f(\nu - 2s))^{n-j}$$

$$(2(i b - i c(\nu - 2s)) z - i f(\nu - 2s))^{j+1} \left(-\frac{(2(i b - i c(\nu - 2s)) z - i f(\nu - 2s))^2}{i b - i c(\nu - 2s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(2(i b - i c(\nu - 2s)) z - i f(\nu - 2s))^2}{4(i b - i c(\nu - 2s))}\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

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$$\int z^n \sin\left(\sqrt{z}\, b + e\right) \sin^\nu\left(\sqrt{z}\, c + f\, z\right) dz ==$$

$$(-1)^n\, 2^{-\nu}\, i \binom{\nu}{\frac{\nu}{2}} \left(e^{-i e}\, \Gamma\left(2 (n+1),\, i\, b \sqrt{z}\right) - e^{i e}\, \Gamma\left(2 (n+1),\, -i\, b \sqrt{z}\right)\right) (1 - \nu \bmod 2)\, b^{-2 (n+1)} +$$

$$2^{-2 n-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{i (-i b - i c (\nu-2 s))^2}{4 f (\nu-2 s)} - i e + \frac{1}{2} i \pi (\nu+1)} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i\, b - i\, c\, (\nu - 2 s))^{-h-j+2 n} \right.\right.$$

$$\left(-i\, b - i\, c\, (\nu - 2 s) - 2\, i\, f\, (\nu - 2 s) \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i\, b - i\, c\, (\nu - 2 s) - 2\, i\, f\, (\nu - 2 s) \sqrt{z}\right)^2}{f\, (\nu - 2 s)}\right)^{\frac{1}{2} (-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left((-i\, b - i\, c\, (\nu - 2 s)) \left(-i\, b - i\, c\, (\nu - 2 s) - 2\, i\, f\, (\nu - 2 s) \sqrt{z}\right) \right.$$

$$\Gamma\left(\frac{1}{2} (h + j + 1),\, -\frac{i \left(-i\, b - i\, c\, (\nu - 2 s) - 2\, i\, f\, (\nu - 2 s) \sqrt{z}\right)^2}{4\, f\, (\nu - 2 s)}\right) - 2$$

$$i\, f\, (\nu - 2 s) \sqrt{-\frac{i \left(-i\, b - i\, c\, (\nu - 2 s) - 2\, i\, f\, (\nu - 2 s) \sqrt{z}\right)^2}{f\, (\nu - 2 s)}}$$

$$\left.\left.\Gamma\left(\frac{1}{2} (h + j + 2),\, -\frac{i \left(-i\, b - i\, c\, (\nu - 2 s) - 2\, i\, f\, (\nu - 2 s) \sqrt{z}\right)^2}{4\, f\, (\nu - 2 s)}\right)\right)\right) (-i\, f\, (\nu - 2 s))^{-2 (n+1)} +$$

$$e^{-\frac{i (i b - i c (\nu-2 s))^2}{4 f (\nu-2 s)} + i e + \frac{1}{2} i \pi (\nu-1)} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, b - i\, c\, (\nu - 2 s))^{-h-j+2 n} \left(i\, b - i\, c\, (\nu - 2 s) - 2\, i\, f\, (\nu - 2 s) \sqrt{z}\right)^{h+j} \right.$$

$$\left(-\frac{i \left(i\, b - i\, c\, (\nu - 2 s) - 2\, i\, f\, (\nu - 2 s) \sqrt{z}\right)^2}{f\, (\nu - 2 s)}\right)^{\frac{1}{2} (-h-j-1)} \binom{j}{h} \binom{n}{j} \left((i\, b - i\, c\, (\nu - 2 s)) \left(i\, b - i\, c\, (\nu - 2 s) - \right.\right.$$

$$\left. 2\, i\, f\, (\nu - 2 s) \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h + j + 1),\, -\frac{i \left(i\, b - i\, c\, (\nu - 2 s) - 2\, i\, f\, (\nu - 2 s) \sqrt{z}\right)^2}{4\, f\, (\nu - 2 s)}\right) - 2$$

$$i\, f\,(v-2\,s)\,\sqrt{-\frac{i\left(i\,b-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(i\,b-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)\right)(-i\,f\,(v-2\,s))^{-2\,(n+1)}+$$

$$e^{\frac{i\,(-i\,b+i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)}-i\,e+\frac{1}{2}\,i\,\pi\,(1-v)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(v-2\,s))^{-h-j+2\,n}$$

$$\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((-i\,b+i\,c\,(v-2\,s))\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)\Gamma\!\left(\right.\right.$$

$$\left.\frac{1}{2}\,(h+j+1),\,\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+$$

$$2\,f\,i\,(v-2\,s)\,\sqrt{\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.$$

$$\left.\left.\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)+e^{\frac{i\,(i\,b+i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)}+i\,e-\frac{1}{2}\,i\,\pi\,(v+1)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(v-2\,s))^{-h-j+2\,n}\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}\left((i\,b+i\,c\,(v-2\,s))\right.$$

$$\left(i\, b + i\, c\,(v-2\,s) + 2\,i\, f\,(v-2\,s)\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\ \frac{i\left(i\, b + i\, c\,(v-2\,s) + 2\,i\, f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\, f\,(v-2\,s)}\right) +$$

$$2\, f\, i\,(v-2\,s)\,\sqrt{\frac{i\left(i\, b + i\, c\,(v-2\,s) + 2\,i\, f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\ \Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.$$

$$\left.\left.\left.\frac{i\left(i\, b + i\, c\,(v-2\,s) + 2\,i\, f\,(v-2\,s)\,\sqrt{z}\right)^2}{4\, f\,(v-2\,s)}\right)\right)\right) /;\ n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin\left(b\, z^r + d\, z\right) \sin^v\left(c\, z^r + f\, z\right)$

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$$\int z^n \sin\left(b\, z^2 + d\, z\right)\sin^v\left(c\, z^2 + f\, z\right)dz = i\, 2^{-v-2}\binom{v}{\frac{v}{2}}(1 - v \bmod 2)$$

$$\left((i\, b)^{-n-1}\, e^{-\frac{i\,d^2}{4\,b}}\sum_{j=0}^{n} 2^{j-n}\,(-i\, d)^{n-j}\,(i\, d + 2\, i\, b\, z)^{j+1}\left(\frac{i\,(i\, d + 2\, i\, b\, z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\ \frac{i\,(i\, d+2\, i\, b\, z)^2}{4\, b}\right) -\right.$$

$$\left.(-i\, b)^{-n-1}\, e^{\frac{i\,d^2}{4\,b}}\sum_{j=0}^{n} 2^{j-n}\,(i\, d)^{n-j}\,(-i\, d - 2\, i\, b\, z)^{j+1}\left(-\frac{i\,(-i\, d - 2\, i\, b\, z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\ -\frac{i\,(-i\, d-2\, i\, b\, z)^2}{4\, b}\right)\right) -$$

$$i^{-v-1}\, 2^{-v-2}\sum_{s=0}^{\left\lfloor \frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left((-1)^{v+1}\, e^{-\frac{(-i\, d + i\, f\,(2\,s-v))^2}{4\,(-i\, b + i\, c\,(2\,s-v))}}\left(\sum_{j=0}^{n} 2^{j-n}\,(i\, d - i\, f\,(2\,s-v))^{n-j}\right.\right.$$

$$(-i\, d + i\, f\,(2\,s-v) + 2\,(-i\, b + i\, c\,(2\,s-v))\, z)^{j+1}\left(-\frac{(-i\, d + i\, f\,(2\,s-v) + 2\,(-i\, b + i\, c\,(2\,s-v))\, z)^2}{-i\, b + i\, c\,(2\,s-v)}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\ -\frac{(-i\, d + i\, f\,(2\,s-v) + 2\,(-i\, b + i\, c\,(2\,s-v))\, z)^2}{4\,(-i\, b + i\, c\,(2\,s-v))}\right)\right)(-i\, b + i\, c\,(2\,s-v))^{-n-1} +$$

$$(-1)^v\, e^{-\frac{(i\, d + i\, f\,(2\,s-v))^2}{4\,(i\, b + i\, c\,(2\,s-v))}}\,(i\, b + i\, c\,(2\,s-v))^{-n-1}\sum_{j=0}^{n} 2^{j-n}\,(-i\, d - i\, f\,(2\,s-v))^{n-j}$$

$$(i\, d + i\, f\,(2\,s-v) + 2\,(i\, b + i\, c\,(2\,s-v))\, z)^{j+1}\left(-\frac{(i\, d + i\, f\,(2\,s-v) + 2\,(i\, b + i\, c\,(2\,s-v))\, z)^2}{i\, b + i\, c\,(2\,s-v)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\ -\frac{(i\, d + i\, f\,(2\,s-v) + 2\,(i\, b + i\, c\,(2\,s-v))\, z)^2}{4\,(i\, b + i\, c\,(2\,s-v))}\right) - e^{-\frac{(-i\, d + i\, f\,(v-2\,s))^2}{4\,(-i\, b + i\, c\,(v-2\,s))}}$$

$$(-i\,b+i\,c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(i\,d-i\,f\,(v-2\,s))^{n-j}\,(-i\,d+i\,f\,(v-2\,s)+2\,(-i\,b+i\,c\,(v-2\,s))\,z)^{j+1}$$
$$\left(-\frac{(-i\,d+i\,f\,(v-2\,s)+2\,(-i\,b+i\,c\,(v-2\,s))\,z)^2}{-i\,b+i\,c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$
$$\Gamma\left(\frac{j+1}{2},-\frac{(-i\,d+i\,f\,(v-2\,s)+2\,(-i\,b+i\,c\,(v-2\,s))\,z)^2}{4\,(-i\,b+i\,c\,(v-2\,s))}\right)+$$
$$e^{-\frac{(i\,d+i\,f\,(v-2\,s))^2}{4\,(i\,b+i\,c\,(v-2\,s))}}\,(i\,b+i\,c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,d-i\,f\,(v-2\,s))^{n-j}\,(i\,d+i\,f\,(v-2\,s)+2\,(i\,b+i\,c\,(v-2\,s))\,z)^{j+1}$$
$$\left(-\frac{(i\,d+i\,f\,(v-2\,s)+2\,(i\,b+i\,c\,(v-2\,s))\,z)^2}{i\,b+i\,c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$
$$\left.\left.\Gamma\left(\frac{j+1}{2},-\frac{(i\,d+i\,f\,(v-2\,s)+2\,(i\,b+i\,c\,(v-2\,s))\,z)^2}{4\,(i\,b+i\,c\,(v-2\,s))}\right)\right)\right)\,/;\,n\in\mathbb{N}\land v\in\mathbb{N}^+$$

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$$\int z^n\sin\left(\sqrt{z}\;b+d\,z\right)\sin^v\left(\sqrt{z}\;c+f\,z\right)dz==$$
$$i^{-v-1}\,2^{-2\,n-v-2}\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\left((-1)^{v+1}\,e^{-\frac{(-i\,b+i\,c\,(2\,k-v))^2}{4\,(-i\,d+i\,f\,(2\,k-v))}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(2\,k-v))^{-h-j+2\,n}\left(-i\,b+i\,c\,(2\,k-v)+\right.\right.\right.$$
$$\left.2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^{h+j}\left(-\frac{\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(2\,k-v)}\right)^{\frac{1}{2}(-h-j-1)}$$
$$\binom{j}{h}\binom{n}{j}\left((-i\,b+i\,c\,(2\,k-v))\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)\right.$$
$$\Gamma\left(\frac{1}{2}\,(h+j+1),-\frac{\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(2\,k-v))}\right)+2$$
$$(-i\,d+i\,f\,(2\,k-v))\,\Gamma\left(\frac{1}{2}\,(h+j+2),-\frac{\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(2\,k-v))}\right)$$
$$\left.\left.\sqrt{-\frac{\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(2\,k-v)}}\right)\right)$$

$$(-i\, d + i\, f\,(2\,k-v))^{-2\,n-2} + (-1)^v\, e^{-\frac{(i\, b+i\, c\,(2\,k-v))^2}{4\,(i\, d+i\, f\,(2\,k-v))}}\,(i\, d + i\, f\,(2\,k-v))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\, b+i\, c\,(2\,k-v))^{-h-j+2\,n}\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^2}{i\, d+i\, f\,(2\,k-v)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\, b+i\, c\,(2\,k-v))\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\, -\frac{\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(i\, d+i\, f\,(2\,k-v))}\right)+\right.$$

$$2\,(i\, d+i\, f\,(2\,k-v))\,\Gamma\left(\frac{1}{2}\,(h+j+2),\, -\frac{\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(i\, d+i\, f\,(2\,k-v))}\right)$$

$$\left.\sqrt{-\frac{\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^2}{i\, d+i\, f\,(2\,k-v)}}\right) - e^{-\frac{(-i\, b+i\, c\,(v-2\,k))^2}{4\,(-i\, d+i\, f\,(v-2\,k))}}\,(-i\, d+i\, f\,(v-2\,k))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\, b+i\, c\,(v-2\,k))^{-h-j+2\,n}\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\,\sqrt{z}\right)^2}{-i\, d+i\, f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((-i\, b+i\, c\,(v-2\,k))\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\, -\frac{\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(-i\, d+i\, f\,(v-2\,k))}\right)+\right.$$

$$2\,(-i\, d+i\, f\,(v-2\,k))\,\Gamma\left(\frac{1}{2}\,(h+j+2),\, -\frac{\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(-i\, d+i\, f\,(v-2\,k))}\right)$$

$$\sqrt{-\frac{\left(-i\,b+i\,c\,(v-2\,k)+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(v-2\,k)}}\Bigg)+e^{-\frac{(i\,b+i\,c\,(v-2\,k))^2}{4\,(i\,d+i\,f\,(v-2\,k))}}\,(i\,d+i\,f\,(v-2\,k))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(v-2\,k))^{-h-j+2\,n}\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\,b+i\,c\,(v-2\,k))\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}\,(h+j+1),\,-\frac{\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(v-2\,k))}\Bigg)+$$

$$2\,(i\,d+i\,f\,(v-2\,k))\,\Gamma\left(\frac{1}{2}\,(h+j+2),\,-\frac{\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(v-2\,k))}\right)$$

$$\sqrt{-\frac{\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(v-2\,k)}}\Bigg)\Bigg)-$$

$$i\,2^{-2\,n-v-2}\,(i\,d)^{-2\,n-2}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\Bigg(e^{-\frac{i\,b^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}\left(i\,b+2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(b\,i\left(i\,b+2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+$$

$$2\,\sqrt{\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}}\,d\,i\,\Gamma\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)-$$

$$e^{\frac{i b^2}{4 d}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b)^{-h-j+2n} \left(-i b - 2 i d \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}$$

$$\binom{n}{j} \left(-i b \left(-i b - 2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{4 d}\right) - \right.$$

$$\left.\left. 2 i d \sqrt{-\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{d}} \; \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{4 d}\right)\right)\right) /; n \in \mathbb{N} \land v \in \mathbb{N}^+$$

Involving $z^n \sin(b z^r + d z + e) \sin^v(c z^r + f z)$

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$$\int z^n \sin\left(b z^2 + d z + e\right) \sin^v\left(c z^2 + f z\right) dz = i \, 2^{-v-2} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)$$

$$\left((i b)^{-n-1} e^{i e - \frac{i d^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-i d)^{n-j} (i d + 2 i b z)^{j+1} \left(\frac{i (i d + 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + 2 i b z)^2}{4 b}\right) - \right.$$

$$\left.(-i b)^{-n-1} e^{\frac{i d^2}{4 b} - i e} \sum_{j=0}^{n} 2^{j-n} (i d)^{n-j} (-i d - 2 i b z)^{j+1} \left(-\frac{i (-i d - 2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - 2 i b z)^2}{4 b}\right)\right) -$$

$$i^{-v-1} 2^{-v-2} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left((-1)^{v+1} e^{-\frac{(-i d + i f (2 s - v))^2}{4 (-i b + i c (2 s - v))} - i e} \left(\sum_{j=0}^{n} 2^{j-n} (i d - i f (2 s - v))^{n-j}\right.\right.$$

$$(-i d + i f (2 s - v) + 2 (-i b + i c (2 s - v)) z)^{j+1} \left(-\frac{(-i d + i f (2 s - v) + 2 (-i b + i c (2 s - v)) z)^2}{-i b + i c (2 s - v)}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i d + i f (2 s - v) + 2 (-i b + i c (2 s - v)) z)^2}{4 (-i b + i c (2 s - v))}\right)\right) (-i b + i c (2 s - v))^{-n-1} +$$

$$(-1)^v e^{i e - \frac{(i d + i f (2 s - v))^2}{4 (i b + i c (2 s - v))}} (i b + i c (2 s - v))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i d - i f (2 s - v))^{n-j}$$

$$(i d + i f (2 s - v) + 2 (i b + i c (2 s - v)) z)^{j+1} \left(-\frac{(i d + i f (2 s - v) + 2 (i b + i c (2 s - v)) z)^2}{i b + i c (2 s - v)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i d + i f (2 s - v) + 2 (i b + i c (2 s - v)) z)^2}{4 (i b + i c (2 s - v))}\right) -$$

$$e^{-\frac{(-i d+i f (v-2 s))^2}{4 (-i b+i c (v-2 s))}-i e} (-i b+i c (v-2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i d-i f (v-2 s))^{n-j}$$

$$(-i d+i f (v-2 s)+2 (-i b+i c (v-2 s)) z)^{j+1} \left(-\frac{(-i d+i f (v-2 s)+2 (-i b+i c (v-2 s)) z)^2}{-i b+i c (v-2 s)}\right)^{\frac{1}{2} (-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i d+i f (v-2 s)+2 (-i b+i c (v-2 s)) z)^2}{4 (-i b+i c (v-2 s))}\right)+$$

$$e^{i e-\frac{(i d+i f (v-2 s))^2}{4 (i b+i c (v-2 s))}} (i b+i c (v-2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i d-i f (v-2 s))^{n-j} (i d+i f (v-2 s)+2 (i b+i c (v-2 s)) z)^{j+1}$$

$$\left(-\frac{(i d+i f (v-2 s)+2 (i b+i c (v-2 s)) z)^2}{i b+i c (v-2 s)}\right)^{\frac{1}{2} (-j-1)} \binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2}, -\frac{(i d+i f (v-2 s)+2 (i b+i c (v-2 s)) z)^2}{4 (i b+i c (v-2 s))}\right)\Bigg)\Bigg) /; n \in \mathbb{N} \land v \in \mathbb{N}^+$$

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$$\int z^n \sin\left(\sqrt{z}\, b+d z+e\right) \sin^v\left(\sqrt{z}\, c+f z\right) dz =$$

$$i^{-v-1} 2^{-2 n-v-2} \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \Bigg((-1)^{v+1} e^{-\frac{(-i b+i c (2 k-v))^2}{4 (-i d+i f (2 k-v))}-i e} \Bigg(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b+i c (2 k-v))^{-h-j+2 n} \Big(-i b+i c (2 k-v)+$$

$$2 (-i d+i f (2 k-v)) \sqrt{z}\Big)^{h+j} \left(-\frac{\left(-i b+i c (2 k-v)+2 (-i d+i f (2 k-v)) \sqrt{z}\right)^2}{-i d+i f (2 k-v)}\right)^{\frac{1}{2} (-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg((-i b+i c (2 k-v)) \left(-i b+i c (2 k-v)+2 (-i d+i f (2 k-v)) \sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2} (h+j+1), -\frac{\left(-i b+i c (2 k-v)+2 (-i d+i f (2 k-v)) \sqrt{z}\right)^2}{4 (-i d+i f (2 k-v))}\right)+2$$

$$(-i d+i f (2 k-v)) \Gamma\left(\frac{1}{2} (h+j+2), -\frac{\left(-i b+i c (2 k-v)+2 (-i d+i f (2 k-v)) \sqrt{z}\right)^2}{4 (-i d+i f (2 k-v))}\right)$$

$$\sqrt{-\frac{\left(-i b+i c (2 k-v)+2 (-i d+i f (2 k-v)) \sqrt{z}\right)^2}{-i d+i f (2 k-v)}}\Bigg)\Bigg)$$

$$(-i\, d + i\, f\,(2\,k - v))^{-2\,n-2} + (-1)^v\, e^{i\, e - \frac{(i\, b + i\, c\,(2\,k - v))^2}{4\,(i\, d + i\, f\,(2\,k - v))}}\,(i\, d + i\, f\,(2\,k - v))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\, b + i\, c\,(2\,k - v))^{-h-j+2\,n}\left(i\, b + i\, c\,(2\,k - v) + 2\,(i\, d + i\, f\,(2\,k - v))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\, b + i\, c\,(2\,k - v) + 2\,(i\, d + i\, f\,(2\,k - v))\,\sqrt{z}\right)^2}{i\, d + i\, f\,(2\,k - v)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\, b + i\, c\,(2\,k - v))\left(i\, b + i\, c\,(2\,k - v) + 2\,(i\, d + i\, f\,(2\,k - v))\,\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}\,(h + j + 1), -\frac{\left(i\, b + i\, c\,(2\,k - v) + 2\,(i\, d + i\, f\,(2\,k - v))\,\sqrt{z}\right)^2}{4\,(i\, d + i\, f\,(2\,k - v))}\Bigg) +$$

$$2\,(i\, d + i\, f\,(2\,k - v))\,\Gamma\left(\frac{1}{2}\,(h + j + 2), -\frac{\left(i\, b + i\, c\,(2\,k - v) + 2\,(i\, d + i\, f\,(2\,k - v))\,\sqrt{z}\right)^2}{4\,(i\, d + i\, f\,(2\,k - v))}\right)$$

$$\sqrt{-\frac{\left(i\, b + i\, c\,(2\,k - v) + 2\,(i\, d + i\, f\,(2\,k - v))\,\sqrt{z}\right)^2}{i\, d + i\, f\,(2\,k - v)}}\Bigg) - e^{-\frac{(-i\, b + i\, c\,(v - 2\,k))^2}{4\,(-i\, d + i\, f\,(v - 2\,k))} - i\, e}\,(-i\, d + i\, f\,(v - 2\,k))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\, b + i\, c\,(v - 2\,k))^{-h-j+2\,n}\left(-i\, b + i\, c\,(v - 2\,k) + 2\,(-i\, d + i\, f\,(v - 2\,k))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i\, b + i\, c\,(v - 2\,k) + 2\,(-i\, d + i\, f\,(v - 2\,k))\,\sqrt{z}\right)^2}{-i\, d + i\, f\,(v - 2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((-i\, b + i\, c\,(v - 2\,k))\left(-i\, b + i\, c\,(v - 2\,k) + 2\,(-i\, d + i\, f\,(v - 2\,k))\,\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}\,(h + j + 1), -\frac{\left(-i\, b + i\, c\,(v - 2\,k) + 2\,(-i\, d + i\, f\,(v - 2\,k))\,\sqrt{z}\right)^2}{4\,(-i\, d + i\, f\,(v - 2\,k))}\Bigg) +$$

$$2\,(-i\, d + i\, f\,(v - 2\,k))\,\Gamma\left(\frac{1}{2}\,(h + j + 2), -\frac{\left(-i\, b + i\, c\,(v - 2\,k) + 2\,(-i\, d + i\, f\,(v - 2\,k))\,\sqrt{z}\right)^2}{4\,(-i\, d + i\, f\,(v - 2\,k))}\right)$$

$$\sqrt{-\frac{\left(-i\,b+i\,c\,(v-2\,k)+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(v-2\,k)}}\Bigg)+e^{i\,e-\frac{(i\,b+i\,c\,(v-2\,k))^2}{4\,(i\,d+i\,f\,(v-2\,k))}}\,(i\,d+i\,f\,(v-2\,k))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(v-2\,k))^{-h-j+2\,n}\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\,b+i\,c\,(v-2\,k))\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\,-\frac{\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(v-2\,k))}\Bigg)+$$

$$2\,(i\,d+i\,f\,(v-2\,k))\,\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{4\,(i\,d+i\,f\,(v-2\,k))}\right)$$

$$\sqrt{-\frac{\left(i\,b+i\,c\,(v-2\,k)+2\,(i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\right)^2}{i\,d+i\,f\,(v-2\,k)}}\Bigg)\Bigg)-$$

$$i\,2^{-2\,n-v-2}\,(i\,d)^{-2\,n-2}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\Bigg(e^{i\,e-\frac{i\,b^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}\left(i\,b+2\,i\,d\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(b\,i\left(i\,b+2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+$$

$$2\sqrt{\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}}\,d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\Bigg)-$$

$$e^{\frac{i b^2}{4 d}-i e} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b)^{-h-j+2 n} \left(-i b - 2 i d \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left(-i b \left(-i b - 2 i d \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h + j + 1), -\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{4 d}\right) - \right.$$

$$\left. 2 i d \sqrt{-\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{d}} \; \Gamma\left(\frac{1}{2} (h + j + 2), -\frac{i \left(-i b - 2 i d \sqrt{z}\right)^2}{4 d}\right)\right)\Bigg) /; n \in \mathbb{N} \bigwedge v \in \mathbb{N}^+$$

Involving $z^n \sin(d z) \sin^v\left(c z^r + f z + g\right)$

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$$\int z^n \sin(d z) \sin^\nu\left(c z^2 + f z + g\right) dz = i (-1)^n 2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} \left((-i d)^{-n-1} \Gamma(n+1, i d z) - (i d)^{-n-1} \Gamma(n+1, -i d z)\right) (1 - \nu \bmod 2) - 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{i (-i d - i f (\nu-2s))^2}{4 c (\nu-2s)} + \frac{1}{2} i \pi (\nu+1) - i g (\nu-2s)} \left(\sum_{j=0}^n 2^{j-n} (i d + i f (\nu-2s))^{n-j} (-i d - i f (\nu-2s) - 2 i c (\nu-2s) z)^{j+1} \left(-\frac{i (-i d - i f (\nu-2s) - 2 i c (\nu-2s) z)^2}{c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d - i f (\nu-2s) - 2 i c (\nu-2s) z)^2}{4 c (\nu-2s)}\right)\right) (-i c (\nu-2s))^{-n-1} + e^{-\frac{i (i d - i f (\nu-2s))^2}{4 c (\nu-2s)} + \frac{1}{2} i \pi (\nu-1) - i g (\nu-2s)} \left(\sum_{j=0}^n 2^{j-n} (-i d + i f (\nu-2s))^{n-j} (i d - i f (\nu-2s) - 2 i c (\nu-2s) z)^{j+1} \left(-\frac{i (i d - i f (\nu-2s) - 2 i c (\nu-2s) z)^2}{c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (i d - i f (\nu-2s) - 2 i c (\nu-2s) z)^2}{4 c (\nu-2s)}\right)\right) (-i c (\nu-2s))^{-n-1} + e^{\frac{i (-i d + i f (\nu-2s))^2}{4 c (\nu-2s)} + \frac{1}{2} i \pi (1-\nu) + g i (\nu-2s)} (i c (\nu-2s))^{-n-1} \sum_{j=0}^n 2^{j-n} (i d - i f (\nu-2s))^{n-j} (-i d + i f (\nu-2s) + 2 i c (\nu-2s) z)^{j+1} \left(\frac{i (-i d + i f (\nu-2s) + 2 i c (\nu-2s) z)^2}{c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (-i d + i f (\nu-2s) + 2 i c (\nu-2s) z)^2}{4 c (\nu-2s)}\right) + e^{\frac{i (i d + i f (\nu-2s))^2}{4 c (\nu-2s)} - \frac{1}{2} i \pi (\nu+1) + g i (\nu-2s)} (i c (\nu-2s))^{-n-1} \sum_{j=0}^n 2^{j-n} (-i d - i f (\nu-2s))^{n-j} (i d + i f (\nu-2s) + 2 i c (\nu-2s) z)^{j+1} \left(\frac{i (i d + i f (\nu-2s) + 2 i c (\nu-2s) z)^2}{c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (i d + i f (\nu-2s) + 2 i c (\nu-2s) z)^2}{4 c (\nu-2s)}\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

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$$\int z^n \sin(d z) \sin^\nu\left(\sqrt{z}\, c + f z + g\right) dz = (-1)^n 2^{-\nu-1} i \binom{\nu}{\frac{\nu}{2}} \left((-i d)^{-n-1} \Gamma(n+1, i d z) - (i d)^{-n-1} \Gamma(n+1, -i d z)\right) (1 - \nu \bmod 2) + 2^{-2n-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s}$$

$$\Bigg(e^{\frac{c^2 (v-2s)^2}{4(-i d+i f (v-2s))}+g i (v-2s)+\frac{1}{2} i \pi (1-v)} \Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h} 4^j (i c (v-2s))^{-h-j+2n} \left(c i (v-2s)+2(-i d+i f (v-2s))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(c i (v-2s)+2(-i d+i f (v-2s))\sqrt{z}\right)^2}{-i d+i f (v-2s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}\Bigg(c i (v-2s)\left(c i (v-2s)+\right.$$

$$\left.2(-i d+i f (v-2s))\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(c i (v-2s)+2(-i d+i f (v-2s))\sqrt{z}\right)^2}{4(-i d+i f (v-2s))}\right)+2$$

$$(-i d+i f (v-2s))\,\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(c i (v-2s)+2(-i d+i f (v-2s))\sqrt{z}\right)^2}{4(-i d+i f (v-2s))}\right)$$

$$\sqrt{-\frac{\left(c i (v-2s)+2(-i d+i f (v-2s))\sqrt{z}\right)^2}{-i d+i f (v-2s)}}\Bigg)\Bigg)(-i d+i f (v-2s))^{-2(n+1)}+$$

$$e^{\frac{c^2 (v-2s)^2}{4(i d+i f (v-2s))}+g i (v-2s)-\frac{1}{2} i \pi (v+1)} (i d+i f (v-2s))^{-2(n+1)} \sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h} 4^j (i c (v-2s))^{-h-j+2n}$$

$$\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)^{h+j}\left(-\frac{\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)^2}{i d+i f (v-2s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg(c i (v-2s)\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}(h+j+1),$$

$$-\frac{\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)^2}{4(i d+i f (v-2s))}\Bigg)+2\sqrt{-\frac{\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)^2}{i d+i f (v-2s)}}$$

$$(i d+i f (v-2s))\,\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)^2}{4(i d+i f (v-2s))}\right)\Bigg)+$$

$$e^{\frac{c^2 (v-2s)^2}{4(-i d-i f (v-2s))}-i g (v-2s)+\frac{1}{2} i \pi (v+1)} (-i d-i f (v-2s))^{-2(n+1)} \sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h} 4^j (-i c (v-2s))^{-h-j+2n}$$

$$\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^{h+j}\left(-\frac{\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{-i\,d-i\,f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{-\frac{\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{-i\,d-i\,f\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.\right.$$

$$\left.-\frac{\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{4\left(-i\,d-i\,f\,(v-2\,s)\right)}\right)-i\,c\,(v-2\,s)\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-\right.$$

$$\left.\left.i\,c\,(v-2\,s)\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{\left(2\left(-i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{4\left(-i\,d-i\,f\,(v-2\,s)\right)}\right)\right)+$$

$$e^{\frac{c^2(v-2\,s)^2}{4\,(i\,d-i\,f\,(v-2\,s))}-i\,g\,(v-2\,s)+\frac{1}{2}i\,\pi\,(v-1)}\left(i\,d-i\,f\,(v-2\,s)\right)^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\left(-i\,c\,(v-2\,s)\right)^{-h-j+2\,n}$$

$$\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^{h+j}\left(-\frac{\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{i\,d-i\,f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{-\frac{\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{i\,d-i\,f\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.\right.$$

$$\left.-\frac{\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{4\left(i\,d-i\,f\,(v-2\,s)\right)}\right)-i\,c\,(v-2\,s)\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)$$

$$\left.\left.\Gamma\left(\frac{1}{2}(h+j+1),-\frac{\left(2\left(i\,d-i\,f\,(v-2\,s)\right)\sqrt{z}-i\,c\,(v-2\,s)\right)^2}{4\left(i\,d-i\,f\,(v-2\,s)\right)}\right)\right)\right)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin(d\,z+e)\sin^v\left(c\,z^r+f\,z+g\right)$

01.06.21.1192.01

$$\int z^n \sin(d z+e) \sin^\nu\left(c z^2+f z+g\right) dz = (-1)^n i\, 2^{-\nu-1} \binom{\nu}{\frac{\nu}{2}} \left((-i d)^{-n-1} e^{-i e} \Gamma(n+1, i d z)-(i d)^{-n-1} e^{i e} \Gamma(n+1,-i d z)\right)(1-\nu \bmod 2) - 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{i(-i d-i f(\nu-2 s))^2}{4 c(\nu-2 s)}-i e+\frac{1}{2} i \pi(\nu+1)-i g(\nu-2 s)} \left(\sum_{j=0}^n 2^{j-n} (i d+i f(\nu-2 s))^{n-j} (-i d-i f(\nu-2 s)-2 i c(\nu-2 s) z)^{j+1} \left(-\frac{i(-i d-i f(\nu-2 s)-2 i c(\nu-2 s) z)^2}{c(\nu-2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2},-\frac{i(-i d-i f(\nu-2 s)-2 i c(\nu-2 s) z)^2}{4 c(\nu-2 s)}\right)\right)(-i c(\nu-2 s))^{-n-1} + e^{-\frac{i(i d-i f(\nu-2 s))^2}{4 c(\nu-2 s)}+i e+\frac{1}{2} i \pi(\nu-1)-i g(\nu-2 s)} \left(\sum_{j=0}^n 2^{j-n} (-i d+i f(\nu-2 s))^{n-j} (i d-i f(\nu-2 s)-2 i c(\nu-2 s) z)^{j+1} \left(-\frac{i(i d-i f(\nu-2 s)-2 i c(\nu-2 s) z)^2}{c(\nu-2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2},-\frac{i(i d-i f(\nu-2 s)-2 i c(\nu-2 s) z)^2}{4 c(\nu-2 s)}\right)\right)(-i c(\nu-2 s))^{-n-1} + e^{\frac{i(-i d+i f(\nu-2 s))^2}{4 c(\nu-2 s)}-i e+\frac{1}{2} i \pi(1-\nu)+g i(\nu-2 s)} (i c(\nu-2 s))^{-n-1} \sum_{j=0}^n 2^{j-n} (i d-i f(\nu-2 s))^{n-j} (-i d+i f(\nu-2 s)+2 i c(\nu-2 s) z)^{j+1} \left(\frac{i(-i d+i f(\nu-2 s)+2 i c(\nu-2 s) z)^2}{c(\nu-2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2},\frac{i(-i d+i f(\nu-2 s)+2 i c(\nu-2 s) z)^2}{4 c(\nu-2 s)}\right) + e^{\frac{i(i d+i f(\nu-2 s))^2}{4 c(\nu-2 s)}+i e-\frac{1}{2} i \pi(\nu+1)+g i(\nu-2 s)} (i c(\nu-2 s))^{-n-1} \sum_{j=0}^n 2^{j-n} (-i d-i f(\nu-2 s))^{n-j} (i d+i f(\nu-2 s)+2 i c(\nu-2 s) z)^{j+1} \left(\frac{i(i d+i f(\nu-2 s)+2 i c(\nu-2 s) z)^2}{c(\nu-2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2},\frac{i(i d+i f(\nu-2 s)+2 i c(\nu-2 s) z)^2}{4 c(\nu-2 s)}\right)\right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1193.01

$$\int z^n \sin(d z+e) \sin^\nu\left(\sqrt{z}\, c+f z+g\right) dz = (-1)^n 2^{-\nu-1} i \binom{\nu}{\frac{\nu}{2}} \left((-i d)^{-n-1} e^{-i e} \Gamma(n+1, i d z)-(i d)^{-n-1} e^{i e} \Gamma(n+1,-i d z)\right)(1-\nu \bmod 2)+2^{-2 n-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s}$$

$$\Bigg(e^{\frac{c^2 (v-2s)^2}{4(-i d+i f (v-2s))}+g i (v-2s)-i e+\frac{1}{2} i \pi (1-v)} \Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h} 4^j (i c (v-2s))^{-h-j+2n} \left(c i (v-2s)+2(-i d+i f (v-2s))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(c i (v-2s)+2(-i d+i f (v-2s))\sqrt{z}\right)^2}{-i d+i f (v-2s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}\Bigg(c i (v-2s)\Big(c i (v-2s)+$$

$$2(-i d+i f (v-2s))\sqrt{z}\Big)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(c i (v-2s)+2(-i d+i f (v-2s))\sqrt{z}\right)^2}{4(-i d+i f (v-2s))}\right)+2$$

$$(-i d+i f (v-2s))\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(c i (v-2s)+2(-i d+i f (v-2s))\sqrt{z}\right)^2}{4(-i d+i f (v-2s))}\right)$$

$$\sqrt{-\frac{\left(c i (v-2s)+2(-i d+i f (v-2s))\sqrt{z}\right)^2}{-i d+i f (v-2s)}}\Bigg)\Bigg)(-i d+i f (v-2s))^{-2(n+1)}+$$

$$e^{\frac{c^2 (v-2s)^2}{4(i d+i f (v-2s))}+g i (v-2s)+i e-\frac{1}{2} i \pi (v+1)} (i d+i f (v-2s))^{-2(n+1)} \sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h} 4^j (i c (v-2s))^{-h-j+2n}$$

$$\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)^{h+j}\left(-\frac{\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)^2}{i d+i f (v-2s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg(c i (v-2s)\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}(h+j+1),$$

$$-\frac{\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)^2}{4(i d+i f (v-2s))}\Bigg)+2\sqrt{-\frac{\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)^2}{i d+i f (v-2s)}}$$

$$(i d+i f (v-2s))\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(c i (v-2s)+2(i d+i f (v-2s))\sqrt{z}\right)^2}{4(i d+i f (v-2s))}\right)\Bigg)+$$

$$e^{\frac{c^2 (v-2s)^2}{4(-i d-i f (v-2s))}-i g (v-2s)-i e+\frac{1}{2} i \pi (v+1)} (-i d-i f (v-2s))^{-2(n+1)} \sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h} 4^j (-i c (v-2s))^{-h-j+2n}$$

$$\left(2 (-i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)^{h+j} \left(-\frac{\left(2 (-i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)^2}{-i d - i f (v - 2 s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left(2 (-i d - i f (v - 2 s)) \sqrt{-\frac{\left(2 (-i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)^2}{-i d - i f (v - 2 s)}} \, \Gamma\left(\frac{1}{2} (h + j + 2), \right.\right.$$

$$\left. -\frac{\left(2 (-i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)^2}{4 (-i d - i f (v - 2 s))}\right) - i c (v - 2 s) \left(2 (-i d - i f (v - 2 s)) \sqrt{z} - \right.$$

$$\left.\left. i c (v - 2 s)\right) \Gamma\left(\frac{1}{2} (h + j + 1), -\frac{\left(2 (-i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)^2}{4 (-i d - i f (v - 2 s))}\right)\right) +$$

$$e^{\frac{c^2 (v-2 s)^2}{4 (i d - i f (v-2 s))} - i g (v-2 s) + i e + \frac{1}{2} i \pi (v-1)} (i d - i f (v - 2 s))^{-2 (n+1)} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c (v - 2 s))^{-h-j+2 n}$$

$$\left(2 (i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)^{h+j} \left(-\frac{\left(2 (i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)^2}{i d - i f (v - 2 s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left(2 (i d - i f (v - 2 s)) \sqrt{-\frac{\left(2 (i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)^2}{i d - i f (v - 2 s)}} \, \Gamma\left(\frac{1}{2} (h + j + 2), \right.\right.$$

$$\left. -\frac{\left(2 (i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)^2}{4 (i d - i f (v - 2 s))}\right) - i c (v - 2 s) \left(2 (i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)$$

$$\left.\left. \Gamma\left(\frac{1}{2} (h + j + 1), -\frac{\left(2 (i d - i f (v - 2 s)) \sqrt{z} - i c (v - 2 s)\right)^2}{4 (i d - i f (v - 2 s))}\right)\right)\right) /; n \in \mathbb{N} \bigwedge v \in \mathbb{N}^+$$

Involving $z^n \sin\left(b z^r\right) \sin^v\left(c z^r + f z + g\right)$

01.06.21.1194.01

$$\int z^n \sin\left(b z^2\right) \sin^\nu\left(c z^2 + f z + g\right) dz = i\, 2^{-\nu-2} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \left(\left(-i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, -i b z^2\right) - \left(i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i b z^2\right)\right)(1 - \nu \bmod 2) - 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{1}{4} i \left(-\frac{f^2 (\nu-2s)^2}{b+2cs-c\nu} - 4 g (\nu-2s) - 2\pi(1-\nu)\right)} \left(\sum_{j=0}^{n} 2^{j-n} (-i f (\nu - 2s))^{n-j} (f i (\nu - 2s) + 2(-i b + i c (\nu - 2s)) z)^{j+1} \left(-\frac{(f i (\nu-2s) + 2(-i b + i c(\nu - 2s)) z)^2}{-i b + i c (\nu - 2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(f i (\nu-2s) + 2(-i b + i c (\nu-2s)) z)^2}{4(-i b + i c(\nu - 2s))}\right)\right)(-i b + i c (\nu - 2s))^{-n-1} + e^{\frac{1}{4} i \left(\frac{f^2 (\nu-2s)^2}{-b+2cs-c\nu} + 4 g (\nu - 2s) - 2\pi(\nu+1)\right)} (i b + i c (\nu - 2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i f (\nu-2s))^{n-j} (f i (\nu - 2s) + 2(i b + i c (\nu - 2s)) z)^{j+1} \left(-\frac{(f i (\nu-2s) + 2(i b + i c (\nu-2s)) z)^2}{i b + i c (\nu - 2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(f i (\nu - 2s) + 2 (i b + i c (\nu - 2s)) z)^2}{4(i b + i c(\nu - 2s))}\right) + e^{-\frac{1}{4} i \left(\frac{f^2 (\nu-2s)^2}{-b+2cs-c\nu} + 4 g (\nu-2s) - 2\pi(\nu+1)\right)} (-i b - i c (\nu - 2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i f (\nu - 2s))^{n-j} (2(-i b - i c(\nu-2s)) z - i f (\nu - 2s))^{j+1} \left(-\frac{(2(-i b - i c (\nu - 2s)) z - i f (\nu-2s))^2}{-i b - i c (\nu - 2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(2(-i b - i c (\nu - 2s)) z - i f (\nu - 2s))^2}{4(-i b - i c (\nu - 2s))}\right) + e^{\frac{1}{4} i \left(-\frac{f^2 (\nu-2s)^2}{b+2cs-c\nu} - 4 g (\nu - 2s) + 2\pi(\nu-1)\right)} (i b - i c (\nu - 2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i f (\nu - 2s))^{n-j} (2(i b - i c (\nu - 2s)) z - i f (\nu - 2s))^{j+1} \left(-\frac{(2(i b - i c (\nu - 2s)) z - i f (\nu-2s))^2}{i b - i c (\nu - 2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(2(i b - i c (\nu - 2s)) z - i f (\nu - 2s))^2}{4(i b - i c(\nu - 2s))}\right)\right) /;\ n \in \mathbb{N} \land m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1195.01

$$\int z^n \sin\left(\sqrt{z}\, b\right) \sin^\nu\left(\sqrt{z}\, c + f z + g\right) dz = (-1)^n 2^{-\nu} i \binom{\nu}{\frac{\nu}{2}} \left(\Gamma\left(2(n+1), i b \sqrt{z}\right) - \Gamma\left(2(n+1), -i b \sqrt{z}\right)\right)(1 - \nu \bmod 2)\, b^{-2(n+1)} +$$

$$2^{-2n-v-2} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Bigg(e^{-\frac{i(-i b - i c (v-2s))^2}{4 f (v-2s)} + \frac{1}{2} i \pi (v+1) - i g (v-2s)} \Bigg(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b - i c (v-2s))^{-h-j+2n}$$

$$\left(-i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)^2}{f (v-2s)} \right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg((-i b - i c (v-2s)) \left(-i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(-i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)^2}{4 f (v-2s)} \right) - 2$$

$$i f (v-2s) \sqrt{-\frac{i \left(-i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)^2}{f (v-2s)}}$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i \left(-i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)^2}{4 f (v-2s)} \right) \Bigg) \Bigg) \Bigg)$$

$$(-i f (v-2s))^{-2(n+1)} + e^{-\frac{i(i b - i c (v-2s))^2}{4 f (v-2s)} + \frac{1}{2} i \pi (v-1) - i g (v-2s)} \Bigg(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i b - i c (v-2s))^{-h-j+2n}$$

$$\left(i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)^{h+j} \left(-\frac{i \left(i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)^2}{f (v-2s)} \right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg((i b - i c (v-2s)) \left(i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)^2}{4 f (v-2s)} \right) - 2$$

$$i f (v-2s) \sqrt{-\frac{i \left(i b - i c (v-2s) - 2 i f (v-2s) \sqrt{z}\right)^2}{f (v-2s)}}$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(i\,b - i\,c\,(v-2\,s) - 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\Bigg)\Bigg)$$

$$(-i\,f\,(v-2\,s))^{-2\,(n+1)} + e^{\frac{i\,(-i\,b+i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)}+\frac{1}{2}\,i\,\pi\,(1-v)+g\,i\,(v-2\,s)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(v-2\,s))^{-h-j+2\,n}\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((-i\,b+i\,c\,(v-2\,s))\left(-i\,b+i\,c\,(v-2\,s)+\right.$$

$$\left.2\,i\,f\,(v-2\,s)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+$$

$$2\,f\,i\,(v-2\,s)\sqrt{\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\frac{i\left(-i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\Bigg) + e^{\frac{i\,(i\,b+i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)}-\frac{1}{2}\,i\,\pi\,(v+1)+g\,i\,(v-2\,s)}$$

$$(i\,f\,(v-2\,s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(v-2\,s))^{-h-j+2\,n}\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((i\,b+i\,c\,(v-2\,s))$$

$$\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+$$

$$2\,f\,i\,(v-2\,s)\sqrt{\frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\Bigg)\Bigg)\Bigg) /;\; n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n \sin(b z^r + e) \sin^\nu(c z^r + f z + g)$

01.06.21.1196.01

$$\int z^n \sin(b z^2 + e) \sin^\nu(c z^2 + f z + g)\, dz = i\, 2^{-\nu-2} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \left(e^{i e} \left(-i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, -i b z^2\right) - e^{-i e} \left(i b z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i b z^2\right)\right)(1 - \nu \bmod 2) - 2^{-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{1}{4} i \left(-\frac{f^2 (\nu-2s)^2}{b+2cs-c\nu} - 4 g (\nu-2s) + 4e - 2\pi(1-\nu)\right)} \left(\sum_{j=0}^{n} 2^{j-n} (-i f (\nu-2s))^{n-j} (f\, i (\nu-2s) + 2(-i b + i c (\nu-2s)) z)^{j+1} \left(-\frac{(f\, i(\nu-2s) + 2(-i b + i c(\nu-2s)) z)^2}{-i b + i c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(f\, i(\nu-2s) + 2(-i b + i c (\nu-2s)) z)^2}{4(-i b + i c (\nu-2s))}\right)\right)(-i b + i c (\nu-2s))^{-n-1} + e^{\frac{1}{4} i \left(\frac{f^2 (\nu-2s)^2}{-b+2cs-c\nu} + 4 g (\nu-2s) + 4e - 2\pi(\nu+1)\right)} (i b + i c (\nu-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i f (\nu-2s))^{n-j} (f\, i (\nu-2s) + 2(i b + i c (\nu-2s)) z)^{j+1} \left(-\frac{(f\, i (\nu-2s) + 2(i b + i c (\nu-2s)) z)^2}{i b + i c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(f\, i (\nu-2s) + 2(i b + i c(\nu-2s)) z)^2}{4(i b + i c (\nu-2s))}\right) + e^{-\frac{1}{4} i \left(\frac{f^2 (\nu-2s)^2}{-b+2cs-c\nu} + 4 g (\nu-2s) + 4e - 2\pi(\nu+1)\right)} (-i b - i c (\nu-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i f (\nu-2s))^{n-j} (2(-i b - i c (\nu-2s)) z - i f (\nu-2s))^{j+1} \left(-\frac{(2(-i b - i c (\nu-2s)) z - i f (\nu-2s))^2}{-i b - i c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(2(-i b - i c (\nu-2s)) z - i f (\nu-2s))^2}{4(-i b - i c (\nu-2s))}\right) + e^{\frac{1}{4} i \left(-\frac{f^2 (\nu-2s)^2}{b+2cs-c\nu} - 4 g (\nu-2s) + 4e + 2\pi(\nu-1)\right)} (i b - i c (\nu-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i f (\nu-2s))^{n-j} (2(i b - i c (\nu-2s)) z - i f (\nu-2s))^{j+1} \left(-\frac{(2(i b - i c (\nu-2s)) z - i f (\nu-2s))^2}{i b - i c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(2(i b - i c (\nu-2s)) z - i f (\nu-2s))^2}{4(i b - i c (\nu-2s))}\right)\right) /;\, n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

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$$\int z^n \sin\left(\sqrt{z}\, b+e\right) \sin^\nu\left(\sqrt{z}\, c+f\, z+g\right) dz = (-1)^n 2^{-\nu} i \binom{\nu}{\frac{\nu}{2}} \left(e^{-i e}\, \Gamma\left(2(n+1),\, i\, b \sqrt{z}\right) - e^{i e}\, \Gamma\left(2(n+1),\, -i\, b \sqrt{z}\right)\right) (1-\nu \bmod 2)\, b^{-2(n+1)} +$$

$$2^{-2n-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{i(-i b-i c(\nu-2s))^2}{4 f(\nu-2s)} - i e+\frac{1}{2} i \pi(\nu+1)-i g(\nu-2s)} \left(\sum_{j=0}^n \sum_{h=0}^j (-1)^{j-h}\, 4^j\, (-i\, b-i\, c(\nu-2s))^{-h-j+2n} \right.\right.$$

$$\left(-i\, b-i\, c(\nu-2s)-2\, i\, f(\nu-2s)\sqrt{z}\right)^{h+j} \left(-\frac{i\left(-i\, b-i\, c(\nu-2s)-2\, i\, f(\nu-2s)\sqrt{z}\right)^2}{f(\nu-2s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j} \left((-i\, b-i\, c(\nu-2s)) \left(-i\, b-i\, c(\nu-2s)-2\, i\, f(\nu-2s)\sqrt{z}\right) \right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1),\, -\frac{i\left(-i\, b-i\, c(\nu-2s)-2\, i\, f(\nu-2s)\sqrt{z}\right)^2}{4\, f(\nu-2s)}\right) - 2$$

$$i\, f(\nu-2s) \sqrt{-\frac{i\left(-i\, b-i\, c(\nu-2s)-2\, i\, f(\nu-2s)\sqrt{z}\right)^2}{f(\nu-2s)}}$$

$$\left.\left.\Gamma\left(\frac{1}{2}(h+j+2),\, -\frac{i\left(-i\, b-i\, c(\nu-2s)-2\, i\, f(\nu-2s)\sqrt{z}\right)^2}{4\, f(\nu-2s)}\right)\right)\right) (-i\, f(\nu-2s))^{-2(n+1)} +$$

$$e^{-\frac{i(i b-i c(\nu-2s))^2}{4 f(\nu-2s)} + i e+\frac{1}{2} i \pi(\nu-1)-i g(\nu-2s)} \left(\sum_{j=0}^n \sum_{h=0}^j (-1)^{j-h}\, 4^j\, (i\, b-i\, c(\nu-2s))^{-h-j+2n} \right.$$

$$\left(i\, b-i\, c(\nu-2s)-2\, i\, f(\nu-2s)\sqrt{z}\right)^{h+j} \left(-\frac{i\left(i\, b-i\, c(\nu-2s)-2\, i\, f(\nu-2s)\sqrt{z}\right)^2}{f(\nu-2s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j} \left((i\, b-i\, c(\nu-2s)) \left(i\, b-i\, c(\nu-2s)-2\, i\, f(\nu-2s)\sqrt{z}\right) \right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(i\,b - i\,c\,(v-2\,s) - 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right) - 2$$

$$i\,f\,(v-2\,s)\sqrt{-\frac{i\left(i\,b - i\,c\,(v-2\,s) - 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}}$$

$$\left.\left.\left.\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(i\,b - i\,c\,(v-2\,s) - 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)\right)\right)$$

$$(-i\,f\,(v-2\,s))^{-2\,(n+1)} + e^{\frac{i\,(-i\,b+i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)} - i\,e + \frac{1}{2}\,i\,\pi\,(1-v) + g\,i\,(v-2\,s)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b + i\,c\,(v-2\,s))^{-h-j+2\,n}\left(-i\,b + i\,c\,(v-2\,s) + 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(-i\,b + i\,c\,(v-2\,s) + 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left((-i\,b + i\,c\,(v-2\,s))\left(-i\,b + i\,c\,(v-2\,s) + \right.\right.$$

$$\left.2\,i\,f\,(v-2\,s)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(-i\,b + i\,c\,(v-2\,s) + 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right) +$$

$$2\,f\,i\,(v-2\,s)\sqrt{\frac{i\left(-i\,b + i\,c\,(v-2\,s) + 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\frac{i\left(-i\,b + i\,c\,(v-2\,s) + 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right) + e^{\frac{i\,(i\,b+i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)} + i\,e - \frac{1}{2}\,i\,\pi\,(v+1) + g\,i\,(v-2\,s)}$$

$$(i\,f\,(v-2\,s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b + i\,c\,(v-2\,s))^{-h-j+2\,n}\left(i\,b + i\,c\,(v-2\,s) + 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b + i\,c\,(v-2\,s) + 2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left((i\,b + i\,c\,(v-2\,s))\right.$$

$$\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\ \frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+$$

$$2\,f\,i\,(v-2\,s)\sqrt{\frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}}\ \Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.\frac{i\left(i\,b+i\,c\,(v-2\,s)+2\,i\,f\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)\right)\ /;\ n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin(b\,z^r+d\,z)\sin^v(c\,z^r+f\,z+g)$

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$$\int z^n \sin\left(b\,z^2+d\,z\right)\sin^v\left(c\,z^2+f\,z+g\right)dz = i^{-v}\,2^{-v-2}\,e^{-\frac{i\,d^2}{4\,b}}$$

$$\left(-i^{n+v}\,e^{\frac{i\,d^2}{2\,b}}\binom{v}{\frac{v}{2}}(v\bmod 2-1)\left(\sum_{j=0}^{n}2^{j-n}\,(i\,d)^{n-j}\,(-i\,(d+2\,b\,z))^{j+1}\left(\frac{i\,(d+2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\ \frac{i\,(d+2\,b\,z)^2}{4\,b}\right)\right)\right.$$

$$b^{-n-1}+(-1)^{n-1}\,i^{n+v}\binom{v}{\frac{v}{2}}(v\bmod 2-1)$$

$$\left(\sum_{j=0}^{n}2^{j-n}\,(-i\,d)^{n-j}\,(i\,(d+2\,b\,z))^{j+1}\left(-\frac{i\,(d+2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\ -\frac{i\,(d+2\,b\,z)^2}{4\,b}\right)\right)b^{-n-1}+$$

$$e^{\frac{i\,d^2}{4\,b}}\,i\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\,e^{-i\,g\,(2\,s-v)}\binom{v}{s}\left(-(-1)^v\,e^{\frac{1}{4}i\left(\frac{(d-2\,f\,s+f\,v)^2}{b-2\,c\,s+c\,v}+8\,g\,(2\,s-v)\right)}\left(\sum_{j=0}^{n}2^{j-n}\,(i\,(d-2\,f\,s+f\,v))^{n-j}\right.\right.$$

$$(-i\,(d+f\,(v-2\,s)+2\,(b-2\,c\,s+c\,v)\,z))^{j+1}\left(\frac{i\,(d+f\,(v-2\,s)+2\,(b-2\,c\,s+c\,v)\,z)^2}{b-2\,c\,s+c\,v}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\binom{n}{j}\Gamma\left(\frac{j+1}{2},\ \frac{i\,(d+f\,(v-2\,s)+2\,(b-2\,c\,s+c\,v)\,z)^2}{4\,(b-2\,c\,s+c\,v)}\right)\right)(-i\,(b-2\,c\,s+c\,v))^{-n-1}+$$

$$e^{-\frac{i\,(d-2\,f\,s+f\,v)^2}{4\,(b-2\,c\,s+c\,v)}}\,(i\,(b-2\,c\,s+c\,v))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,(d-2\,f\,s+f\,v))^{n-j}$$

$$(i\,(d+f\,(v-2\,s)+2\,(b-2\,c\,s+c\,v)\,z))^{j+1}\left(-\frac{i\,(d+f\,(v-2\,s)+2\,(b-2\,c\,s+c\,v)\,z)^2}{b-2\,c\,s+c\,v}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{i\,(d+f\,(v-2\,s)+2\,(b-2\,c\,s+c\,v)\,z)^2}{4\,(b-2\,c\,s+c\,v)}\right)-$$

$$e^{\frac{i\,(d+2\,f\,s-f\,v)^2}{4\,(b+2\,c\,s-c\,v)}}\,(-i\,(b+2\,c\,s-c\,v))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(i\,(d+2\,f\,s-f\,v))^{n-j}$$

$$(-i\,(d+2\,f\,s-f\,v+2\,b\,z+4\,c\,s\,z-2\,c\,v\,z))^{j+1}\left(\frac{i\,(d+2\,f\,s-f\,v+2\,b\,z+4\,c\,s\,z-2\,c\,v\,z)^2}{b+2\,c\,s-c\,v}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2}, \frac{i\,(d+2\,f\,s-f\,v+2\,b\,z+4\,c\,s\,z-2\,c\,v\,z)^2}{4\,(b+2\,c\,s-c\,v)}\right)+$$

$$(-1)^v\,e^{2\,i\,g\,(2\,s-v)-\frac{i\,(d+2\,f\,s-f\,v)^2}{4\,(b+2\,c\,s-c\,v)}}\,(i\,(b+2\,c\,s-c\,v))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,(d+2\,f\,s-f\,v))^{n-j}$$

$$(i\,(d+2\,f\,s-f\,v+2\,b\,z+4\,c\,s\,z-2\,c\,v\,z))^{j+1}\left(-\frac{i\,(d+2\,f\,s-f\,v+2\,b\,z+4\,c\,s\,z-2\,c\,v\,z)^2}{b+2\,c\,s-c\,v}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\left.\left.\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{i\,(d+2\,f\,s-f\,v+2\,b\,z+4\,c\,s\,z-2\,c\,v\,z)^2}{4\,(b+2\,c\,s-c\,v)}\right)\right)\right)\right)\,/;\,n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

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$$\int z^n\sin\left(\sqrt{z}\,b+d\,z\right)\sin^v\left(\sqrt{z}\,c+f\,z+g\right)dz = i^{-v-1}\,2^{-2\,n-v-2}$$

$$\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\left((-1)^{v+1}\,e^{i\,g\,(2\,k-v)-\frac{(-i\,b+i\,c\,(2\,k-v))^2}{4\,(-i\,d+i\,f\,(2\,k-v))}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(2\,k-v))^{-h-j+2\,n}\,\left(-i\,b+i\,c\,(2\,k-v)+\right.\right.\right.$$

$$\left.2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^{h+j}\left(-\frac{\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{-i\,d+i\,f\,(2\,k-v)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((-i\,b+i\,c\,(2\,k-v))\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}\,(h+j+1), -\frac{\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(2\,k-v))}\right)+2$$

$$(-i\,d+i\,f\,(2\,k-v))\,\Gamma\left(\frac{1}{2}\,(h+j+2), -\frac{\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(-i\,d+i\,f\,(2\,k-v))}\right)$$

$$\left.\left.\sqrt{-\frac{\left(-i\, b+i\, c\,(2\,k-v)+2\,(-i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^2}{-i\, d+i\, f\,(2\,k-v)}}\,\right)\right)$$

$$(-i\, d+i\, f\,(2\,k-v))^{-2\,n-2}+(-1)^v\, e^{i\, g\,(2\,k-v)-\frac{(i\, b+i\, c\,(2\,k-v))^2}{4\,(i\, d+i\, f\,(2\,k-v))}}\,(i\, d+i\, f\,(2\,k-v))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\, b+i\, c\,(2\,k-v))^{-h-j+2\,n}\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^2}{i\, d+i\, f\,(2\,k-v)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\, b+i\, c\,(2\,k-v))\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)\Gamma\left(\right.\right.$$

$$\left.\frac{1}{2}\,(h+j+1),\,-\frac{\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(i\, d+i\, f\,(2\,k-v))}\right)+$$

$$2\,(i\, d+i\, f\,(2\,k-v))\,\Gamma\left(\frac{1}{2}\,(h+j+2),\,-\frac{\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^2}{4\,(i\, d+i\, f\,(2\,k-v))}\right)$$

$$\left.\sqrt{-\frac{\left(i\, b+i\, c\,(2\,k-v)+2\,(i\, d+i\, f\,(2\,k-v))\,\sqrt{z}\right)^2}{i\, d+i\, f\,(2\,k-v)}}\,\right)-$$

$$e^{i\, g\,(v-2\,k)-\frac{(-i\, b+i\, c\,(v-2\,k))^2}{4\,(-i\, d+i\, f\,(v-2\,k))}}\,(-i\, d+i\, f\,(v-2\,k))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\, b+i\, c\,(v-2\,k))^{-h-j+2\,n}$$

$$\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\,\sqrt{z}\right)^2}{-i\, d+i\, f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((-i\, b+i\, c\,(v-2\,k))\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\,\sqrt{z}\right)\Gamma\left(\right.\right.$$

$$\frac{1}{2}(h+j+1),\, -\frac{\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\sqrt{z}\right)^2}{4\,(-i\, d+i\, f\,(v-2\,k))}\Bigg)+$$

$$2\,(-i\, d+i\, f\,(v-2\,k))\,\Gamma\!\left(\frac{1}{2}(h+j+2),\, -\frac{\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\sqrt{z}\right)^2}{4\,(-i\, d+i\, f\,(v-2\,k))}\right)$$

$$\sqrt{-\frac{\left(-i\, b+i\, c\,(v-2\,k)+2\,(-i\, d+i\, f\,(v-2\,k))\sqrt{z}\right)^2}{-i\, d+i\, f\,(v-2\,k}}\Bigg)+$$

$$e^{i\, g\,(v-2\,k)-\frac{(i\, b+i\, c\,(v-2\,k))^2}{4\,(i\, d+i\, f\,(v-2\,k))}}\,(i\, d+i\, f\,(v-2\,k))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\, b+i\, c\,(v-2\,k))^{-h-j+2\,n}$$

$$\left(i\, b+i\, c\,(v-2\,k)+2\,(i\, d+i\, f\,(v-2\,k))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\, b+i\, c\,(v-2\,k)+2\,(i\, d+i\, f\,(v-2\,k))\sqrt{z}\right)^2}{i\, d+i\, f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\, b+i\, c\,(v-2\,k))\left(i\, b+i\, c\,(v-2\,k)+2\,(i\, d+i\, f\,(v-2\,k))\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\, -\frac{\left(i\, b+i\, c\,(v-2\,k)+2\,(i\, d+i\, f\,(v-2\,k))\sqrt{z}\right)^2}{4\,(i\, d+i\, f\,(v-2\,k))}\Bigg)+$$

$$2\,(i\, d+i\, f\,(v-2\,k))\,\Gamma\!\left(\frac{1}{2}(h+j+2),\, -\frac{\left(i\, b+i\, c\,(v-2\,k)+2\,(i\, d+i\, f\,(v-2\,k))\sqrt{z}\right)^2}{4\,(i\, d+i\, f\,(v-2\,k))}\right)$$

$$\sqrt{-\frac{\left(i\, b+i\, c\,(v-2\,k)+2\,(i\, d+i\, f\,(v-2\,k))\sqrt{z}\right)^2}{i\, d+i\, f\,(v-2\,k)}}\Bigg)\Bigg)-$$

$$i\, 2^{-2\,n-v-2}\,(i\, d)^{-2\,n-2}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\Bigg(e^{-\frac{i\, b^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\, b)^{-h-j+2\,n}\left(i\, b+2\,i\, d\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)+\right.$$

$$\left.2\sqrt{\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{d}}\,d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)-$$

$$e^{\frac{i\,b^2}{4\,d}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^{h+j}\left(-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\left(-i\,b\left(-i\,b-2\,i\,d\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)-\right.$$

$$\left.\left.2\,i\,d\sqrt{-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(-i\,b-2\,i\,d\,\sqrt{z}\right)^2}{4\,d}\right)\right)\right)\;/;\;n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n \sin\left(b\,z^r+d\,z+e\right)\sin^v\left(c\,z^r+f\,z+g\right)$

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$$\int z^n\sin\left(b\,z^2+d\,z+e\right)\sin^v\left(c\,z^2+f\,z+g\right)dz = i\,2^{-v-2}\binom{v}{\frac{v}{2}}(1-v\bmod 2)$$

$$\left((i\,b)^{-n-1}\,e^{i\,e-\frac{i\,d^2}{4\,b}}\sum_{j=0}^{n}2^{j-n}\,(-i\,d)^{n-j}\,(i\,d+2\,i\,b\,z)^{j+1}\left(\frac{i\,(i\,d+2\,i\,b\,z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,\frac{i\,(i\,d+2\,i\,b\,z)^2}{4\,b}\right)-\right.$$

$$\left.(-i\,b)^{-n-1}\,e^{\frac{i\,d^2}{4\,b}-i\,e}\sum_{j=0}^{n}2^{j-n}\,(i\,d)^{n-j}\,(-i\,d-2\,i\,b\,z)^{j+1}\left(-\frac{i\,(-i\,d-2\,i\,b\,z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,-\frac{i\,(-i\,d-2\,i\,b\,z)^2}{4\,b}\right)\right)-$$

$$i^{-v-1}\,2^{-v-2}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left((-1)^{v+1}\,e^{-\frac{(-i\,d+i\,f\,(2\,s-v))^2}{4\,(-i\,b+i\,c\,(2\,s-v))}-i\,e+g\,i\,(2\,s-v)}\left(\sum_{j=0}^{n}2^{j-n}\,(i\,d-i\,f\,(2\,s-v))^{n-j}\right.\right.$$

$$(-i\,d+i\,f\,(2\,s-v)+2\,(-i\,b+i\,c\,(2\,s-v))\,z)^{j+1}\left(-\frac{(-i\,d+i\,f\,(2\,s-v)+2\,(-i\,b+i\,c\,(2\,s-v))\,z)^2}{-i\,b+i\,c\,(2\,s-v)}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,-\frac{(-i\,d+i\,f\,(2\,s-v)+2\,(-i\,b+i\,c\,(2\,s-v))\,z)^2}{4\,(-i\,b+i\,c\,(2\,s-v))}\right)\right)(-i\,b+i\,c\,(2\,s-v))^{-n-1}+$$

$$(-1)^{\nu} e^{-\frac{(i d+i f (2 s-\nu))^2}{4 (i b+i c (2 s-\nu))}+i e+g i (2 s-\nu)} (i b+i c (2 s-\nu))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i d-i f (2 s-\nu))^{n-j}$$

$$(i d+i f (2 s-\nu)+2 (i b+i c (2 s-\nu)) z)^{j+1} \left(-\frac{(i d+i f (2 s-\nu)+2 (i b+i c (2 s-\nu)) z)^2}{i b+i c (2 s-\nu)}\right)^{\frac{1}{2} (-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i d+i f (2 s-\nu)+2 (i b+i c (2 s-\nu)) z)^2}{4 (i b+i c (2 s-\nu))}\right)-$$

$$e^{-\frac{(-i d+i f (\nu-2 s))^2}{4 (-i b+i c (\nu-2 s))}-i e+g i (\nu-2 s)} (-i b+i c (\nu-2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i d-i f (\nu-2 s))^{n-j}$$

$$(-i d+i f (\nu-2 s)+2 (-i b+i c (\nu-2 s)) z)^{j+1} \left(-\frac{(-i d+i f (\nu-2 s)+2 (-i b+i c (\nu-2 s)) z)^2}{-i b+i c (\nu-2 s)}\right)^{\frac{1}{2} (-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i d+i f (\nu-2 s)+2 (-i b+i c (\nu-2 s)) z)^2}{4 (-i b+i c (\nu-2 s))}\right)+$$

$$e^{-\frac{(i d+i f (\nu-2 s))^2}{4 (i b+i c (\nu-2 s))}+i e+g i (\nu-2 s)} (i b+i c (\nu-2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i d-i f (\nu-2 s))^{n-j}$$

$$(i d+i f (\nu-2 s)+2 (i b+i c (\nu-2 s)) z)^{j+1} \left(-\frac{(i d+i f (\nu-2 s)+2 (i b+i c (\nu-2 s)) z)^2}{i b+i c (\nu-2 s)}\right)^{\frac{1}{2} (-j-1)}$$

$$\left.\left.\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i d+i f (\nu-2 s)+2 (i b+i c (\nu-2 s)) z)^2}{4 (i b+i c (\nu-2 s))}\right)\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

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$$\int z^n \sin\left(\sqrt{z}\, b+d z+e\right) \sin^{\nu}\left(\sqrt{z}\, c+f z+g\right) dz = i^{-\nu-1} 2^{-2 n-\nu-2}$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^{\nu+1} e^{-\frac{(-i b+i c (2 k-\nu))^2}{4 (-i d+i f (2 k-\nu))}-i e+g i (2 k-\nu)} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b+i c (2 k-\nu))^{-h-j+2 n} \left(-i b+i c (2 k-\nu)+\right.\right.\right.$$

$$\left.2 (-i d+i f (2 k-\nu)) \sqrt{z}\right)^{h+j} \left(-\frac{\left(-i b+i c (2 k-\nu)+2 (-i d+i f (2 k-\nu)) \sqrt{z}\right)^2}{-i d+i f (2 k-\nu)}\right)^{\frac{1}{2} (-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left((-i b+i c (2 k-\nu)) \left(-i b+i c (2 k-\nu)+2 (-i d+i f (2 k-\nu)) \sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2} (h+j+1), -\frac{\left(-i b+i c (2 k-\nu)+2 (-i d+i f (2 k-\nu)) \sqrt{z}\right)^2}{4 (-i d+i f (2 k-\nu))}\right)+2$$

$$(-i\,d+i\,f\,(2\,k-v))\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\,\right)^2}{4\,(-i\,d+i\,f\,(2\,k-v))}\right)$$

$$\left.\left.\sqrt{-\frac{\left(-i\,b+i\,c\,(2\,k-v)+2\,(-i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\,\right)^2}{-i\,d+i\,f\,(2\,k-v)}}\,\right)\right)$$

$$(-i\,d+i\,f\,(2\,k-v))^{-2\,n-2}+(-1)^v\,e^{-\frac{(i\,b+i\,c\,(2\,k-v))^2}{4\,(i\,d+i\,f\,(2\,k-v))}+i\,e+g\,i\,(2\,k-v)}\,(i\,d+i\,f\,(2\,k-v))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(2\,k-v))^{-h-j+2\,n}\left(i\,b+i\,c\,(2\,k-v)+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\,\right)^{h+j}$$

$$\left(-\frac{\left(i\,b+i\,c\,(2\,k-v)+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\,\right)^2}{i\,d+i\,f\,(2\,k-v)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\,b+i\,c\,(2\,k-v))\left(i\,b+i\,c\,(2\,k-v)+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\,\right)\Gamma\!\left(\right.\right.$$

$$\left.\frac{1}{2}\,(h+j+1),\,-\frac{\left(i\,b+i\,c\,(2\,k-v)+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\,\right)^2}{4\,(i\,d+i\,f\,(2\,k-v))}\right)+$$

$$2\,(i\,d+i\,f\,(2\,k-v))\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{\left(i\,b+i\,c\,(2\,k-v)+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\,\right)^2}{4\,(i\,d+i\,f\,(2\,k-v))}\right)$$

$$\left.\sqrt{-\frac{\left(i\,b+i\,c\,(2\,k-v)+2\,(i\,d+i\,f\,(2\,k-v))\,\sqrt{z}\,\right)^2}{i\,d+i\,f\,(2\,k-v)}}\,\right)-$$

$$e^{-\frac{(-i\,b+i\,c\,(v-2\,k))^2}{4\,(-i\,d+i\,f\,(v-2\,k))}-i\,e+g\,i\,(v-2\,k)}\,(-i\,d+i\,f\,(v-2\,k))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(v-2\,k))^{-h-j+2\,n}$$

$$\left(-i\,b+i\,c\,(v-2\,k)+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\,\right)^{h+j}$$

$$\left(-\frac{\left(-i\,b+i\,c\,(v-2\,k)+2\,(-i\,d+i\,f\,(v-2\,k))\,\sqrt{z}\,\right)^2}{-i\,d+i\,f\,(v-2\,k)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((-i\, b + i\, c\, (v-2\, k))\left(-i\, b + i\, c\, (v-2\, k) + 2\, (-i\, d + i\, f\, (v-2\, k))\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\, -\frac{\left(-i\, b + i\, c\, (v-2\, k) + 2\, (-i\, d + i\, f\, (v-2\, k))\sqrt{z}\right)^2}{4\, (-i\, d + i\, f\, (v-2\, k))}\Bigg) +$$

$$2\, (-i\, d + i\, f\, (v-2\, k))\,\Gamma\left(\frac{1}{2}(h+j+2),\, -\frac{\left(-i\, b + i\, c\, (v-2\, k) + 2\, (-i\, d + i\, f\, (v-2\, k))\sqrt{z}\right)^2}{4\, (-i\, d + i\, f\, (v-2\, k))}\right)$$

$$\sqrt{-\frac{\left(-i\, b + i\, c\, (v-2\, k) + 2\, (-i\, d + i\, f\, (v-2\, k))\sqrt{z}\right)^2}{-i\, d + i\, f\, (v-2\, k)}}\Bigg) +$$

$$e^{-\frac{(i\, b + i\, c\, (v-2\, k))^2}{4\, (i\, d + i\, f\, (v-2\, k))} + i\, e + g\, i\, (v-2\, k)}\, (i\, d + i\, f\, (v-2\, k))^{-2\, n-2} \sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, b + i\, c\, (v-2\, k))^{-h-j+2\, n}$$

$$\left(i\, b + i\, c\, (v-2\, k) + 2\, (i\, d + i\, f\, (v-2\, k))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\, b + i\, c\, (v-2\, k) + 2\, (i\, d + i\, f\, (v-2\, k))\sqrt{z}\right)^2}{i\, d + i\, f\, (v-2\, k)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\, b + i\, c\, (v-2\, k))\left(i\, b + i\, c\, (v-2\, k) + 2\, (i\, d + i\, f\, (v-2\, k))\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\, -\frac{\left(i\, b + i\, c\, (v-2\, k) + 2\, (i\, d + i\, f\, (v-2\, k))\sqrt{z}\right)^2}{4\, (i\, d + i\, f\, (v-2\, k))}\Bigg) +$$

$$2\, (i\, d + i\, f\, (v-2\, k))\,\Gamma\left(\frac{1}{2}(h+j+2),\, -\frac{\left(i\, b + i\, c\, (v-2\, k) + 2\, (i\, d + i\, f\, (v-2\, k))\sqrt{z}\right)^2}{4\, (i\, d + i\, f\, (v-2\, k))}\right)$$

$$\sqrt{-\frac{\left(i\, b + i\, c\, (v-2\, k) + 2\, (i\, d + i\, f\, (v-2\, k))\sqrt{z}\right)^2}{i\, d + i\, f\, (v-2\, k)}}\Bigg)\Bigg) -$$

$$i\, 2^{-2\, n-v-2}\, (i\, d)^{-2\, n-2} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)\Bigg(e^{i\, e - \frac{i\, b^2}{4\, d}} \sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, b)^{-h-j+2\, n} \left(i\, b + 2\, i\, d\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+2\,i\,d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,i\,d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(i\,b+2\,i\,d\sqrt{z}\right)^2}{4\,d}\right)+\right.$$

$$\left.2\sqrt{\frac{i\left(i\,b+2\,i\,d\sqrt{z}\right)^2}{d}}\;d\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+2\,i\,d\sqrt{z}\right)^2}{4\,d}\right)\right)-$$

$$e^{\frac{i\,b^2}{4\,d}-i\,e}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}\left(-i\,b-2\,i\,d\sqrt{z}\right)^{h+j}\left(-\frac{i\left(-i\,b-2\,i\,d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(-i\,b\left(-i\,b-2\,i\,d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,b-2\,i\,d\sqrt{z}\right)^2}{4\,d}\right)-\right.$$

$$\left.\left.2\,i\,d\sqrt{-\frac{i\left(-i\,b-2\,i\,d\sqrt{z}\right)^2}{d}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(-i\,b-2\,i\,d\sqrt{z}\right)^2}{4\,d}\right)\right)\right)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving product of powers of two direct functions and a power function

Involving $z^{\alpha-1}\sin^{\mu}(c\,z)\sin^{\nu}(a\,z)$

01.06.21.1202.01

$$\int z^{\alpha-1}\sin^m(c\,z)\sin^{\nu}(a\,z)\,dz = \frac{(-1)^m\,2^{-m-\nu}\,(1-m\bmod 2)\,(1-\nu\bmod 2)}{\alpha}\,z^{\alpha}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}-2^{-m-\nu}\,i^{-m}\,z^{\alpha}\binom{\nu}{\frac{\nu}{2}}(1-\nu\bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k-m}\binom{m}{k}\left(\Gamma(\alpha,\,i\,c\,(m-2\,k)\,z)\,(i\,c\,(m-2\,k)\,z)^{-\alpha}+e^{i\,m\,\pi}\,((2\,i\,c\,k-i\,c\,m)\,z)^{-\alpha}\,\Gamma(\alpha,\,(2\,i\,c\,k-i\,c\,m)\,z)\right)-$$

$$(-1)^m\,i^{-\nu}\,2^{-m-\nu}\,z^{\alpha}\binom{m}{\frac{m}{2}}(1-m\bmod 2)$$

$$\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(\Gamma(\alpha,\,-i\,a\,(\nu-2\,s)\,z)\,(-i\,a\,(\nu-2\,s)\,z)^{-\alpha}+e^{i\,\pi\,\nu}\,((i\,a\,\nu-2\,i\,a\,s)\,z)^{-\alpha}\,\Gamma(\alpha,\,(i\,a\,\nu-2\,i\,a\,s)\,z)\right)+2^{-m-\nu}\,i^{-m-\nu}\,z^{\alpha}$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k-m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(-e^{i\,\pi\,\nu}\,\Gamma(\alpha,\,(-2\,c\,i\,k+i\,c\,m-2\,i\,a\,s+i\,a\,\nu)\,z)\,((-2\,c\,i\,k+i\,c\,m-2\,i\,a\,s+i\,a\,\nu)\,z)^{-\alpha}-\right.$$

$$e^{i\,\pi\,m+i\,\pi\,\nu}\,((2\,i\,c\,k-i\,c\,m-2\,i\,a\,s+i\,a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,\,(2\,i\,c\,k-i\,c\,m-2\,i\,a\,s+i\,a\,\nu)\,z)-$$

$$((-2\,c\,i\,k+i\,c\,m+2\,i\,a\,s-i\,a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,\,(-2\,c\,i\,k+i\,c\,m+2\,i\,a\,s-i\,a\,\nu)\,z)-$$

$$\left.e^{i\,m\,\pi}\,((2\,i\,c\,k-i\,c\,m+2\,i\,a\,s-i\,a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,\,(2\,i\,c\,k-i\,c\,m+2\,i\,a\,s-i\,a\,\nu)\,z)\right)\;/;\;m\in\mathbb{N}^+\bigwedge\nu\in\mathbb{N}^+$$

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$$\int z^n \sin^\mu(c z) \sin^\nu(a z)\, dz = 2^{-\nu} \binom{\nu}{\frac{\nu}{2}} n!\,(1-\nu \bmod 2) \sin^\mu(c z) \left(\sum_{j=0}^{n} \frac{\left((-1)^j z^{n-j}\right)}{(n-j)!\,(-i c \mu)^{j+1}}\, {}_{j+2}F_{j+1}\!\left(-\frac{\mu}{2}, \ldots, -\frac{\mu}{2}, -\mu; 1-\frac{\mu}{2}, \ldots, 1-\frac{\mu}{2}; e^{2 i c z}\right)\right) \left(1-e^{2 i c z}\right)^{-\mu} + 2^{-\nu} n! \sin^\mu(c z) \left(\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{i a(\nu-2k) z - \frac{i \pi \nu}{2}} \sum_{j=0}^{n} \frac{(-1)^j z^{n-j} (i a(\nu-2k) - i c \mu)^{-j-1}}{(n-j)!}\, {}_{j+2}F_{j+1}\!\left(-\frac{c\mu - a(\nu-2k)}{2c}, \ldots, -\frac{c\mu - a(\nu-2k)}{2c}, -\mu; 1-\frac{c\mu - a(\nu-2k)}{2c}, \ldots, 1-\frac{c\mu - a(\nu-2k)}{2c}; e^{2icz}\right) + e^{\frac{i\pi\nu}{2} - i a(\nu-2k) z} \sum_{j=0}^{n} \frac{(-1)^j z^{n-j} (-i a(\nu-2k) - i c\mu)^{-j-1}}{(n-j)!}\, {}_{j+2}F_{j+1}\!\left(-\frac{a(\nu-2k)+c\mu}{2c}, \ldots, -\frac{a(\nu-2k)+c\mu}{2c}, -\mu; 1-\frac{a(\nu-2k)+c\mu}{2c}, \ldots, 1-\frac{a(\nu-2k)+c\mu}{2c}; e^{2icz}\right)\right)\right) \left(1-e^{2icz}\right)^{-\mu} /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^{\alpha-1} \sin^\mu(c z) \sin^\nu(a z + b)$

01.06.21.1204.01

$$\int z^{\alpha-1} \sin^m(c z) \sin^\nu(b + a z)\, dz = \frac{(-1)^m 2^{-m-\nu} z^\alpha \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1-m \bmod 2)(1-\nu \bmod 2)}{\alpha} - i^{-m} 2^{-m-\nu} z^\alpha \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k-m} \binom{m}{k} \left(\Gamma(\alpha, i c(m-2k) z)(i c(m-2k) z)^{-\alpha} + e^{i m \pi} ((2 i c k - i c m) z)^{-\alpha} \Gamma(\alpha, (2 i c k - i c m) z)\right) - (-1)^m i^{-\nu} 2^{-m-\nu} z^\alpha \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{-2 b i s - i b \nu} \binom{\nu}{s} \left(e^{2 i b \nu} \Gamma(\alpha, -i a(\nu-2s) z)(-i a(\nu-2s) z)^{-\alpha} + e^{4 i b s + i \pi \nu} ((i a \nu - 2 i a s) z)^{-\alpha} \Gamma(\alpha, (i a \nu - 2 i a s) z)\right) + (2 i)^{-m-\nu} z^\alpha \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k-m} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{-2 b i s - i b \nu} \binom{\nu}{s} \left(-e^{4 i b s + i \pi \nu} \Gamma(\alpha, (-2 c i k + i c m - 2 i a s + i a \nu) z) ((-2 c i k + i c m - 2 i a s + i a \nu) z)^{-\alpha} - e^{i \pi m + 4 i b s + i \pi \nu} ((2 i c k - i c m - 2 i a s + i a \nu) z)^{-\alpha} \Gamma(\alpha, (2 i c k - i c m - 2 i a s + i a \nu) z) + e^{2 i b \nu} \left(-\Gamma(\alpha, (-2 c i k + i c m + 2 i a s - i a \nu) z) ((-2 c i k + i c m + 2 i a s - i a \nu) z)^{-\alpha} - e^{i m \pi} ((2 i c k - i c m + 2 i a s - i a \nu) z)^{-\alpha} \Gamma(\alpha, (2 i c k - i c m + 2 i a s - i a \nu) z)\right)\right) /; m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1205.01

$$\int z^n \sin^\mu(c\,z)\sin^\nu(a\,z+b)\,dz = 2^{-\nu}\binom{\nu}{\frac{\nu}{2}} n!\,(1-\nu \bmod 2)\sin^\mu(c\,z)\left(1-e^{2 i c z}\right)^{-\mu}\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}}{(n-j)!\,(-i\,c\,\mu)^{j+1}}\,{}_{j+2}F_{j+1}\left(-\frac{\mu}{2},\ldots,-\frac{\mu}{2},-\mu;1-\frac{\mu}{2},\ldots,1-\frac{\mu}{2};e^{2 i c z}\right)+ 2^{-\nu} n!\sin^\mu(c\,z)\left(1-e^{2 i c z}\right)^{-\mu}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(e^{\frac{i\pi\nu}{2}-i\,b\,(\nu-2k)-i\,a\,(\nu-2k)\,z}\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(-i\,a\,(\nu-2k)-i\,c\,\mu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\left(-\frac{a(-2k+\nu)+c\mu}{2c},\ldots,-\frac{a(-2k+\nu)+c\mu}{2c},-\mu;1-\frac{a(-2k+\nu)+c\mu}{2c},\ldots,1-\frac{a(-2k+\nu)+c\mu}{2c};e^{2 i c z}\right)+e^{-\frac{1}{2}i\pi\nu+b\,i\,(\nu-2k)+a\,i\,(\nu-2k)\,z}\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(a\,i\,(\nu-2k)-i\,c\,\mu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\left(-\frac{-a(-2k+\nu)+c\mu}{2c},\ldots,-\frac{-a(-2k+\nu)+c\mu}{2c},-\mu;1-\frac{-a(-2k+\nu)+c\mu}{2c},\ldots,1-\frac{-a(-2k+\nu)+c\mu}{2c};e^{2 i c z}\right)\right)\;/;\; n\in\mathbb{N}\land\nu\in\mathbb{N}^+$$

01.06.21.1206.01

$$\int z^n \sin^m(c\,z)\sin^\nu(b+a\,z)\,dz = 2^{-m}\binom{m}{\frac{m}{2}} n!\,(1-m \bmod 2)\sin^\nu(b+a\,z)\left(\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(-i\,a\,\nu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\left(-\frac{\nu}{2},\ldots,-\frac{\nu}{2},-\nu;1-\frac{\nu}{2},\ldots,1-\frac{\nu}{2};e^{2 i (b+a z)}\right)\right)\left(1-e^{2 i (b+a z)}\right)^{-\nu}+2^{-m} n!\sin^\nu(b+a\,z)\left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(e^{-\frac{1}{2}i(-2czm+\pi m+4ckz)}\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(i\,c\,(m-2k)-i\,a\,\nu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\left(-\frac{a\nu-c(m-2k)}{2a},\ldots,-\frac{a\nu-c(m-2k)}{2a},-\nu;1-\frac{a\nu-c(m-2k)}{2a},\ldots,1-\frac{a\nu-c(m-2k)}{2a};e^{2 i (b+a z)}\right)+e^{\frac{1}{2}i(-2czm+\pi m+4ckz)}\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(-i\,c\,(m-2k)-i\,a\,\nu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\left(-\frac{c(m-2k)+a\nu}{2a},\ldots,-\frac{c(m-2k)+a\nu}{2a},-\nu;1-\frac{c(m-2k)+a\nu}{2a},\ldots,1-\frac{c(m-2k)+a\nu}{2a};e^{2 i (b+a z)}\right)\right)\right)\left(1-e^{2 i (b+a z)}\right)^{-\nu}\;/;\; n\in\mathbb{N}\land m\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\sin^\mu(c\,z+d)\sin^\nu(a\,z+b)$

01.06.21.1207.01

$$\int z^{\alpha-1}\sin^m(d+c\,z)\sin^\nu(b+a\,z)\,dz = \frac{(-1)^m\,2^{-m-\nu}}{\alpha}z^\alpha\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m\bmod 2)(1-\nu\bmod 2)-2^{-m-\nu}\,i^{-m}\,z^\alpha\binom{\nu}{\frac{\nu}{2}}(1-\nu\bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k-m}\,e^{2idk+idm}\binom{m}{k}\left(e^{-2idm}\,\Gamma(\alpha,\,i\,c\,(m-2k)\,z)\,(i\,c\,(m-2k)\,z)^{-\alpha}+e^{im\pi-4idk}\,((2\,i\,c\,k-i\,c\,m)\,z)^{-\alpha}\,\Gamma(\alpha,\,(2\,i\,c\,k-i\,c\,m)\,z)\right)-(-1)^m\,i^{-\nu}\,2^{-m-\nu}\,z^\alpha\binom{m}{\frac{m}{2}}(1-m\bmod 2)\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\,e^{-2bis-ib\nu}\binom{\nu}{s}\left(e^{2ib\nu}\,\Gamma(\alpha,\,-i\,a\,(\nu-2s)\,z)\,(-i\,a\,(\nu-2s)\,z)^{-\alpha}+e^{4ibs+i\pi\nu}\,((i\,a\,\nu-2\,i\,a\,s)\,z)^{-\alpha}\,\Gamma(\alpha,\,(i\,a\,\nu-2\,i\,a\,s)\,z)\right)+2^{-m-\nu}\,i^{-m-\nu}\,z^\alpha\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^{k-m}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\,e^{2idk+idm-2ibs-ib\nu}\binom{\nu}{s}\left(-e^{-2dim+4ibs+i\pi\nu}\,\Gamma(\alpha,\,(-2\,c\,i\,k+i\,c\,m-2\,i\,a\,s+i\,a\,\nu)\,z)\,((-2\,c\,i\,k+i\,c\,m-2\,i\,a\,s+i\,a\,\nu)\,z)^{-\alpha}-e^{-4dik+4ibs+i\pi\nu+im\pi}\,((2\,i\,c\,k-i\,c\,m-2\,i\,a\,s+i\,a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,\,(2\,i\,c\,k-i\,c\,m-2\,i\,a\,s+i\,a\,\nu)\,z)+e^{2ib\nu}\left(-e^{-2idm}\,\Gamma(\alpha,\,(-2\,c\,i\,k+i\,c\,m+2\,i\,a\,s-i\,a\,\nu)\,z)\,((-2\,c\,i\,k+i\,c\,m+2\,i\,a\,s-i\,a\,\nu)\,z)^{-\alpha}-e^{im\pi-4idk}\,((2\,i\,c\,k-i\,c\,m+2\,i\,a\,s-i\,a\,\nu)\,z)^{-\alpha}\,\Gamma(\alpha,\,(2\,i\,c\,k-i\,c\,m+2\,i\,a\,s-i\,a\,\nu)\,z)\right)\right)\;/;\;m\in\mathbb{N}^+\land\nu\in\mathbb{N}^+$$

01.06.21.1208.01

$$\int z^n\sin^\mu(c\,z+d)\sin^\nu(a\,z+b)\,dz = 2^{-\nu}\binom{\nu}{\frac{\nu}{2}}n!\,(1-\nu\bmod 2)\sin^\mu(d+c\,z)\left(1-e^{2i(d+cz)}\right)^{-\mu}\sum_{j=0}^{n}\frac{\left((-1)^j\,z^{n-j}\right)}{(n-j)!\,(-i\,c\,\mu)^{j+1}}\,{}_{j+2}F_{j+1}\!\left(-\frac{\mu}{2},\,\ldots,\,-\frac{\mu}{2},\,-\mu;\,1-\frac{\mu}{2},\,\ldots,\,1-\frac{\mu}{2};\,e^{2i(d+cz)}\right)+2^{-\nu}\left(1-e^{2i(d+cz)}\right)^{-\mu}n!\sin^\mu(d+c\,z)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(e^{-\frac{1}{2}i(4bk+4azk-2b\nu+\pi\nu-2a\nu z)}\sum_{j=0}^{n}\frac{(-1)^j\,z^{n-j}\,(i\,a\,(\nu-2k)-i\,c\,\mu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\!\left(-\frac{c\,\mu-a\,(\nu-2k)}{2c},\,\ldots,\,-\frac{c\,\mu-a\,(\nu-2k)}{2c},\,-\mu;\,1-\frac{c\,\mu-a\,(\nu-2k)}{2c},\,\ldots,\,1-\frac{c\,\mu-a\,(\nu-2k)}{2c};\,e^{2i(d+cz)}\right)+e^{\frac{1}{2}i(4bk+4azk-2b\nu+\pi\nu-2a\nu z)}\sum_{j=0}^{n}\frac{(-1)^j\,z^{n-j}\,(-i\,a\,(\nu-2k)-i\,c\,\mu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\!\left(-\frac{a\,(\nu-2k)+c\,\mu}{2c},\,\ldots,\,-\frac{a\,(\nu-2k)+c\,\mu}{2c},\,-\mu;\,1-\frac{a\,(\nu-2k)+c\,\mu}{2c},\,\ldots,\,1-\frac{a\,(\nu-2k)+c\,\mu}{2c};\,e^{2i(d+cz)}\right)\right)\;/;\;n\in\mathbb{N}\land\nu\in\mathbb{N}^+$$

Involving $z^n\sin^m(b\,z)\sin^\nu\left(c\,z^r\right)$

01.06.21.1209.01

$$\int z^n \sin^m(b z) \sin^\nu(c z^2)\, dz = \frac{(-1)^m 2^{-m-\nu} (1 - m \bmod 2)(1 - \nu \bmod 2)}{n+1} z^{n+1} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} - (-1)^m i^{-\nu} 2^{-m-\nu-1} z^{n+1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k}$$

$$\left((-1)^\nu \Gamma\left(\frac{n+1}{2}, (i c \nu - 2 i c k) z^2\right) \left((i c \nu - 2 i c k) z^2\right)^{\frac{1}{2}(-n-1)} + \left((2 i c k - i c \nu) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (2 i c k - i c \nu) z^2\right)\right) -$$

$$i^{-m} 2^{-m-\nu} z^{n+1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left((-1)^m \Gamma(n+1, (i b m - 2 i b k) z) ((i b m - 2 i b k) z)^{-n-1} + \right.$$

$$\left. ((2 i b k - i b m) z)^{-n-1} \Gamma(n+1, (2 i b k - i b m) z)\right) -$$

$$2^{-m-\nu-1} i^{-m-\nu} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{-\frac{i b^2 (2k-m)^2}{4 c (2s-\nu)}} \left(\sum_{j=0}^{n} 2^{j-n} (i b (2k-m))^{n-j} (2 i c (2s-\nu) z - i b (2k-m))^{j+1} \right.\right.$$

$$\left.\left. \left(\frac{i (2 i c (2s-\nu) z - i b (2k-m))^2}{c (2s-\nu)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (2 i c (2s-\nu) z - i b (2k-m))^2}{4 c (2s-\nu)}\right)\right)\right.$$

$$(i c (2s-\nu))^{-n-1} + (-1)^{m+\nu} e^{-\frac{i b^2 (m-2k)^2}{4 c (2s-\nu)}} \left(\sum_{j=0}^{n} 2^{j-n} (i b (m-2k))^{n-j} (2 i c (2s-\nu) z - i b (m-2k))^{j+1} \right.$$

$$\left. \left(\frac{i (2 i c (2s-\nu) z - i b (m-2k))^2}{c (2s-\nu)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (2 i c (2s-\nu) z - i b (m-2k))^2}{4 c (2s-\nu)}\right)\right)$$

$$(i c (2s-\nu))^{-n-1} + e^{-\frac{i b^2 (2k-m)^2}{4 c (\nu-2s)}} (i c (\nu-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i b (2k-m))^{n-j} (2 i c (\nu-2s) z - i b (2k-m))^{j+1}$$

$$\left(\frac{i (2 i c (\nu-2s) z - i b (2k-m))^2}{c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (2 i c (\nu-2s) z - i b (2k-m))^2}{4 c (\nu-2s)}\right) +$$

$$(-1)^m e^{-\frac{i b^2 (m-2k)^2}{4 c (\nu-2s)}} (i c (\nu-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i b (m-2k))^{n-j} (2 i c (\nu-2s) z - i b (m-2k))^{j+1}$$

$$\left(\frac{i (2 i c (\nu-2s) z - i b (m-2k))^2}{c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}$$

$$\left.\Gamma\left(\frac{j+1}{2}, \frac{i (2 i c (\nu-2s) z - i b (m-2k))^2}{4 c (\nu-2s)}\right)\right) /; n \in \mathbb{N} \land m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1210.01

$$\int z^n \sin^m(b\,z)\sin^\nu\left(c\sqrt{z}\right)dz = \frac{(-1)^m\,2^{-m-\nu}\,(1-m \bmod 2)\,(1-\nu \bmod 2)}{n+1}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}} + \frac{1}{b}\left(i^{m+1}\,2^{-m-\nu}\,z^n\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{2k-m}\left((-1)^k\binom{m}{k}\right.\right.$$

$$\left.\left.\left(e^{i m\pi}(-i\,b\,(m-2k)\,z)^{-n}\,\Gamma(n+1,-i\,b\,(m-2k)\,z)-(-i\,b\,(2k-m)\,z)^{-n}\,\Gamma(n+1,-i\,b\,(2k-m)\,z)\right)\right)\right)-(-1)^m$$

$$i^{-\nu}\,2^{-m-\nu+1}\,z^{n+1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left((-1)^\nu\,\Gamma\left(2(n+1),(i\,c\,\nu-2\,i\,c\,k)\sqrt{z}\right)\left((i\,c\,\nu-2\,i\,c\,k)\sqrt{z}\right)^{-2(n+1)}+\right.$$

$$\left.\left((2\,i\,c\,k-i\,c\,\nu)\sqrt{z}\right)^{-2(n+1)}\Gamma\left(2(n+1),(2\,i\,c\,k-i\,c\,\nu)\sqrt{z}\right)\right)+2^{-m-2n-\nu-1}\,i^{-m-\nu}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}$$

$$\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^\nu\,e^{\frac{i\,c^2(\nu-2s)^2}{4b(2k-m)}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(\nu-2s))^{-h-j+2n}\left(-2\,i\,b\sqrt{z}\,(2k-m)-i\,c\,(\nu-2s)\right)^{h+j}\right.\right.$$

$$\left(-\frac{i\left(-2\,i\,b\sqrt{z}\,(2k-m)-i\,c\,(\nu-2s)\right)^2}{b\,(2k-m)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(-i\,c\,(\nu-2s)\left(-2\,i\,b\sqrt{z}\,(2k-m)-\right.\right.$$

$$\left.i\,c\,(\nu-2s)\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(-2\,i\,b\sqrt{z}\,(2k-m)-i\,c\,(\nu-2s)\right)^2}{4\,b\,(2k-m)}\right)-$$

$$2\,i\,b\,(2k-m)\sqrt{-\frac{i\left(-2\,i\,b\sqrt{z}\,(2k-m)-i\,c\,(\nu-2s)\right)^2}{b\,(2k-m)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(-2\,i\,b\sqrt{z}\,(2k-m)-i\,c\,(\nu-2s)\right)^2}{4\,b\,(2k-m)}\right)\right)\right)(-i\,b\,(2k-m))^{-2n-2}+$$

$$e^{\frac{i\,c^2(\nu-2s)^2}{4b(2k-m)}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(\nu-2s))^{-h-j+2n}\left(i\,c\,(\nu-2s)-2\,i\,b\,(2k-m)\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,b\,(2\,k-m)\,\sqrt{z}\right)^2}{b\,(2\,k-m)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(i\,c\,(v-2\,s)\right.$$

$$\left(i\,c\,(v-2\,s)-2\,i\,b\,(2\,k-m)\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,b\,(2\,k-m)\,\sqrt{z}\right)^2}{4\,b\,(2\,k-m)}\right)-$$

$$2\,i\,b\,(2\,k-m)\sqrt{-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,b\,(2\,k-m)\,\sqrt{z}\right)^2}{b\,(2\,k-m)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,b\,(2\,k-m)\,\sqrt{z}\right)^2}{4\,b\,(2\,k-m)}\right)\right)\right)(-i\,b\,(2\,k-m))^{-2\,n-2}+(-1)^{m+v}\,e^{\frac{i\,c^2\,(v-2\,s)^2}{4\,b\,(m-2\,k)}}$$

$$(-i\,b\,(m-2\,k))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2\,s))^{-h-j+2\,n}\left(-2\,i\,b\,\sqrt{z}\,(m-2\,k)-i\,c\,(v-2\,s)\right)^{h+j}$$

$$\left(-\frac{i\left(-2\,i\,b\,\sqrt{z}\,(m-2\,k)-i\,c\,(v-2\,s)\right)^2}{b\,(m-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(-i\,c\,(v-2\,s)\right.$$

$$\left(-2\,i\,b\,\sqrt{z}\,(m-2\,k)-i\,c\,(v-2\,s)\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-2\,i\,b\,\sqrt{z}\,(m-2\,k)-i\,c\,(v-2\,s)\right)^2}{4\,b\,(m-2\,k)}\right)-$$

$$2\,i\,b\,(m-2\,k)\sqrt{-\frac{i\left(-2\,i\,b\,\sqrt{z}\,(m-2\,k)-i\,c\,(v-2\,s)\right)^2}{b\,(m-2\,k)}}$$

$$\left.\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{i\left(-2\,i\,b\,\sqrt{z}\,(m-2\,k)-i\,c\,(v-2\,s)\right)^2}{4\,b\,(m-2\,k)}\right)\right)+(-1)^m\,e^{\frac{i\,c^2\,(v-2\,s)^2}{4\,b\,(m-2\,k)}}$$

$$(-i\,b\,(m-2\,k))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s))^{-h-j+2\,n}\left(i\,c\,(v-2\,s)-2\,i\,b\,(m-2\,k)\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,b\,(m-2\,k)\,\sqrt{z}\right)^2}{b\,(m-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(i\,c\,(v-2\,s)\right.$$

$$\left(i\,c\,(v-2\,s)-2\,i\,b\,(m-2\,k)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,b\,(m-2\,k)\sqrt{z}\right)^2}{4\,b\,(m-2\,k)}\right)-$$

$$2\,i\,b\,(m-2\,k)\sqrt{-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,b\,(m-2\,k)\sqrt{z}\right)^2}{b\,(m-2\,k)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,b\,(m-2\,k)\sqrt{z}\right)^2}{4\,b\,(m-2\,k)}\right)\right)\right)\;/;\;n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin^m(d\,z+e)\sin^v\left(c\,z^r\right)$

01.06.21.1211.01

$$\int z^n \sin^m(e+d z)\sin^\nu(c z^2)\,dz = \frac{(-1)^m 2^{-m-\nu}(1-m \bmod 2)(1-\nu \bmod 2)}{n+1} z^{n+1}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}} - (-1)^m i^{-\nu} 2^{-m-\nu-1} z^{n+1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}$$
$$\left((-1)^\nu\,\Gamma\!\left(\frac{n+1}{2}, (i c \nu - 2 i c k) z^2\right)\left((i c \nu - 2 i c k) z^2\right)^{\frac{1}{2}(-n-1)} + \left((2 i c k - i c \nu) z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\!\left(\frac{n+1}{2}, (2 i c k - i c \nu) z^2\right)\right) -$$
$$i^{-m} 2^{-m-\nu} z^{n+1}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\Big((-1)^m e^{2 i e k - i e m}\,\Gamma(n+1, (i d m - 2 i d k) z)\,((i d m - 2 i d k) z)^{-n-1} +$$
$$e^{i e m - 2 i e k}\,((2 i d k - i d m) z)^{-n-1}\,\Gamma(n+1, (2 i d k - i d m) z)\Big) -$$
$$2^{-m-\nu-1} i^{-m-\nu}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\Bigg((-1)^\nu e^{-\frac{i d^2 (2k-m)^2}{4 c (2s-\nu)} - i e (2k-m)}$$
$$\left(\sum_{j=0}^{n} 2^{j-n}(i d (2k-m))^{n-j}(2 i c (2s-\nu) z - i d (2k-m))^{j+1}\left(\frac{i (2 i c (2s-\nu) z - i d (2k-m))^2}{c (2s-\nu)}\right)^{\frac{1}{2}(-j-1)}\right.$$
$$\left.\binom{n}{j}\Gamma\!\left(\frac{j+1}{2}, \frac{i (2 i c (2s-\nu) z - i d (2k-m))^2}{4 c (2s-\nu)}\right)\right)(i c (2s-\nu))^{-n-1} + (-1)^{m+\nu} e^{-\frac{i d^2 (m-2k)^2}{4 c (2s-\nu)} - i e (m-2k)}$$
$$\left(\sum_{j=0}^{n} 2^{j-n}(i d (m-2k))^{n-j}(2 i c (2s-\nu) z - i d (m-2k))^{j+1}\left(\frac{i (2 i c (2s-\nu) z - i d (m-2k))^2}{c (2s-\nu)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\right.$$
$$\left.\Gamma\!\left(\frac{j+1}{2}, \frac{i (2 i c (2s-\nu) z - i d (m-2k))^2}{4 c (2s-\nu)}\right)\right)(i c (2s-\nu))^{-n-1} + e^{-\frac{i d^2 (2k-m)^2}{4 c (\nu-2s)} - i e (2k-m)}\,(i c (\nu-2s))^{-n-1}$$
$$\sum_{j=0}^{n} 2^{j-n}(i d (2k-m))^{n-j}(2 i c (\nu-2s) z - i d (2k-m))^{j+1}\left(\frac{i (2 i c (\nu-2s) z - i d (2k-m))^2}{c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)}$$
$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2}, \frac{i (2 i c (\nu-2s) z - i d (2k-m))^2}{4 c (\nu-2s)}\right) + (-1)^m e^{-\frac{i d^2 (m-2k)^2}{4 c (\nu-2s)} - i e (m-2k)}\,(i c (\nu-2s))^{-n-1}$$
$$\sum_{j=0}^{n} 2^{j-n}(i d (m-2k))^{n-j}(2 i c (\nu-2s) z - i d (m-2k))^{j+1}\left(\frac{i (2 i c (\nu-2s) z - i d (m-2k))^2}{c (\nu-2s)}\right)^{\frac{1}{2}(-j-1)}$$
$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2}, \frac{i (2 i c (\nu-2s) z - i d (m-2k))^2}{4 c (\nu-2s)}\right)\Bigg) /;\ n \in \mathbb{N} \land m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1212.01

$$\int z^n \sin^m(d z + e) \sin^\nu\left(c \sqrt{z}\right) dz = \frac{(-1)^m 2^{-m-\nu} z^{n+1} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - m \bmod 2)(1 - \nu \bmod 2)}{n+1} + \frac{1}{d}\left(i^{m+1} 2^{-m-\nu} z^n \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)\right.$$

$$\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \frac{1}{2k-m} \left((-1)^k e^{2iek+iem} \binom{m}{k} \left(e^{im\pi - 4iek} (-i d (m-2k) z)^{-n} \Gamma(n+1, -i d (m-2k) z) - \right.\right.$$

$$\left.\left.\left. e^{-2iem} (-i d (2k-m) z)^{-n} \Gamma(n+1, -i d (2k-m) z)\right)\right)\right) - (-1)^m i^{-\nu} 2^{-m-\nu+1} z^{n+1}$$

$$\binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^\nu \Gamma\left(2(n+1), (i c \nu - 2 i c k) \sqrt{z}\right) \left((i c \nu - 2 i c k) \sqrt{z}\right)^{-2(n+1)} + \right.$$

$$\left.\left((2 i c k - i c \nu) \sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (2 i c k - i c \nu) \sqrt{z}\right)\right) + 2^{-m-2n-\nu-1} i^{-m-\nu} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s$$

$$\binom{\nu}{s} \left((-1)^\nu e^{\frac{i c^2 (\nu - 2s)^2}{4 d (2k-m)} - i e (2k-m)} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c (\nu - 2s))^{-h-j+2n} \left(-2 i d \sqrt{z} (2k-m) - i c (\nu - 2s)\right)^{h+j}\right.\right.$$

$$\left(-\frac{i\left(-2 i d \sqrt{z} (2k-m) - i c (\nu - 2s)\right)^2}{d (2k-m)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(-i c (\nu - 2s) \left(-2 i d \sqrt{z} (2k-m) - \right.\right.$$

$$\left. i c (\nu - 2s)\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(-2 i d \sqrt{z} (2k-m) - i c (\nu - 2s)\right)^2}{4 d (2k-m)}\right) -$$

$$2 i d (2k-m) \sqrt{-\frac{i\left(-2 i d \sqrt{z} (2k-m) - i c (\nu - 2s)\right)^2}{d (2k-m)}} \Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left. -\frac{i\left(-2 i d \sqrt{z} (2k-m) - i c (\nu - 2s)\right)^2}{4 d (2k-m)}\right)\right)\right) (-i d (2k-m))^{-2n-2} +$$

$$e^{\frac{i c^2 (v-2 s)^2}{4 d (2 k-m)} - i e (2 k-m)} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i c (v-2 s))^{-h-j+2 n} \left(i c (v-2 s) - 2 i d (2 k-m) \sqrt{z}\right)^{h+j} \right.$$

$$\left(-\frac{i \left(i c (v-2 s) - 2 i d (2 k-m) \sqrt{z}\right)^2}{d (2 k-m)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(i c (v-2 s) \right.$$

$$\left(i c (v-2 s) - 2 i d (2 k-m) \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(i c (v-2 s) - 2 i d (2 k-m) \sqrt{z}\right)^2}{4 d (2 k-m)}\right) -$$

$$2 i d (2 k-m) \sqrt{-\frac{i \left(i c (v-2 s) - 2 i d (2 k-m) \sqrt{z}\right)^2}{d (2 k-m)}} \, \Gamma\left(\frac{1}{2}(h+j+2), \right.$$

$$\left.\left.\left. -\frac{i \left(i c (v-2 s) - 2 i d (2 k-m) \sqrt{z}\right)^2}{4 d (2 k-m)}\right)\right)\right) (-i d (2 k-m))^{-2 n-2} + (-1)^{m+v} e^{\frac{i c^2 (v-2 s)^2}{4 d (m-2 k)} - i e (m-2 k)}$$

$$(-i d (m-2 k))^{-2 n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c (v-2 s))^{-h-j+2 n} \left(-2 i d \sqrt{z} (m-2 k) - i c (v-2 s)\right)^{h+j}$$

$$\left(-\frac{i \left(-2 i d \sqrt{z} (m-2 k) - i c (v-2 s)\right)^2}{d (m-2 k)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(-i c (v-2 s) \right.$$

$$\left(-2 i d \sqrt{z} (m-2 k) - i c (v-2 s)\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(-2 i d \sqrt{z} (m-2 k) - i c (v-2 s)\right)^2}{4 d (m-2 k)}\right) -$$

$$2 i d (m-2 k) \sqrt{-\frac{i \left(-2 i d \sqrt{z} (m-2 k) - i c (v-2 s)\right)^2}{d (m-2 k)}} \, \Gamma\left(\frac{1}{2}(h+j+2), \right.$$

$$\left.\left. -\frac{i \left(-2 i d \sqrt{z} (m-2 k) - i c (v-2 s)\right)^2}{4 d (m-2 k)}\right)\right) + (-1)^m e^{\frac{i c^2 (v-2 s)^2}{4 d (m-2 k)} - i e (m-2 k)}$$

$$(-i d (m-2 k))^{-2 n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i c (v-2 s))^{-h-j+2 n} \left(i c (v-2 s) - 2 i d (m-2 k) \sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,(m-2\,k)\sqrt{z}\right)^2}{d\,(m-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(i\,c\,(v-2\,s)$$

$$\left(i\,c\,(v-2\,s)-2\,i\,d\,(m-2\,k)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,(m-2\,k)\sqrt{z}\right)^2}{4\,d\,(m-2\,k)}\right)-$$

$$2\,i\,d\,(m-2\,k)\sqrt{-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,(m-2\,k)\sqrt{z}\right)^2}{d\,(m-2\,k)}}\;\Gamma\Bigg(\frac{1}{2}(h+j+2),$$

$$\left.\left.\left.-\frac{i\left(i\,c\,(v-2\,s)-2\,i\,d\,(m-2\,k)\sqrt{z}\right)^2}{4\,d\,(m-2\,k)}\right)\right)\right)\,/;\,n\in\mathbb{N}\wedge m\in\mathbb{N}^+\wedge v\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\sin^m(b\,z^r)\sin^v(c\,z^r)$

01.06.21.1213.01

$$\int z^{\alpha-1}\sin^m(b\,z^r)\sin^v(c\,z^r)\,dz = \frac{(-1)^m\,2^{-m-v}\,(1-m\bmod 2)\,(1-v\bmod 2)}{\alpha}\,z^\alpha\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}-\frac{i^{-m}\,2^{-m-v}\,z^\alpha}{r}\binom{v}{\frac{v}{2}}(1-v\bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left((-1)^m\,\Gamma\left(\frac{\alpha}{r},\,(i\,b\,m-2\,i\,b\,k)\,z^r\right)((i\,b\,m-2\,i\,b\,k)\,z^r)^{-\frac{\alpha}{r}}+((2\,i\,b\,k-i\,b\,m)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,(2\,i\,b\,k-i\,b\,m)\,z^r\right)\right)-$$

$$\frac{(-1)^m\,i^{-v}\,2^{-m-v}\,z^\alpha}{r}\binom{m}{\frac{m}{2}}(1-m\bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}$$

$$\left((-1)^v\,\Gamma\left(\frac{\alpha}{r},\,(i\,c\,v-2\,i\,c\,k)\,z^r\right)((i\,c\,v-2\,i\,c\,k)\,z^r)^{-\frac{\alpha}{r}}+((2\,i\,c\,k-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,(2\,i\,c\,k-i\,c\,v)\,z^r\right)\right)-\frac{i^{-m-v}\,2^{-m-v}\,z^\alpha}{r}$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left((-1)^{m+v}\,\Gamma\left(\frac{\alpha}{r},\,(-2\,b\,i\,k+i\,b\,m-2\,i\,c\,s+i\,c\,v)\,z^r\right)((-2\,b\,i\,k+i\,b\,m-2\,i\,c\,s+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}+\right.$$

$$(-1)^v\,((2\,i\,b\,k-i\,b\,m-2\,i\,c\,s+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,(2\,i\,b\,k-i\,b\,m-2\,i\,c\,s+i\,c\,v)\,z^r\right)+$$

$$(-1)^m\,((-2\,b\,i\,k+i\,b\,m+2\,i\,c\,s-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,(-2\,b\,i\,k+i\,b\,m+2\,i\,c\,s-i\,c\,v)\,z^r\right)+$$

$$\left.((2\,i\,b\,k-i\,b\,m+2\,i\,c\,s-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},\,(2\,i\,b\,k-i\,b\,m+2\,i\,c\,s-i\,c\,v)\,z^r\right)\right)\,/;\,m\in\mathbb{N}^+\wedge v\in\mathbb{N}^+$$

01.06.21.1214.01

$$\int z^n \sin^m(b z^2) \sin^\nu(c z^2)\, dz = -2^{-m-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)\, z^{n+1} \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k} \left(e^{-\frac{i m \pi}{2}} \Gamma\left(\frac{n+1}{2}, -i\, b\,(m-2k)\, z^2\right) \left(-i\, b\,(m-2k)\, z^2\right)^{\frac{1}{2}(-n-1)} + e^{\frac{i m \pi}{2}} \left(i\, b\,(m-2k)\, z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i\, b\,(m-2k)\, z^2\right)\right) - 2^{-m-\nu-1} \binom{m}{\frac{m}{2}} (1-m \bmod 2)\, z^{n+1} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{i \nu \pi}{2}} \Gamma\left(\frac{n+1}{2}, -i\, c\,(\nu-2s)\, z^2\right) \left(-i\, c\,(\nu-2s)\, z^2\right)^{\frac{1}{2}(-n-1)} + e^{\frac{i \nu \pi}{2}} \left(i\, c\,(\nu-2s)\, z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i\, c\,(\nu-2s)\, z^2\right)\right) - 2^{-m-\nu-1} z^{n+1} \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{i(m-\nu)\pi}{2}} \Gamma\left(\frac{n+1}{2}, (i\, c\,(\nu-2s) - i\, b\,(m-2k))\, z^2\right) \left((i\, c\,(\nu-2s) - i\, b\,(m-2k))\, z^2\right)^{\frac{1}{2}(-n-1)} + e^{\frac{1}{2} i (m+\nu)\pi} \left((b\, i\,(m-2k) + c\, i\,(\nu-2s))\, z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (b\, i\,(m-2k) + c\, i\,(\nu-2s))\, z^2\right) + e^{-\frac{i(m+\nu)\pi}{2}} \left((-i\, b\,(m-2k) - i\, c\,(\nu-2s))\, z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (-i\, b\,(m-2k) - i\, c\,(\nu-2s))\, z^2\right) + e^{\frac{1}{2} i (m-\nu)\pi} \left((i\, b\,(m-2k) - i\, c\,(\nu-2s))\, z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (i\, b\,(m-2k) - i\, c\,(\nu-2s))\, z^2\right)\right) + \frac{2^{-m-\nu} z^{n+1} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1-m \bmod 2)(1-\nu \bmod 2)}{n+1} \;/;\; n \in \mathbb{N} \land m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1215.01

$$\int z^n \sin^m\left(\sqrt{z}\, b+e\right) \sin^\nu\left(c \sqrt{z}\right) dz = (-1)^n 2^{-m-\nu+1} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)\, b^{-2(n+1)} \sum_{k=0}^{\left\lfloor \frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k} (m-2k)^{-2(n+1)}$$
$$\left(e^{i e (m-2k)-\frac{i m \pi}{2}}\, \Gamma\left(2(n+1), -i b (m-2k) \sqrt{z}\right) + e^{\frac{i m \pi}{2}-i e (m-2k)}\, \Gamma\left(2(n+1), i b (m-2k)\sqrt{z}\right)\right) +$$
$$\frac{2^{-m-\nu} z^{n+1} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1-m \bmod 2)(1-\nu \bmod 2)}{n+1} + (-1)^n 2^{-m-\nu+1} c^{-2(n+1)} \binom{m}{\frac{m}{2}} (1-m \bmod 2)$$
$$\sum_{s=0}^{\left\lfloor \frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} (\nu-2s)^{-2(n+1)} \left(e^{-\frac{i \nu \pi}{2}}\, \Gamma\left(2(n+1), -i c (\nu-2s)\sqrt{z}\right) + e^{\frac{i \nu \pi}{2}}\, \Gamma\left(2(n+1), i c (\nu-2s)\sqrt{z}\right)\right) -$$
$$2^{-m-\nu+1} z^{n+1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{i e (m-2k)-\frac{1}{2} i (m-\nu)\pi}\, \Gamma\left(2(n+1), (i c (\nu-2s) - i b (m-2k))\sqrt{z}\right)\right.$$
$$\left((i c (\nu-2s) - i b (m-2k))\sqrt{z}\right)^{-2(n+1)} + e^{\frac{1}{2} i (m+\nu)\pi - i e (m-2k)} \left((b i (m-2k) + c i (\nu-2s))\sqrt{z}\right)^{-2(n+1)}$$
$$\Gamma\left(2(n+1), (b i (m-2k) + c i (\nu-2s))\sqrt{z}\right) + e^{i e (m-2k)-\frac{1}{2} i (m+\nu)\pi} \left((-i b (m-2k) - i c (\nu-2s))\sqrt{z}\right)^{-2(n+1)}$$
$$\Gamma\left(2(n+1), (-i b (m-2k) - i c (\nu-2s))\sqrt{z}\right) + e^{\frac{1}{2} i (m-\nu)\pi - i e (m-2k)} \left((i b (m-2k) - i c (\nu-2s))\sqrt{z}\right)^{-2(n+1)}$$
$$\left.\Gamma\left(2(n+1), (i b (m-2k) - i c (\nu-2s))\sqrt{z}\right)\right) /; n \in \mathbb{N} \land m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

Involving $z^n \sin^m(d\, z) \sin^\nu\left(c\, z^r + g\right)$

01.06.21.1216.01

$$\int z^n \sin^m(d z) \sin^\nu\left(c z^2 + g\right) dz =$$
$$-2^{-m-\nu-1} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \left(\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{i g (\nu-2k)-\frac{i \pi \nu}{2}}\, \Gamma\left(\frac{n+1}{2}, -i c (\nu-2k) z^2\right) \left(-i c (\nu-2k) z^2\right)^{\frac{1}{2}(-n-1)} +\right.\right.$$
$$\left.\left. e^{\frac{i \pi \nu}{2}-i g (\nu-2k)} \left(i c (\nu-2k) z^2\right)^{\frac{1}{2}(-n-1)}\, \Gamma\left(\frac{n+1}{2}, i c (\nu-2k) z^2\right)\right)\right) z^{n+1} +$$
$$\frac{2^{-m-\nu} z^{n+1} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1-m \bmod 2)(1-\nu \bmod 2)}{n+1} + (-1)^n 2^{-m-\nu} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k}$$
$$\left(e^{\frac{i m \pi}{2}}\, \Gamma(n+1, i d (m-2k) z) (-i d (m-2k))^{-n-1} + e^{-\frac{1}{2} i m \pi} (i d (m-2k))^{-n-1}\, \Gamma(n+1, -i d (m-2k) z)\right) -$$
$$2^{-m-\nu-1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{\frac{d^2 i (m-2k)^2}{4 c (\nu-2s)} + \frac{i \pi \nu}{2} - i g (\nu-2s) + \frac{i m \pi}{2}} \right.$$

$$\left(\sum_{j=0}^{n} 2^{j-n} (i\, d\,(m-2k))^{n-j} (-i\, d\,(m-2k) - 2\, i\, c\,(v-2s)\, z)^{j+1} \left(-\frac{i\,(-i\, d\,(m-2k) - 2\, i\, c\,(v-2s)\, z)^2}{c\,(v-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\!\left(\frac{j+1}{2}, -\frac{i\,(-i\, d\,(m-2k) - 2\, i\, c\,(v-2s)\, z)^2}{4\, c\,(v-2s)}\right)\right) (-i\, c\,(v-2s))^{-n-1} +$$

$$e^{\frac{d^2\, i\,(m-2k)^2}{4\, c\,(v-2s)} + \frac{i\,\pi\, v}{2} - i\, g\,(v-2s) - \frac{i\, m\,\pi}{2}} \left(\sum_{j=0}^{n} 2^{j-n} (-i\, d\,(m-2k))^{n-j} (i\, d\,(m-2k) - 2\, i\, c\,(v-2s)\, z)^{j+1} \left(-\frac{i\,(i\, d\,(m-2k) - 2\, i\, c\,(v-2s)\, z)^2}{c\,(v-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\!\left(\frac{j+1}{2}, -\frac{i\,(i\, d\,(m-2k) - 2\, i\, c\,(v-2s)\, z)^2}{4\, c\,(v-2s)}\right)\right)$$

$$(-i\, c\,(v-2s))^{-n-1} + e^{-\frac{i\, d^2\,(m-2k)^2}{4\, c\,(v-2s)} + g\, i\,(v-2s) - \frac{i\,\pi\, v}{2} + \frac{i\, m\,\pi}{2}} (i\, c\,(v-2s))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i\, d\,(m-2k))^{n-j} (2\, i\, c\,(v-2s)\, z - i\, d\,(m-2k))^{j+1} \left(\frac{i\,(2\, i\, c\,(v-2s)\, z - i\, d\,(m-2k))^2}{c\,(v-2s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\!\left(\frac{j+1}{2}, \frac{i\,(2\, i\, c\,(v-2s)\, z - i\, d\,(m-2k))^2}{4\, c\,(v-2s)}\right) + e^{-\frac{i\, d^2\,(m-2k)^2}{4\, c\,(v-2s)} + g\, i\,(v-2s) - \frac{i\,\pi\, v}{2} - \frac{i\, m\,\pi}{2}} (i\, c\,(v-2s))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (-i\, d\,(m-2k))^{n-j} (d\, i\,(m-2k) + 2\, c\, i\,(v-2s)\, z)^{j+1} \left(\frac{i\,(d\, i\,(m-2k) + 2\, c\, i\,(v-2s)\, z)^2}{c\,(v-2s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\binom{n}{j} \Gamma\!\left(\frac{j+1}{2}, \frac{i\,(d\, i\,(m-2k) + 2\, c\, i\,(v-2s)\, z)^2}{4\, c\,(v-2s)}\right)\right) /;\, n \in \mathbb{N} \land m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

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$$\int z^n \sin^m(d\, z) \sin^v\!\left(\sqrt{z}\, c + g\right) dz =$$

$$\frac{2^{-m-v} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2)}{n+1} + (-1)^n 2^{-m-v} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k}$$

$$\left(e^{\frac{i\, m\,\pi}{2}} \Gamma(n+1, i\, d\,(m-2k)\, z) (-i\, d\,(m-2k))^{-n-1} + e^{-\frac{1}{2} i\, m\,\pi} (i\, d\,(m-2k))^{-n-1} \Gamma(n+1, -i\, d\,(m-2k)\, z)\right) +$$

$$2^{-m-v+1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{k+n} (c\,(v-2k))^{-2(n+1)} \binom{v}{k} \left(e^{i\, g\,(v-2k) - \frac{i\,\pi\, v}{2}} \Gamma\!\left(2(n+1), -i\, c\,(v-2k) \sqrt{z}\right) +\right.$$

$$\left. e^{\frac{i\,\pi\, v}{2} - i\, g\,(v-2k)} \Gamma\!\left(2(n+1), i\, c\,(v-2k) \sqrt{z}\right)\right) + 2^{-m-2n-v-1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s}$$

$$\left(e^{\frac{c^2 i (v-2s)^2}{4d(m-2k)} - i g (v-2s) + \frac{i\pi v}{2} + \frac{i m\pi}{2}} \left(\sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c (v-2s))^{-h-j+2n} \left(-2 i d \sqrt{z}\, (m-2k) - i c (v-2s)\right)^{h+j}\right.\right.$$

$$\left(-\frac{i\left(-2 i d \sqrt{z}\, (m-2k) - i c (v-2s)\right)^2}{d(m-2k)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j} \left(-i c (v-2s) \left(-2 i d \sqrt{z}\, (m-2k) -\right.\right.$$

$$\left. i c (v-2s)\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(-2 i d \sqrt{z}\, (m-2k) - i c (v-2s)\right)^2}{4d(m-2k)}\right) -$$

$$2 i d (m-2k) \sqrt{-\frac{i\left(-2 i d \sqrt{z}\, (m-2k) - i c (v-2s)\right)^2}{d(m-2k)}}\; \Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(-2 i d \sqrt{z}\, (m-2k) - i c (v-2s)\right)^2}{4d(m-2k)}\right)\right)\right) (-i d (m-2k))^{-2(n+1)} +$$

$$e^{\frac{c^2 i (v-2s)^2}{4d(m-2k)} + g i (v-2s) - \frac{i\pi v}{2} + \frac{i m\pi}{2}} \left(\sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h} 4^j (i c (v-2s))^{-h-j+2n} \left(i c (v-2s) - 2 i d (m-2k) \sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{i\left(i c (v-2s) - 2 i d (m-2k) \sqrt{z}\right)^2}{d(m-2k)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j} \left(i c (v-2s)\right.$$

$$\left(i c (v-2s) - 2 i d (m-2k) \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(i c (v-2s) - 2 i d (m-2k) \sqrt{z}\right)^2}{4d(m-2k)}\right) -$$

$$2 i d (m-2k) \sqrt{-\frac{i\left(i c (v-2s) - 2 i d (m-2k) \sqrt{z}\right)^2}{d(m-2k)}}\; \Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(i c (v-2s) - 2 i d (m-2k) \sqrt{z}\right)^2}{4d(m-2k)}\right)\right)\right) (-i d (m-2k))^{-2(n+1)} +$$

$$e^{-\frac{i c^2 (v-2s)^2}{4d(m-2k)} - i g (v-2s) + \frac{i\pi v}{2} - \frac{i m\pi}{2}} (i d (m-2k))^{-2(n+1)} \sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c (v-2s))^{-h-j+2n}$$

$$\left(2\,i\,d\,(m-2\,k)\,\sqrt{z}\,-i\,c\,(v-2\,s)\right)^{h+j}\left(\frac{i\left(2\,i\,d\,(m-2\,k)\,\sqrt{z}\,-i\,c\,(v-2\,s)\right)^2}{d\,(m-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\,i\,d\,(m-2\,k)\sqrt{\frac{i\left(2\,i\,d\,(m-2\,k)\,\sqrt{z}\,-i\,c\,(v-2\,s)\right)^2}{d\,(m-2\,k)}}\;\Gamma\left(\frac{1}{2}\,(h+j+2),\right.\right.$$

$$\left.\frac{i\left(2\,i\,d\,(m-2\,k)\,\sqrt{z}\,-i\,c\,(v-2\,s)\right)^2}{4\,d\,(m-2\,k)}\right)-i\,c\,(v-2\,s)\left(2\,i\,d\,(m-2\,k)\,\sqrt{z}\,-i\,c\,(v-2\,s)\right)$$

$$\left.\left.\Gamma\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(2\,i\,d\,(m-2\,k)\,\sqrt{z}\,-i\,c\,(v-2\,s)\right)^2}{4\,d\,(m-2\,k)}\right)\right)\right)+e^{-\frac{i\,c^2\,(v-2\,s)^2}{4\,d\,(m-2\,k)}+g\,i\,(v-2\,s)-\frac{i\,\pi\,v}{2}-\frac{i\,m\,\pi}{2}}$$

$$(i\,d\,(m-2\,k))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s))^{-h-j+2\,n}\left(2\,d\,i\,\sqrt{z}\,\;(m-2\,k)+c\,i\,(v-2\,s)\right)^{h+j}$$

$$\left(\frac{i\left(2\,d\,i\,\sqrt{z}\,\;(m-2\,k)+c\,i\,(v-2\,s)\right)^2}{d\,(m-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(c\,i\,(v-2\,s)\right.$$

$$\left(2\,d\,i\,\sqrt{z}\,\;(m-2\,k)+c\,i\,(v-2\,s)\right)\Gamma\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(2\,d\,i\,\sqrt{z}\,\;(m-2\,k)+c\,i\,(v-2\,s)\right)^2}{4\,d\,(m-2\,k)}\right)+$$

$$2\,d\,i\,(m-2\,k)\sqrt{\frac{i\left(2\,d\,i\,\sqrt{z}\,\;(m-2\,k)+c\,i\,(v-2\,s)\right)^2}{d\,(m-2\,k)}}\;\Gamma\left(\frac{1}{2}\,(h+j+2),\right.$$

$$\left.\left.\left.\frac{i\left(2\,d\,i\,\sqrt{z}\,\;(m-2\,k)+c\,i\,(v-2\,s)\right)^2}{4\,d\,(m-2\,k)}\right)\right)\right)\;/;\;n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $z^n\sin^m(d\,z+e)\sin^v\left(c\,z^r+g\right)$

01.06.21.1218.01

$$\int z^n\sin^m(e+d\,z)\sin^v\left(c\,z^2+g\right)dz=$$

$$-2^{-m-v-1}\binom{m}{\frac{m}{2}}(1-m\bmod 2)\left(\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\left(e^{i\,g\,(v-2\,k)-\frac{i\,\pi\,v}{2}}\,\Gamma\left(\frac{n+1}{2},\,-i\,c\,(v-2\,k)\,z^2\right)\left(-i\,c\,(v-2\,k)\,z^2\right)^{\frac{1}{2}(-n-1)}+\right.\right.$$

$$e^{\frac{i\pi v}{2}-i g (v-2k)} \left(i c (v-2k) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i c (v-2k) z^2\right)\Bigg)\Bigg) z^{n+1} +$$

$$\frac{2^{-m-v} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2)}{n+1} + (-1)^n 2^{-m-v} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \Bigg(e^{\frac{i m \pi}{2} - i e (m-2k)} \Gamma(n+1, i d (m-2k) z) (-i d (m-2k))^{-n-1} +$$

$$e^{i e (m-2k) - \frac{i m \pi}{2}} (i d (m-2k))^{-n-1} \Gamma(n+1, -i d (m-2k) z)\Bigg) -$$

$$2^{-m-v-1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Bigg(e^{\frac{d^2 i (m-2k)^2}{4 c (v-2s)} - i e (m-2k) + \frac{i\pi v}{2} - i g (v-2s) + \frac{i m \pi}{2}}$$

$$\Bigg(\sum_{j=0}^{n} 2^{j-n} (i d (m-2k))^{n-j} (-i d (m-2k) - 2 i c (v-2s) z)^{j+1} \left(-\frac{i (-i d (m-2k) - 2 i c (v-2s) z)^2}{c (v-2s)} \right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d (m-2k) - 2 i c (v-2s) z)^2}{4 c (v-2s)} \right)\Bigg) (-i c (v-2s))^{-n-1} +$$

$$e^{\frac{d^2 i (m-2k)^2}{4 c (v-2s)} + e i (m-2k) + \frac{i\pi v}{2} - i g (v-2s) - \frac{i m \pi}{2}} \Bigg(\sum_{j=0}^{n} 2^{j-n} (-i d (m-2k))^{n-j} (i d (m-2k) - 2 i c (v-2s) z)^{j+1}$$

$$\left(-\frac{i (i d (m-2k) - 2 i c (v-2s) z)^2}{c (v-2s)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (i d (m-2k) - 2 i c (v-2s) z)^2}{4 c (v-2s)} \right)\Bigg)$$

$$(-i c (v-2s))^{-n-1} + e^{-\frac{i d^2 (m-2k)^2}{4 c (v-2s)} - i e (m-2k) + g i (v-2s) - \frac{i\pi v}{2} + \frac{i m \pi}{2}} (i c (v-2s))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i d (m-2k))^{n-j} (2 i c (v-2s) z - i d (m-2k))^{j+1} \left(\frac{i (2 i c (v-2s) z - i d (m-2k))^2}{c (v-2s)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2}, \frac{i (2 i c (v-2s) z - i d (m-2k))^2}{4 c (v-2s)} \right) + e^{-\frac{i d^2 (m-2k)^2}{4 c (v-2s)} + e i (m-2k) + g i (v-2s) - \frac{i\pi v}{2} - \frac{i m \pi}{2}} (i c (v-2s))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (-i d (m-2k))^{n-j} (d i (m-2k) + 2 c i (v-2s) z)^{j+1} \left(\frac{i (d i (m-2k) + 2 c i (v-2s) z)^2}{c (v-2s)} \right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (d i (m-2k) + 2 c i (v-2s) z)^2}{4 c (v-2s)} \right)\Bigg) /; n \in \mathbb{N} \land m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

01.06.21.1219.01

$$\int z^n \sin^m(d\,z+e)\sin^\nu\left(\sqrt{z}\;c+g\right)dz = \frac{2^{-m-\nu} z^{n+1}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)}{n+1} +$$

$$(-1)^n 2^{-m-\nu}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(e^{\frac{i m\pi}{2}-i e (m-2k)}\,\Gamma(n+1,\, i\,d\,(m-2k)\,z)\,(-i\,d\,(m-2k))^{-n-1} +\right.$$

$$\left. e^{i e (m-2k)-\frac{i m\pi}{2}}(i\,d\,(m-2k))^{-n-1}\,\Gamma(n+1,\,-i\,d\,(m-2k)\,z)\right) + 2^{-m-\nu+1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{k+n}\binom{\nu}{k}$$

$$(c\,(\nu-2k))^{-2(n+1)}\left(e^{i g (\nu-2k)-\frac{i\pi\nu}{2}}\,\Gamma\left(2\,(n+1),\,-i\,c\,(\nu-2k)\sqrt{z}\right) + e^{\frac{i\pi\nu}{2}-i g (\nu-2k)}\,\Gamma\left(2\,(n+1),\,i\,c\,(\nu-2k)\sqrt{z}\right)\right) +$$

$$2^{-m-2n-\nu-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{\frac{c^2 i (\nu-2s)^2}{4 d (m-2k)}-i g (\nu-2s)-i e (m-2k)+\frac{i\pi\nu}{2}+\frac{i m\pi}{2}}\right.$$

$$\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(\nu-2s))^{-h-j+2n}\left(-2\,i\,d\sqrt{z}\,(m-2k)-i\,c\,(\nu-2s)\right)^{h+j}\right.$$

$$\left(-\frac{i\left(-2\,i\,d\sqrt{z}\,(m-2k)-i\,c\,(\nu-2s)\right)^2}{d\,(m-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(-i\,c\,(\nu-2s)\left(-2\,i\,d\sqrt{z}\,(m-2k)-\right.\right.$$

$$\left.i\,c\,(\nu-2s)\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-2\,i\,d\sqrt{z}\,(m-2k)-i\,c\,(\nu-2s)\right)^2}{4\,d\,(m-2k)}\right) -$$

$$2\,i\,d\,(m-2k)\sqrt{-\frac{i\left(-2\,i\,d\sqrt{z}\,(m-2k)-i\,c\,(\nu-2s)\right)^2}{d\,(m-2k)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(-2\,i\,d\sqrt{z}\,(m-2k)-i\,c\,(\nu-2s)\right)^2}{4\,d\,(m-2k)}\right)\right)\right)(-i\,d\,(m-2k))^{-2(n+1)} +$$

$$e^{\frac{c^2 i (\nu-2s)^2}{4 d (m-2k)}+g\,i\,(\nu-2s)-i e (m-2k)-\frac{i\pi\nu}{2}+\frac{i m\pi}{2}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(\nu-2s))^{-h-j+2n}\left(i\,c\,(\nu-2s)-2\,i\,d\right.\right.$$

$$\left((m-2k)\sqrt{z}\right)^{h+j}\left(-\frac{i\left(i\,c\,(v-2s)-2\,i\,d\,(m-2k)\sqrt{z}\right)^2}{d\,(m-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(i\,c\,(v-2s)$$

$$\left(i\,c\,(v-2s)-2\,i\,d\,(m-2k)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(i\,c\,(v-2s)-2\,i\,d\,(m-2k)\sqrt{z}\right)^2}{4\,d\,(m-2k)}\right)-$$

$$2\,i\,d\,(m-2k)\sqrt{-\frac{i\left(i\,c\,(v-2s)-2\,i\,d\,(m-2k)\sqrt{z}\right)^2}{d\,(m-2k)}}\;\Gamma\Bigg(\frac{1}{2}(h+j+2),$$

$$\left.\left.\left.-\frac{i\left(i\,c\,(v-2s)-2\,i\,d\,(m-2k)\sqrt{z}\right)^2}{4\,d\,(m-2k)}\right)\right)\right)(-i\,d\,(m-2k))^{-2(n+1)}+$$

$$e^{-\frac{i\,c^2(v-2s)^2}{4\,d\,(m-2k)}-i\,g\,(v-2s)+e\,i\,(m-2k)+\frac{i\,\pi\,v}{2}-\frac{i\,m\,\pi}{2}}\,(i\,d\,(m-2k))^{-2(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2s))^{-h-j+2n}$$

$$\left(2\,i\,d\,(m-2k)\sqrt{z}-i\,c\,(v-2s)\right)^{h+j}\left(\frac{i\left(2\,i\,d\,(m-2k)\sqrt{z}-i\,c\,(v-2s)\right)^2}{d\,(m-2k)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg(2\,i\,d\,(m-2k)\sqrt{\frac{i\left(2\,i\,d\,(m-2k)\sqrt{z}-i\,c\,(v-2s)\right)^2}{d\,(m-2k)}}\;\Gamma\Bigg(\frac{1}{2}(h+j+2),$$

$$\left.\frac{i\left(2\,i\,d\,(m-2k)\sqrt{z}-i\,c\,(v-2s)\right)^2}{4\,d\,(m-2k)}\right)-i\,c\,(v-2s)\left(2\,i\,d\,(m-2k)\sqrt{z}-i\,c\,(v-2s)\right)$$

$$\left.\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(2\,i\,d\,(m-2k)\sqrt{z}-i\,c\,(v-2s)\right)^2}{4\,d\,(m-2k)}\right)\right)+e^{-\frac{i\,c^2(v-2s)^2}{4\,d\,(m-2k)}+g\,i\,(v-2s)+e\,i\,(m-2k)-\frac{i\,\pi\,v}{2}-\frac{i\,m\,\pi}{2}}$$

$$(i\,d\,(m-2k))^{-2(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2s))^{-h-j+2n}\left(2\,d\,i\sqrt{z}\,(m-2k)+c\,i\,(v-2s)\right)^{h+j}$$

$$\left(\frac{i\left(2\,d\,i\sqrt{z}\,(m-2k)+c\,i\,(v-2s)\right)^2}{d\,(m-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(c\,i\,(v-2s)$$

$$\left(2\,d\,i\sqrt{z}\,(m-2k)+c\,i\,(v-2s)\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,\frac{i\left(2\,d\,i\sqrt{z}\,(m-2k)+c\,i\,(v-2s)\right)^2}{4\,d\,(m-2k)}\right)+$$

$$2\,d\,i\,(m-2k)\sqrt{\frac{i\left(2\,d\,i\sqrt{z}\,(m-2k)+c\,i\,(v-2s)\right)^2}{d\,(m-2k)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.\frac{i\left(2\,d\,i\sqrt{z}\,(m-2k)+c\,i\,(v-2s)\right)^2}{4\,d\,(m-2k)}\right)\right)\right)\;/;\;n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\sin^m(b\,z^r)\sin^v(c\,z^r+g)$

01.06.21.1220.01

$$\int z^{\alpha-1}\sin^m(b\,z^r)\sin^v(c\,z^r+g)\,dz ==$$

$$\frac{(-1)^m\,2^{-m-v}\,z^\alpha\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m\bmod 2)(1-v\bmod 2)}{\alpha}-\frac{1}{r}\left(i^{-m}\,2^{-m-v}\,z^\alpha\binom{v}{\frac{v}{2}}(1-v\bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\right.$$

$$\left.\left((-1)^m\,\Gamma\!\left(\frac{\alpha}{r},\,(i\,b\,m-2\,i\,b\,k)\,z^r\right)((i\,b\,m-2\,i\,b\,k)\,z^r)^{-\frac{\alpha}{r}}+((2\,i\,b\,k-i\,b\,m)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(2\,i\,b\,k-i\,b\,m)\,z^r\right)\right)\right)-$$

$$\frac{1}{r}\left((-1)^m\,i^{-v}\,2^{-m-v}\,z^\alpha\binom{m}{\frac{m}{2}}(1-m\bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\left((-1)^v\,e^{2\,i\,g\,k-i\,g\,v}\,\Gamma\!\left(\frac{\alpha}{r},\,(i\,c\,v-2\,i\,c\,k)\,z^r\right)((i\,c\,v-2\,i\,c\,k)\,z^r)^{-\frac{\alpha}{r}}+\right.\right.$$

$$\left.\left.e^{i\,g\,v-2\,i\,g\,k}\,((2\,i\,c\,k-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(2\,i\,c\,k-i\,c\,v)\,z^r\right)\right)\right)-$$

$$\frac{1}{r}\left((2\,i)^{-m-v}\,z^\alpha\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left((-1)^{m+v}\,e^{2\,i\,g\,s-i\,g\,v}\,\Gamma\!\left(\frac{\alpha}{r},\,(-2\,b\,i\,k+i\,b\,m-2\,i\,c\,s+i\,c\,v)\,z^r\right)\right.\right.$$

$$((-2\,b\,i\,k+i\,b\,m-2\,i\,c\,s+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}+(-1)^v\,e^{2\,i\,g\,s-i\,g\,v}\,((2\,i\,b\,k-i\,b\,m-2\,i\,c\,s+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}$$

$$\Gamma\!\left(\frac{\alpha}{r},\,(2\,i\,b\,k-i\,b\,m-2\,i\,c\,s+i\,c\,v)\,z^r\right)+(-1)^m\,e^{i\,g\,v-2\,i\,g\,s}\,((-2\,b\,i\,k+i\,b\,m+2\,i\,c\,s-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}$$

$$\Gamma\!\left(\frac{\alpha}{r},\,(-2\,b\,i\,k+i\,b\,m+2\,i\,c\,s-i\,c\,v)\,z^r\right)+e^{i\,g\,v-2\,i\,g\,s}\,((2\,i\,b\,k-i\,b\,m+2\,i\,c\,s-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}$$

$$\left.\left.\Gamma\!\left(\frac{\alpha}{r},\,(2\,i\,b\,k-i\,b\,m+2\,i\,c\,s-i\,c\,v)\,z^r\right)\right)\right)\;/;\;m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

01.06.21.1221.01

$$\int z^n \sin^m\left(b z^2\right) \sin^v\left(c z^2 + g\right) dz ==$$

$$-2^{-m-v-1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)\, z^{n+1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left(e^{-\frac{i m \pi}{2}} \Gamma\left(\frac{n+1}{2}, -i\, b\, (m-2k)\, z^2\right) \left(-i\, b\, (m-2k)\, z^2\right)^{\frac{1}{2}(-n-1)} + e^{\frac{i m \pi}{2}} \left(i\, b\, (m-2k)\, z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i\, b\, (m-2k)\, z^2\right)\right) -$$

$$2^{-m-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)\, z^{n+1} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(e^{i g (v-2s) - \frac{i v \pi}{2}} \Gamma\left(\frac{n+1}{2}, -i\, c\, (v-2s)\, z^2\right) \left(-i\, c\, (v-2s)\, z^2\right)^{\frac{1}{2}(-n-1)} + e^{\frac{i v \pi}{2} - i g (v-2s)} \left(i\, c\, (v-2s)\, z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i\, c\, (v-2s)\, z^2\right)\right) - 2^{-m-v-1} z^{n+1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k}$$

$$\sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(e^{-\frac{1}{2} i \pi (m-v) - i g (v-2s)} \Gamma\left(\frac{n+1}{2}, (i\, c\, (v-2s) - i\, b\, (m-2k))\, z^2\right) \left((i\, c\, (v-2s) - i\, b\, (m-2k))\, z^2\right)^{\frac{1}{2}(-n-1)} + \right.$$

$$e^{\frac{1}{2} i (m+v) \pi - i g (v-2s)} \left((b\, i\, (m-2k) + c\, i\, (v-2s))\, z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (b\, i\, (m-2k) + c\, i\, (v-2s))\, z^2\right) +$$

$$e^{i g (v-2s) - \frac{1}{2} i (m+v) \pi} \left((-i\, b\, (m-2k) - i\, c\, (v-2s))\, z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (-i\, b\, (m-2k) - i\, c\, (v-2s))\, z^2\right) +$$

$$\left. e^{\frac{1}{2} i \pi (m-v) + g\, i\, (v-2s)} \left((i\, b\, (m-2k) - i\, c\, (v-2s))\, z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (i\, b\, (m-2k) - i\, c\, (v-2s))\, z^2\right)\right) +$$

$$\frac{2^{-m-v} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2)}{n+1} \;/;\; n \in \mathbb{N} \land m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

01.06.21.1222.01

$$\int z^n \sin^m\left(b\sqrt{z}\right)\sin^\nu\left(\sqrt{z}\,c+g\right)dz = (-1)^n\,2^{-m-\nu+1}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\,b^{-2(n+1)}$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}(m-2k)^{-2(n+1)}\left(e^{-\frac{i m\pi}{2}}\,\Gamma\left(2(n+1),\,-i\,b\,(m-2k)\sqrt{z}\right)+e^{\frac{i m\pi}{2}}\,\Gamma\left(2(n+1),\,i\,b\,(m-2k)\sqrt{z}\right)\right)+$$

$$\frac{2^{-m-\nu}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)}{n+1}+(-1)^n\,2^{-m-\nu+1}\,c^{-2(n+1)}\binom{m}{\frac{m}{2}}(1-m \bmod 2)$$

$$\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}(\nu-2s)^{-2(n+1)}\left(e^{i g(\nu-2s)-\frac{i\nu\pi}{2}}\,\Gamma\left(2(n+1),\,-i\,c\,(\nu-2s)\sqrt{z}\right)+e^{\frac{i\nu\pi}{2}-i g(\nu-2s)}\,\Gamma\left(2(n+1),\,i\,c\,(\nu-2s)\sqrt{z}\right)\right)-$$

$$2^{-m-\nu+1}\,z^{n+1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{-\frac{1}{2}i\pi(m-\nu)-i g(\nu-2s)}\,\Gamma\left(2(n+1),\,(i\,c\,(\nu-2s)-i\,b\,(m-2k))\sqrt{z}\right)\right.$$

$$\left((i\,c\,(\nu-2s)-i\,b\,(m-2k))\sqrt{z}\right)^{-2(n+1)}+e^{\frac{1}{2}i(m+\nu)\pi-i g(\nu-2s)}\left((b\,i\,(m-2k)+c\,i\,(\nu-2s))\sqrt{z}\right)^{-2(n+1)}$$

$$\Gamma\left(2(n+1),\,(b\,i\,(m-2k)+c\,i\,(\nu-2s))\sqrt{z}\right)+e^{i g(\nu-2s)-\frac{1}{2}i(m+\nu)\pi}\left((-i\,b\,(m-2k)-i\,c\,(\nu-2s))\sqrt{z}\right)^{-2(n+1)}$$

$$\Gamma\left(2(n+1),\,(-i\,b\,(m-2k)-i\,c\,(\nu-2s))\sqrt{z}\right)+e^{\frac{1}{2}i\pi(m-\nu)+g\,i\,(\nu-2s)}\left((i\,b\,(m-2k)-i\,c\,(\nu-2s))\sqrt{z}\right)^{-2(n+1)}$$

$$\left.\Gamma\left(2(n+1),\,(i\,b\,(m-2k)-i\,c\,(\nu-2s))\sqrt{z}\right)\right)\,/;\; n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge \nu\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\sin^m\left(b\,z^r+e\right)\sin^\nu\left(c\,z^r+g\right)$

01.06.21.1223.01

$$\int z^{\alpha-1}\sin^m(b z^r+e)\sin^\nu(c z^r+g)\,dz = \frac{(-1)^m 2^{-m-\nu}(1-m \bmod 2)(1-\nu \bmod 2)}{\alpha} z^\alpha \binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}} -$$

$$\frac{i^{-m} 2^{-m-\nu} z^\alpha}{r}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left((-1)^m e^{2ike-ime}\,\Gamma\left(\frac{\alpha}{r},(ibm-2ibk)z^r\right)((ibm-2ibk)z^r)^{-\frac{\alpha}{r}}+\right.$$

$$\left.e^{ime-2ike}((2ibk-ibm)z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},(2ibk-ibm)z^r\right)\right)-$$

$$\frac{(-1)^m i^{-\nu} 2^{-m-\nu} z^\alpha}{r}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left((-1)^\nu e^{2igk-ig\nu}\,\Gamma\left(\frac{\alpha}{r},(ic\nu-2ick)z^r\right)((ic\nu-2ick)z^r)^{-\frac{\alpha}{r}}+\right.$$

$$\left.e^{ig\nu-2igk}((2ick-ic\nu)z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},(2ick-ic\nu)z^r\right)\right)-$$

$$\frac{i^{-m-\nu} 2^{-m-\nu} z^\alpha}{r}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^{m+\nu} e^{2ike-ime+2igs-ig\nu}\,\Gamma\left(\frac{\alpha}{r},(-2bik+ibm-2ics+ic\nu)z^r\right)\right.$$

$$((-2bik+ibm-2ics+ic\nu)z^r)^{-\frac{\alpha}{r}}+(-1)^\nu e^{-2ike+ime+2igs-ig\nu}((2ibk-ibm-2ics+ic\nu)z^r)^{-\frac{\alpha}{r}}$$

$$\Gamma\left(\frac{\alpha}{r},(2ibk-ibm-2ics+ic\nu)z^r\right)+(-1)^m e^{2ike-ime-2igs+ig\nu}$$

$$((-2bik+ibm+2ics-ic\nu)z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},(-2bik+ibm+2ics-ic\nu)z^r\right)+e^{-2ike+ime-2igs+ig\nu}$$

$$\left.((2ibk-ibm+2ics-ic\nu)z^r)^{-\frac{\alpha}{r}}\,\Gamma\left(\frac{\alpha}{r},(2ibk-ibm+2ics-ic\nu)z^r\right)\right)\;/;\;m\in\mathbb{N}^+\land\nu\in\mathbb{N}^+$$

01.06.21.1224.01

$$\int z^n \sin^m(b z^2 + e) \sin^v(c z^2 + g)\, dz = -2^{-m-v-1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)\, z^{n+1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \Big(e^{i e (m-2k) - \frac{i m \pi}{2}} \Gamma\Big(\frac{n+1}{2}, -i b (m-2k) z^2\Big) \big(-i b (m-2k) z^2\big)^{\frac{1}{2}(-n-1)} + e^{\frac{i m \pi}{2} - i e (m-2k)} \big(i b (m-2k) z^2\big)^{\frac{1}{2}(-n-1)} \Gamma\Big(\frac{n+1}{2}, i b (m-2k) z^2\Big)\Big) - 2^{-m-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)\, z^{n+1} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Big(e^{i g (v-2s) - \frac{i v \pi}{2}} \Gamma\Big(\frac{n+1}{2}, -i c (v-2s) z^2\Big) \big(-i c (v-2s) z^2\big)^{\frac{1}{2}(-n-1)} + e^{\frac{i v \pi}{2} - i g (v-2s)} \big(i c (v-2s) z^2\big)^{\frac{1}{2}(-n-1)} \Gamma\Big(\frac{n+1}{2}, i c (v-2s) z^2\Big)\Big) - 2^{-m-v-1} z^{n+1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Big(e^{e i (m-2k) - i g (v-2s) - \frac{1}{2} i (m-v) \pi} \Gamma\Big(\frac{n+1}{2}, (i c (v-2s) - i b (m-2k)) z^2\Big) \big((i c (v-2s) - i b (m-2k)) z^2\big)^{\frac{1}{2}(-n-1)} + e^{-i e (m-2k) + \frac{1}{2} i \pi (m+v) - i g (v-2s)} \big((b i (m-2k) + c i (v-2s)) z^2\big)^{\frac{1}{2}(-n-1)} \Gamma\Big(\frac{n+1}{2}, (b i (m-2k) + c i (v-2s)) z^2\Big) + e^{e i (m-2k) + g i (v-2s) - \frac{1}{2} i (m+v) \pi} \big((-i b (m-2k) - i c (v-2s)) z^2\big)^{\frac{1}{2}(-n-1)} \Gamma\Big(\frac{n+1}{2}, (-i b (m-2k) - i c (v-2s)) z^2\Big) + e^{-i e (m-2k) + \frac{1}{2} i \pi (m-v) + g i (v-2s)} \big((i b (m-2k) - i c (v-2s)) z^2\big)^{\frac{1}{2}(-n-1)} \Gamma\Big(\frac{n+1}{2}, (i b (m-2k) - i c (v-2s)) z^2\Big)\Big) + \frac{2^{-m-v} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2)}{n+1} \;/;\; n \in \mathbb{N} \land m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

01.06.21.1225.01

$$\int z^n \sin^m\left(\sqrt{z}\, b+e\right) \sin^v\left(\sqrt{z}\, c+g\right) dz = (-1)^n\, 2^{-m-v+1} \binom{v}{\frac{v}{2}} (1-v \bmod 2)\, b^{-2(n+1)} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} (m-2k)^{-2(n+1)} \left(e^{i e (m-2k)-\frac{i m \pi}{2}}\, \Gamma\left(2(n+1), -i\, b\, (m-2k) \sqrt{z}\right) + e^{\frac{i m \pi}{2}-i e (m-2k)}\, \Gamma\left(2(n+1), i\, b\, (m-2k) \sqrt{z}\right)\right) + \frac{2^{-m-v} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1-m \bmod 2)(1-v \bmod 2)}{n+1} + (-1)^n\, 2^{-m-v+1} c^{-2(n+1)} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} (v-2s)^{-2(n+1)} \left(e^{i g (v-2s)-\frac{i v \pi}{2}}\, \Gamma\left(2(n+1), -i\, c\, (v-2s) \sqrt{z}\right) + e^{\frac{i v \pi}{2}-i g (v-2s)}\, \Gamma\left(2(n+1), i\, c\, (v-2s) \sqrt{z}\right)\right) - 2^{-m-v+1} z^{n+1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(e^{e\, i (m-2k)-i g (v-2s)-\frac{1}{2} i (m-v) \pi}\, \Gamma\left(2(n+1), (i\, c\, (v-2s)-i\, b\, (m-2k)) \sqrt{z}\right) \left((i\, c\, (v-2s)-i\, b\, (m-2k)) \sqrt{z}\right)^{-2(n+1)} + e^{-i e (m-2k)+\frac{1}{2} i \pi (m+v)-i g (v-2s)} \left((b\, i\, (m-2k)+c\, i\, (v-2s)) \sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (b\, i\, (m-2k)+c\, i\, (v-2s)) \sqrt{z}\right) + e^{e\, i (m-2k)+g\, i (v-2s)-\frac{1}{2} i (m+v) \pi} \left((-i\, b\, (m-2k)-i\, c\, (v-2s)) \sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (-i\, b\, (m-2k)-i\, c\, (v-2s)) \sqrt{z}\right) + e^{-i e (m-2k)+\frac{1}{2} i \pi (m-v)+g\, i (v-2s)} \left((i\, b\, (m-2k)-i\, c\, (v-2s)) \sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (i\, b\, (m-2k)-i\, c\, (v-2s)) \sqrt{z}\right)\right) /;\, n \in \mathbb{N} \land m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

Involving $z^n \sin^m(d\, z) \sin^v\left(c\, z^r + f\, z\right)$

01.06.21.1226.01

$$\int z^n \sin^m(d\, z) \sin^v\left(c\, z^2 + f\, z\right) dz = \frac{2^{-m-v} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1-m \bmod 2)(1-v \bmod 2)}{n+1} + (-1)^n\, 2^{-m-v} \binom{v}{\frac{v}{2}} (1-v \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left(e^{\frac{i m \pi}{2}}\, \Gamma(n+1, i\, d\, (m-2k)\, z)\, (-i\, d\, (m-2k))^{-n-1} + e^{-\frac{1}{2} i m \pi} (i\, d\, (m-2k))^{-n-1}\, \Gamma(n+1, -i\, d\, (m-2k)\, z)\right) - 2^{-m-v-1} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \left(e^{\frac{i (v-2k) f^2}{4c}+\frac{i \pi v}{2}} \left(\sum_{j=0}^{n} 2^{j-n} (i\, f\, (v-2k))^{n-j} (-i\, f\, (v-2k) - 2\, i\, c\, z\, (v-2k))^{j+1} \left(-\frac{i\, (-i\, f\, (v-2k) - 2\, i\, c\, z\, (v-2k))^2}{c\, (v-2k)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i\, (-i\, f\, (v-2k) - 2\, i\, c\, z\, (v-2k))^2}{4\, c\, (v-2k)}\right)\right) (-i\, c\, (v-2k))^{-n-1} + e^{-\frac{i (v-2k) f^2}{4c}-\frac{i \pi v}{2}} (i\, c\, (v-2k))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i\, f\, (v-2k))^{n-j} (f\, i\, (v-2k) + 2\, c\, i\, z\, (v-2k))^{j+1}$$

$$\left(\frac{i\,(f\,i\,(v-2\,k)+2\,c\,i\,z\,(v-2\,k))^2}{c\,(v-2\,k)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\!\left(\frac{j+1}{2}, \frac{i\,(f\,i\,(v-2\,k)+2\,c\,i\,z\,(v-2\,k))^2}{4\,c\,(v-2\,k)}\right)\Bigg) - 2^{-m-v-1}$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor} (-1)^s \binom{v}{s} \Bigg(e^{\frac{1}{2} i\,\pi\,(m+v) - \frac{i\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^2}{4\,c\,(v-2\,s)}} \Bigg(\sum_{j=0}^{n} 2^{j-n}\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))^{n-j}\,(-i\,d\,(m-2\,k)-$$

$$i\,f\,(v-2\,s)-2\,i\,c\,(v-2\,s)\,z)^{j+1} \left(-\frac{i\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s)-2\,i\,c\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\!\left(\frac{j+1}{2}, -\frac{i\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s)-2\,i\,c\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\Bigg) (-i\,c\,(v-2\,s))^{-n-1} +$$

$$e^{\frac{1}{2} i\,\pi\,(v-m) - \frac{i\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^2}{4\,c\,(v-2\,s)}} \Bigg(\sum_{j=0}^{n} 2^{j-n}\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))^{n-j}\,(d\,i\,(m-2\,k)-i\,f\,(v-2\,s)-$$

$$2\,i\,c\,(v-2\,s)\,z)^{j+1} \left(-\frac{i\,(d\,i\,(m-2\,k)-i\,f\,(v-2\,s)-2\,i\,c\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}$$

$$\Gamma\!\left(\frac{j+1}{2}, -\frac{i\,(d\,i\,(m-2\,k)-i\,f\,(v-2\,s)-2\,i\,c\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\Bigg) (-i\,c\,(v-2\,s))^{-n-1} +$$

$$e^{\frac{i\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))^2}{4\,c\,(v-2\,s)} + \frac{1}{2} i\,\pi\,(m-v)} (i\,c\,(v-2\,s))^{-n-1} \sum_{j=0}^{n} 2^{j-n}\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^{n-j}\,(-i\,d\,(m-2\,k)+$$

$$f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^{j+1} \left(\frac{i\,(-i\,d\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\!\left(\frac{j+1}{2}, \frac{i\,(-i\,d\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right) +$$

$$e^{\frac{i\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))^2}{4\,c\,(v-2\,s)} - \frac{1}{2} i\,\pi\,(m+v)} (i\,c\,(v-2\,s))^{-n-1} \sum_{j=0}^{n} 2^{j-n}\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^{n-j}$$

$$(d\,i\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^{j+1} \left(\frac{i\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\!\left(\frac{j+1}{2}, \frac{i\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\Bigg) /;\ n \in \mathbb{N} \bigwedge m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

01.06.21.1227.01

$$\int z^n \sin^m(d\,z)\sin^\nu\left(\sqrt{z}\,c+f\,z\right)dz = \frac{2^{-m-\nu} z^{n+1}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)}{n+1} + (-1)^n 2^{-m-\nu}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}$$

$$\left(e^{\frac{i m\pi}{2}}\Gamma(n+1, i\,d\,(m-2k)\,z)\,(-i\,d\,(m-2k))^{-n-1} + e^{-\frac{1}{2} i m\pi}(i\,d\,(m-2k))^{-n-1}\Gamma(n+1, -i\,d\,(m-2k)\,z)\right)+$$

$$2^{-m-2n-\nu-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{k+n-1}(f\,(\nu-2k))^{-2(n+1)}\binom{\nu}{k}$$

$$\left(e^{-\frac{i(\nu-2k)c^2}{4f}-\frac{i\pi\nu}{2}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j\,(i\,c\,(\nu-2k))^{-h-j+2n}\left(c\,i\,(\nu-2k)+2\,f\,i\sqrt{z}\,(\nu-2k)\right)^{h+j}\right.$$

$$\left(\frac{i\left(c\,i\,(\nu-2k)+2\,f\,i\sqrt{z}\,(\nu-2k)\right)^2}{f\,(\nu-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(c\,i\,(\nu-2k)\left(c\,i\,(\nu-2k)+2\,f\,i\sqrt{z}\,(\nu-2k)\right)\Gamma\left(\right.\right.$$

$$\left.\frac{1}{2}(h+j+1), \frac{i\left(c\,i\,(\nu-2k)+2\,f\,i\sqrt{z}\,(\nu-2k)\right)^2}{4\,f\,(\nu-2k)}\right)+2\,f\,i\,(\nu-2k)$$

$$\left.\sqrt{\frac{i\left(c\,i\,(\nu-2k)+2\,f\,i\sqrt{z}\,(\nu-2k)\right)^2}{f\,(\nu-2k)}}\,\Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(c\,i\,(\nu-2k)+2\,f\,i\sqrt{z}\,(\nu-2k)\right)^2}{4\,f\,(\nu-2k)}\right)\right)+$$

$$e^{\frac{i(\nu-2k)c^2}{4f}+\frac{i\pi\nu}{2}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j\,(-i\,c\,(\nu-2k))^{-h-j+2n}\left(-i\,c\,(\nu-2k)-2\,i\,f\sqrt{z}\,(\nu-2k)\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,c\,(\nu-2k)-2\,i\,f\sqrt{z}\,(\nu-2k)\right)^2}{f\,(\nu-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(-i\,c\,(\nu-2k)\right.$$

$$\left(-i\,c\,(\nu-2k)-2\,i\,f\sqrt{z}\,(\nu-2k)\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(-i\,c\,(\nu-2k)-2\,i\,f\sqrt{z}\,(\nu-2k)\right)^2}{4\,f\,(\nu-2k)}\right)-$$

$$2\,i\,f\,(\nu-2k)\sqrt{-\frac{i\left(-i\,c\,(\nu-2k)-2\,i\,f\sqrt{z}\,(\nu-2k)\right)^2}{f\,(\nu-2k)}}\,\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$-\frac{i\left(-i\,c\,(v-2k)-2\,i\,f\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\Bigg)\Bigg)\Bigg)\Bigg)+$$

$$2^{-m-2n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg(e^{\frac{c^2(v-2s)^2}{4(i\,f\,(v-2s)-i\,d\,(m-2k))}+\frac{1}{2}i\,\pi\,(m-v)}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2s))^{-h-j+2n}$$

$$\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\,\sqrt{z}\right)^2}{i\,f\,(v-2s)-i\,d\,(m-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Bigg(c\,i\,(v-2s)\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\,\sqrt{z}\right)$$

$$\Gamma\Bigg(\frac{1}{2}(h+j+1),\,-\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\,\sqrt{z}\right)^2\Big/$$

$$(4\,(i\,f\,(v-2s)-i\,d\,(m-2k)))\Bigg)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\,\Gamma\Bigg(\frac{1}{2}(h+j+2),$$

$$-\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\,\sqrt{z}\right)^2\Big/(4\,(i\,f\,(v-2s)-i\,d\,(m-2k)))\Bigg)$$

$$\sqrt{\left(-\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\,\sqrt{z}\right)^2\Big/(i\,f\,(v-2s)-i\,d\,(m-2k))\right)}\Bigg)$$

$$(i\,f\,(v-2s)-i\,d\,(m-2k))^{-2(n+1)}+e^{\frac{c^2(v-2s)^2}{4(d\,i\,(m-2k)+f\,i\,(v-2s))}-\frac{1}{2}i\,\pi\,(m+v)}\,(d\,i\,(m-2k)+f\,i\,(v-2s))^{-2(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2s))^{-h-j+2n}\left(c\,i\,(v-2s)+2\,(d\,i\,(m-2k)+f\,i\,(v-2s))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(c\,i\,(v-2s)+2\,(d\,i\,(m-2k)+f\,i\,(v-2s))\,\sqrt{z}\right)^2}{d\,i\,(m-2k)+f\,i\,(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg(c\,i\,(v-2s)\left(c\,i\,(v-2s)+2\,(d\,i\,(m-2k)+f\,i\,(v-2s))\,\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}(h+j+1),$$

$$-\frac{\left(c\,i\,(v-2s)+2\,(d\,i\,(m-2k)+f\,i\,(v-2s))\,\sqrt{z}\right)^2}{4\,(d\,i\,(m-2k)+f\,i\,(v-2s))}\Bigg)+2\,(d\,i\,(m-2k)+f\,i\,(v-2s))$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(c\,i\,(v-2s)+2\,(d\,i\,(m-2k)+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d\,i\,(m-2k)+f\,i\,(v-2s))}\right)$$

$$\left.\sqrt{\left(-\left(c\,i\,(v-2s)+2\,(d\,i\,(m-2k)+f\,i\,(v-2s))\sqrt{z}\right)^2 \Big/ (d\,i\,(m-2k)+f\,i\,(v-2s))\right)}\right)+$$

$$e^{\frac{c^2 (v-2s)^2}{4(-i\,d\,(m-2k)-i\,f\,(v-2s))}+\frac{1}{2} i\,\pi\,(m+v)}\,(-i\,d\,(m-2k)-i\,f\,(v-2s))^{-2(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2s))^{-h-j+2n}\left(2\,(-i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)^{h+j}$$

$$\left(-\left(2\,(-i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)^2 \Big/ (-i\,d\,(m-2k)-i\,f\,(v-2s))\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\left(2\,(-i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{\left(-\left(2\,(-i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)^2 \Big/\right.}\right.$$

$$\left.(-i\,d\,(m-2k)-i\,f\,(v-2s))\right)\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.-\left(2\,(-i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)^2 \Big/ (4\,(-i\,d\,(m-2k)-i\,f\,(v-2s)))\right)-$$

$$i\,c\,(v-2s)\left(2\,(-i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)\Gamma\left(\frac{1}{2}(h+j+1),\right.$$

$$\left.\left.-\left(2\,(-i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)^2 \Big/ (4\,(-i\,d\,(m-2k)-i\,f\,(v-2s)))\right)\right)+$$

$$e^{\frac{c^2 (v-2s)^2}{4(i\,d\,(m-2k)-i\,f\,(v-2s))}+\frac{1}{2} i\,\pi\,(v-m)}\,(i\,d\,(m-2k)-i\,f\,(v-2s))^{-2(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j$$

$$(-i\,c\,(v-2s))^{-h-j+2n}\left(2\,(i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)^{h+j}$$

$$\left(-\frac{\left(2\,(i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)^2}{i\,d\,(m-2k)-i\,f\,(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\,(i\,d\,(m-2k)-i\,f\,(v-2s))\right.$$

$$\sqrt{\left(-\left(2\,(i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)^2 \Big/ (i\,d\,(m-2k)-i\,f\,(v-2s))\right)}$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(2\,(i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)^2}{4\,(i\,d\,(m-2k)-i\,f\,(v-2s))}\right)-$$

$$i\,c\,(v-2s)\left(2\,(i\,d\,(m-2k)-i\,f\,(v-2s))\sqrt{z}-i\,c\,(v-2s)\right)\Gamma\left(\frac{1}{2}(h+j+1),\right.$$

[illegible]

Involving $z^n \sin^m(d\,z+e)\sin^\nu(c\,z^r+f\,z)$

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$$\int z^n \sin^m(d\,z+e)\sin^\nu(c\,z^2+f\,z)\,dz = \frac{2^{-m-\nu}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)}{n+1} +$$

$$(-1)^n\,2^{-m-\nu}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\Big(e^{\frac{i\,m\,\pi}{2}-i\,e\,(m-2\,k)}\,\Gamma(n+1,\,i\,d\,(m-2\,k)\,z)\,(-i\,d\,(m-2\,k))^{-n-1} +$$

$$e^{i\,e\,(m-2\,k)-\frac{i\,m\,\pi}{2}}\,(i\,d\,(m-2\,k))^{-n-1}\,\Gamma(n+1,\,-i\,d\,(m-2\,k)\,z)\Big) -$$

$$2^{-m-\nu-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(e^{\frac{i\,(\nu-2\,k)\,f^2}{4\,c}+\frac{i\,\pi\,\nu}{2}}\left(\sum_{j=0}^{n}2^{j-n}\,(i\,f\,(\nu-2\,k))^{n-j}\,(-i\,f\,(\nu-2\,k)-2\,i\,c\,z\,(\nu-2\,k))^{j+1}\right.\right.$$

$$\left.\left(-\frac{i\,(-i\,f\,(\nu-2\,k)-2\,i\,c\,z\,(\nu-2\,k))^2}{c\,(\nu-2\,k)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,-\frac{i\,(-i\,f\,(\nu-2\,k)-2\,i\,c\,z\,(\nu-2\,k))^2}{4\,c\,(\nu-2\,k)}\right)\right)$$

$$(-i\,c\,(\nu-2\,k))^{-n-1}+e^{-\frac{i\,(\nu-2\,k)\,f^2}{4\,c}-\frac{i\,\pi\,\nu}{2}}\,(i\,c\,(\nu-2\,k))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,f\,(\nu-2\,k))^{n-j}\,(f\,i\,(\nu-2\,k)+2\,c\,i\,z\,(\nu-2\,k))^{j+1}$$

$$\left.\left(\frac{i\,(f\,i\,(\nu-2\,k)+2\,c\,i\,z\,(\nu-2\,k))^2}{c\,(\nu-2\,k)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,\frac{i\,(f\,i\,(\nu-2\,k)+2\,c\,i\,z\,(\nu-2\,k))^2}{4\,c\,(\nu-2\,k)}\right)\right) -$$

$$2^{-m-\nu-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{-\frac{i\,(-i\,d\,(m-2\,k)-i\,f\,(\nu-2\,s))^2}{4\,c\,(\nu-2\,s)}-i\,e\,(m-2\,k)+\frac{1}{2}\,i\,\pi\,(m+\nu)}\right.$$

$$\left(\sum_{j=0}^{n}2^{j-n}\,(d\,i\,(m-2\,k)+f\,i\,(\nu-2\,s))^{n-j}\,(-i\,d\,(m-2\,k)-i\,f\,(\nu-2\,s)-2\,i\,c\,(\nu-2\,s)\,z)^{j+1}\right.$$

$$\left(-\frac{i\,(-i\,d\,(m-2\,k)-i\,f\,(\nu-2\,s)-2\,i\,c\,(\nu-2\,s)\,z)^2}{c\,(\nu-2\,s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\left.\Gamma\!\left(\frac{j+1}{2},\,-\frac{i\,(-i\,d\,(m-2\,k)-i\,f\,(\nu-2\,s)-2\,i\,c\,(\nu-2\,s)\,z)^2}{4\,c\,(\nu-2\,s)}\right)\right)(-i\,c\,(\nu-2\,s))^{-n-1} +$$

$$e^{-\frac{i\,(i\,d\,(m-2\,k)-i\,f\,(\nu-2\,s))^2}{4\,c\,(\nu-2\,s)}+e\,i\,(m-2\,k)+\frac{1}{2}\,i\,\pi\,(\nu-m)}\left(\sum_{j=0}^{n}2^{j-n}\,(i\,f\,(\nu-2\,s)-i\,d\,(m-2\,k))^{n-j}\,(d\,i\,(m-2\,k)-\right.$$

$$i\, f\,(v-2\,s)-2\,i\,c\,(v-2\,s)\,z)^{j+1}\left(-\frac{i\,(d\,i\,(m-2\,k)-i\,f\,(v-2\,s)-2\,i\,c\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,-\frac{i\,(d\,i\,(m-2\,k)-i\,f\,(v-2\,s)-2\,i\,c\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\Bigg)(-i\,c\,(v-2\,s))^{-n-1}+$$

$$e^{\frac{i\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))^2}{4\,c\,(v-2\,s)}-i\,e\,(m-2\,k)+\frac{1}{2}\,i\,\pi\,(m-v)}\,(i\,c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^{n-j}\,(-i\,d\,(m-2\,k)+$$

$$f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^{j+1}\left(\frac{i\,(-i\,d\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,\frac{i\,(-i\,d\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)+$$

$$e^{\frac{i\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))^2}{4\,c\,(v-2\,s)}+e\,i\,(m-2\,k)-\frac{1}{2}\,i\,\pi\,(m+v)}\,(i\,c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^{n-j}$$

$$(d\,i\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^{j+1}\left(\frac{i\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,\frac{i\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\Bigg)\Bigg)\,/;\;n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

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$$\int z^n\sin^m(d\,z+e)\sin^v\!\left(\sqrt{z}\;c+f\,z\right)dz=\frac{2^{-m-v}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m\bmod 2)\,(1-v\bmod 2)}{n+1}+$$

$$(-1)^n\,2^{-m-v}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\Big(e^{\frac{i\,m\,\pi}{2}-i\,e\,(m-2\,k)}\,\Gamma(n+1,\,i\,d\,(m-2\,k)\,z)\,(-i\,d\,(m-2\,k))^{-n-1}+$$

$$e^{i\,e\,(m-2\,k)-\frac{i\,m\,\pi}{2}}\,(i\,d\,(m-2\,k))^{-n-1}\,\Gamma(n+1,\,-i\,d\,(m-2\,k)\,z)\Big)+2^{-m-2\,n-v-1}\binom{m}{\frac{m}{2}}(1-m\bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{k+n-1}$$

$$(f\,(v-2\,k))^{-2\,(n+1)}\binom{v}{k}\Bigg(e^{-\frac{i\,(v-2\,k)\,c^2}{4\,f}-\frac{i\,\pi\,v}{2}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,k))^{-h-j+2\,n}\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\;(v-2\,k)\right)^{h+j}$$

$$\left(\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\;(v-2\,k)\right)^2}{f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(c\,i\,(v-2\,k)\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\;(v-2\,k)\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\ \frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\Bigg)+2\,f\,i\,(v-2k)$$

$$\sqrt{\frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}}\ \Gamma\!\left(\frac{1}{2}(h+j+2),\ \frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right)\Bigg)\Bigg)+$$

$$e^{\frac{i(v-2k)c^2}{4f}+\frac{i\pi v}{2}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2k))^{-h-j+2n}\left(-i\,c\,(v-2k)-2\,i\,f\,\sqrt{z}\,(v-2k)\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,c\,(v-2k)-2\,i\,f\,\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(-i\,c\,(v-2k)$$

$$\left(-i\,c\,(v-2k)-2\,i\,f\,\sqrt{z}\,(v-2k)\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\ -\frac{i\left(-i\,c\,(v-2k)-2\,i\,f\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right)-$$

$$2\,i\,f\,(v-2k)\sqrt{-\frac{i\left(-i\,c\,(v-2k)-2\,i\,f\,\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}}\ \Gamma\Bigg(\frac{1}{2}(h+j+2),$$

$$-\frac{i\left(-i\,c\,(v-2k)-2\,i\,f\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\Bigg)\Bigg)\Bigg)\Bigg)+$$

$$2^{-m-2n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg(e^{\frac{c^2(v-2s)^2}{4(i\,f\,(v-2s)-i\,d\,(m-2k))}-i\,e\,(m-2k)+\frac{1}{2}\,i\,\pi\,(m-v)}$$

$$\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2s))^{-h-j+2n}\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\sqrt{z}\right)^2}{i\,f\,(v-2s)-i\,d\,(m-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Big(c\,i\,(v-2s)\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\sqrt{z}\right)$$

$$\Gamma\Bigg(\frac{1}{2}(h+j+1),\ -\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\sqrt{z}\right)^2\Big/$$

$$\left.(4\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k)))\right)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.$$
$$\left.-\left(c\,i\,(v-2\,s)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\,\sqrt{z}\right)^2\Big/(4\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k)))\right)$$
$$\left.\sqrt{\left(-\left(c\,i\,(v-2\,s)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\,\sqrt{z}\right)^2\Big/(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\right)}\right)$$

$$(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))^{-2\,(n+1)}+e^{\frac{c^2\,(v-2\,s)^2}{4\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))}+e\,i\,(m-2\,k)-\frac{1}{2}\,i\,\pi\,(m+v)}\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))^{-2\,(n+1)}$$
$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s))^{-h-j+2\,n}\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^{h+j}$$
$$\left(-\frac{\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2}{d\,i\,(m-2\,k)+f\,i\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$
$$\left(c\,i\,(v-2\,s)\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\right.\right.$$
$$\left.-\frac{\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))}\right)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))$$
$$\Gamma\!\left(\frac{1}{2}\,(h+j+2),-\frac{\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))}\right)$$
$$\left.\sqrt{\left(-\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2\Big/(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\right)}\right)+$$

$$e^{\frac{c^2\,(v-2\,s)^2}{4\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))}-i\,e\,(m-2\,k)+\frac{1}{2}\,i\,\pi\,(m+v)}\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^{-2\,(n+1)}$$
$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2\,s))^{-h-j+2\,n}\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^{h+j}$$
$$\left(-\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^2\Big/(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}$$
$$\binom{n}{j}\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{\left(-\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^2\Big/\right.}\right.$$
$$\left.(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\right)\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.$$
$$\left.-\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^2\Big/(4\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s)))\right)-$$
$$i\,c\,(v-2\,s)\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\right.$$

$$-\left(2\left(-i\, d\,(m-2k)-i\, f\,(v-2s)\right)\sqrt{z}-i\, c\,(v-2s)\right)^2 \Big/ \left(4\left(-i\, d\,(m-2k)-i\, f\,(v-2s)\right)\right)\Bigg)\Bigg)+$$

$$e^{\frac{c^2 (v-2s)^2}{4 (i\, d\,(m-2k)-i\, f\,(v-2s))}+e\, i\,(m-2k)+\frac{1}{2}\, i\, \pi\,(v-m)} \left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)^{-2(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j \left(-i\, c\,(v-2s)\right)^{-h-j+2n} \left(2\left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)\sqrt{z}-i\, c\,(v-2s)\right)^{h+j}$$

$$\left(-\frac{\left(2\left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)\sqrt{z}-i\, c\,(v-2s)\right)^2}{i\, d\,(m-2k)-i\, f\,(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg(2\left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)$$

$$\sqrt{\left(-\left(2\left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)\sqrt{z}-i\, c\,(v-2s)\right)^2 \Big/ \left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)\right)}$$

$$\Gamma\!\left(\frac{1}{2}(h+j+2),\, -\frac{\left(2\left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)\sqrt{z}-i\, c\,(v-2s)\right)^2}{4\left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)}\right)-$$

$$i\, c\,(v-2s)\left(2\left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)\sqrt{z}-i\, c\,(v-2s)\right)\Gamma\Bigg(\frac{1}{2}(h+j+1),$$

$$-\frac{\left(2\left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)\sqrt{z}-i\, c\,(v-2s)\right)^2}{4\left(i\, d\,(m-2k)-i\, f\,(v-2s)\right)}\Bigg)\Bigg)\Bigg)\Bigg) /;\, n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin^m\left(b\, z^r\right) \sin^v\left(c\, z^r + f\, z\right)$

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$$\int z^n \sin^m\left(b\, z^2\right)\sin^v\left(c\, z^2+f\, z\right)dz = \frac{2^{-m-v}\, z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m \bmod 2)(1-v \bmod 2)}{n+1}-$$

$$2^{-m-v-1}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(e^{-\frac{1}{2}\, i\, m\, \pi}\, z^{n+1}\, \Gamma\!\left(\frac{n+1}{2},\, -i\, b\,(m-2k)\, z^2\right)\left(-i\, b\,(m-2k)\, z^2\right)^{\frac{1}{2}(-n-1)}+\right.$$

$$\left.e^{\frac{i\, m\, \pi}{2}}\, z^{n+1}\left(i\, b\,(m-2k)\, z^2\right)^{\frac{1}{2}(-n-1)}\,\Gamma\!\left(\frac{n+1}{2},\, i\, b\,(m-2k)\, z^2\right)\right)-$$

$$2^{-m-v-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\Bigg(e^{\frac{i\,(v-2k)\, f^2}{4c}+\frac{i\, \pi\, v}{2}}\Bigg(\sum_{j=0}^{n}2^{j-n}\left(i\, f\,(v-2k)\right)^{n-j}\left(-i\, f\,(v-2k)-2\, i\, c\, z\,(v-2k)\right)^{j+1}$$

$$\left(-\frac{i\,(-i\,f\,(v-2\,k)-2\,i\,c\,z\,(v-2\,k))^2}{c\,(v-2\,k)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,-\frac{i\,(-i\,f\,(v-2\,k)-2\,i\,c\,z\,(v-2\,k))^2}{4\,c\,(v-2\,k)}\right)\Bigg)$$

$$(-i\,c\,(v-2\,k))^{-n-1}+e^{-\frac{i\,(v-2\,k)\,f^2}{4\,c}-\frac{i\,\pi\,v}{2}}\,(i\,c\,(v-2\,k))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,f\,(v-2\,k))^{n-j}\,(f\,i\,(v-2\,k)+2\,c\,i\,z\,(v-2\,k))^{j+1}$$

$$\left(\frac{i\,(f\,i\,(v-2\,k)+2\,c\,i\,z\,(v-2\,k))^2}{c\,(v-2\,k)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,\frac{i\,(f\,i\,(v-2\,k)+2\,c\,i\,z\,(v-2\,k))^2}{4\,c\,(v-2\,k)}\right)\Bigg)-$$

$$2^{-m-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg(e^{-\frac{1}{4}i\left(-\frac{f^2\,(v-2\,s)^2}{-2\,b\,k+b\,m+2\,c\,s-c\,v}-2\,\pi\,(m-v)\right)}\Bigg(\sum_{j=0}^{n}2^{j-n}\,(-i\,f\,(v-2\,s))^{n-j}\,(f\,i\,(v-2\,s)+$$

$$2\,(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))\,z)^{j+1}\left(-\frac{(f\,i\,(v-2\,s)+2\,(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))\,z)^2}{i\,c\,(v-2\,s)-i\,b\,(m-2\,k)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,-\frac{(f\,i\,(v-2\,s)+2\,(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))\,z)^2}{4\,(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))}\right)\Bigg)(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))^{-n-1}+$$

$$e^{\frac{1}{4}i\left(\frac{f^2\,(v-2\,s)^2}{2\,b\,k-b\,m+2\,c\,s-c\,v}-2\,\pi\,(m+v)\right)}\,(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,f\,(v-2\,s))^{n-j}\,(f\,i\,(v-2\,s)+$$

$$2\,(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))\,z)^{j+1}\left(-\frac{(f\,i\,(v-2\,s)+2\,(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))\,z)^2}{b\,i\,(m-2\,k)+c\,i\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,-\frac{(f\,i\,(v-2\,s)+2\,(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))\,z)^2}{4\,(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))}\right)+e^{-\frac{1}{4}i\left(\frac{f^2\,(v-2\,s)^2}{2\,b\,k-b\,m+2\,c\,s-c\,v}-2\,\pi\,(m+v)\right)}$$

$$(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(i\,f\,(v-2\,s))^{n-j}\,(2\,(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s))\,z-i\,f\,(v-2\,s))^{j+1}$$

$$\left(-\frac{(2\,(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s))\,z-i\,f\,(v-2\,s))^2}{-i\,b\,(m-2\,k)-i\,c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2},\,-\frac{(2\,(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s))\,z-i\,f\,(v-2\,s))^2}{4\,(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s))}\right)+e^{\frac{1}{4}i\left(2\,\pi\,(v-m)-\frac{f^2\,(v-2\,s)^2}{-2\,b\,k+b\,m+2\,c\,s-c\,v}\right)}$$

$$(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(i\,f\,(v-2\,s))^{n-j}\,(2\,(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))\,z-i\,f\,(v-2\,s))^{j+1}$$

$$\left(-\frac{(2\,(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))\,z-i\,f\,(v-2\,s))^2}{i\,b\,(m-2\,k)-i\,c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2},\,-\frac{(2\,(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))\,z-i\,f\,(v-2\,s))^2}{4\,(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))}\right)\Bigg)\Bigg)\,/;\,n\in\mathbb{N}\land m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

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$$\int z^n \sin^m\left(\sqrt{z}\, b\right) \sin^\nu\left(\sqrt{z}\, c + f z\right) dz = -(-1)^{n+1} 2^{-m-\nu+1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k (m-2k)^{-2(n+1)} \binom{m}{k} \left(e^{-\frac{1}{2} i m \pi} \Gamma\left(2(n+1), -i b (m-2k) \sqrt{z}\right) + e^{\frac{i m \pi}{2}} \Gamma\left(2(n+1), i b (m-2k) \sqrt{z}\right)\right)\right)$$

$$b^{-2(n+1)} + \frac{2^{-m-\nu} z^{n+1} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - m \bmod 2)(1 - \nu \bmod 2)}{n+1} + 2^{-m-2n-\nu-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{\frac{i(\nu-2k)c^2}{4f} + \frac{i \pi \nu}{2}} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c (\nu-2k))^{-h-j+2n} \left(-i c (\nu-2k) - 2 i f \sqrt{z} (\nu-2k)\right)^{h+j}\right.\right.$$

$$\left(-\frac{i\left(-i c (\nu-2k) - 2 i f \sqrt{z} (\nu-2k)\right)^2}{f(\nu-2k)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(-i c (\nu-2k)\right.$$

$$\left(-i c (\nu-2k) - 2 i f \sqrt{z} (\nu-2k)\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(-i c (\nu-2k) - 2 i f \sqrt{z} (\nu-2k)\right)^2}{4 f (\nu-2k)}\right) - 2$$

$$i f (\nu-2k) \sqrt{-\frac{i\left(-i c (\nu-2k) - 2 i f \sqrt{z} (\nu-2k)\right)^2}{f(\nu-2k)}}$$

$$\left.\left.\left.\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(-i c (\nu-2k) - 2 i f \sqrt{z} (\nu-2k)\right)^2}{4 f (\nu-2k)}\right)\right)\right)(-i f (\nu-2k))^{-2(n+1)} +$$

$$e^{-\frac{i(\nu-2k)c^2}{4f} - \frac{i \pi \nu}{2}} (i f (\nu-2k))^{-2(n+1)} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i c (\nu-2k))^{-h-j+2n} \left(c i (\nu-2k) + 2 f i \sqrt{z} (\nu-2k)\right)^{h+j}$$

$$\left(\frac{i\left(c i (\nu-2k) + 2 f i \sqrt{z} (\nu-2k)\right)^2}{f(\nu-2k)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(c i (\nu-2k) \left(c i (\nu-2k) + 2 f i \sqrt{z} (\nu-2k)\right) \Gamma\left(\right.\right.$$

$$\left.\frac{1}{2}(h+j+1), \frac{i\left(c i (\nu-2k) + 2 f i \sqrt{z} (\nu-2k)\right)^2}{4 f (\nu-2k)}\right) + 2 f i (\nu-2k)$$

$$\sqrt{\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)^2}{f\,(v-2\,k)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)^2}{4\,f\,(v-2\,k)}\right)\Bigg)\Bigg)\Bigg)+$$

$$2^{-m-2\,n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg(e^{\frac{1}{2}\,i\,\pi\,(m+v)-\frac{i\,(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)}}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j$$

$$(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s))^{-h-j+2\,n}\left(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{1}{f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Bigg((-i\,b\,(m-2\,k)-i\,c\,(v-2\,s))\left(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{1}{4\,f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)-$$

$$2\,i\,f\,(v-2\,s)\,\sqrt{\left(-\frac{1}{f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)}$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{1}{4\,f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)\Bigg)\Bigg)$$

$$(-i\,f\,(v-2\,s))^{-2\,(n+1)}+e^{\frac{1}{2}\,i\,\pi\,(v-m)-\frac{i\,(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)}}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))^{-h-j+2\,n}$$

$$\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\,b\,(m-2\,k)-i\,c\,(v-2\,s))\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{1}{4\,f\,(v-2\,s)}\left(i\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)-$$

$$2\,i\,f\,(v-2\,s)\,\sqrt{\left(-\frac{1}{f\,(v-2\,s)}\left(i\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)}$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{1}{4\,f\,(v-2\,s)}\left(i\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)\Bigg)\Bigg)$$

$$(-i\, f\,(v-2\,s))^{-2\,(n+1)} + e^{\frac{i\,(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))^2}{4\,f\,(v-2\,s)}+\frac{1}{2}\,i\,\pi\,(m-v)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))^{-h-j+2\,n}\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\,c\,(v-2\,s)-i\,b\,(m-2\,k))\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,\frac{1}{4\,f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)+$$

$$2\,f\,i\,(v-2\,s)\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{1}{4\,f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)$$

$$\sqrt{\left(\frac{1}{f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)}\Bigg)+$$

$$e^{\frac{i\,(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))^2}{4\,f\,(v-2\,s)}-\frac{1}{2}\,i\,\pi\,(m+v)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))^{-h-j+2\,n}$$

$$\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((b\,i\,(m-2\,k)+c\,i\,(v-2\,s))\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+$$

$$2\,f\,i\,(v-2\,s)\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)$$

$$\sqrt{\frac{i\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\Bigg)\Bigg)\;/;\;n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin^m(b\,z^r+e)\sin^v(c\,z^r+f\,z)$

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$$\int z^n \sin^m\left(b z^2+e\right)\sin^\nu\left(c z^2+f z\right)dz = \frac{2^{-m-\nu} z^{n+1}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)}{n+1} -$$

$$2^{-m-\nu-1}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(e^{i e(m-2k)-\frac{i m\pi}{2}} z^{n+1}\,\Gamma\left(\frac{n+1}{2}, -i b(m-2k)z^2\right)\left(-i b(m-2k)z^2\right)^{\frac{1}{2}(-n-1)} +\right.$$

$$\left. e^{\frac{i m\pi}{2}-i e(m-2k)} z^{n+1}\left(i b(m-2k)z^2\right)^{\frac{1}{2}(-n-1)}\Gamma\left(\frac{n+1}{2}, i b(m-2k)z^2\right)\right) -$$

$$2^{-m-\nu-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(e^{\frac{i(\nu-2k)f^2}{4c}+\frac{i\pi\nu}{2}}\left(\sum_{j=0}^{n}2^{j-n}\left(i f(\nu-2k)\right)^{n-j}\left(-i f(\nu-2k)-2 i c z(\nu-2k)\right)^{j+1}\right.\right.$$

$$\left.\left(-\frac{i\left(-i f(\nu-2k)-2 i c z(\nu-2k)\right)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{i\left(-i f(\nu-2k)-2 i c z(\nu-2k)\right)^2}{4c(\nu-2k)}\right)\right)$$

$$\left(-i c(\nu-2k)\right)^{-n-1} + e^{-\frac{i(\nu-2k)f^2}{4c}-\frac{i\pi\nu}{2}}\left(i c(\nu-2k)\right)^{-n-1}\sum_{j=0}^{n}2^{j-n}\left(-i f(\nu-2k)\right)^{n-j}\left(f i(\nu-2k)+2 c i z(\nu-2k)\right)^{j+1}$$

$$\left.\left(\frac{i\left(f i(\nu-2k)+2 c i z(\nu-2k)\right)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2}, \frac{i\left(f i(\nu-2k)+2 c i z(\nu-2k)\right)^2}{4c(\nu-2k)}\right)\right) -$$

$$2^{-m-\nu-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{-\frac{1}{4}i\left(-\frac{f^2(\nu-2s)^2}{-2bk+bm+2cs-c\nu}+4e(m-2k)-2\pi(m-\nu)\right)}\left(\sum_{j=0}^{n}2^{j-n}\left(-i f(\nu-2s)\right)^{n-j}\left(f i(\nu-2s)+\right.\right.\right.$$

$$\left.2\left(i c(\nu-2s)-i b(m-2k)\right)z\right)^{j+1}\left(-\frac{\left(f i(\nu-2s)+2\left(i c(\nu-2s)-i b(m-2k)\right)z\right)^2}{i c(\nu-2s)-i b(m-2k)}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{\left(f i(\nu-2s)+2\left(i c(\nu-2s)-i b(m-2k)\right)z\right)^2}{4\left(i c(\nu-2s)-i b(m-2k)\right)}\right)\right)\left(i c(\nu-2s)-i b(m-2k)\right)^{-n-1} +$$

$$e^{\frac{1}{4}i\left(\frac{f^2(\nu-2s)^2}{2bk-bm+2cs-c\nu}+4e(m-2k)-2\pi(m+\nu)\right)}\left(b i(m-2k)+c i(\nu-2s)\right)^{-n-1}\sum_{j=0}^{n}2^{j-n}\left(-i f(\nu-2s)\right)^{n-j}\left(f i(\nu-2s)+\right.$$

$$\left.2\left(b i(m-2k)+c i(\nu-2s)\right)z\right)^{j+1}\left(-\frac{\left(f i(\nu-2s)+2\left(b i(m-2k)+c i(\nu-2s)\right)z\right)^2}{b i(m-2k)+c i(\nu-2s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{\left(f i(\nu-2s)+2\left(b i(m-2k)+c i(\nu-2s)\right)z\right)^2}{4\left(b i(m-2k)+c i(\nu-2s)\right)}\right) + e^{-\frac{1}{4}i\left(\frac{f^2(\nu-2s)^2}{2bk-bm+2cs-c\nu}+4e(m-2k)-2\pi(m+\nu)\right)}$$

$$\left(-i b(m-2k)-i c(\nu-2s)\right)^{-n-1}\sum_{j=0}^{n}2^{j-n}\left(i f(\nu-2s)\right)^{n-j}\left(2\left(-i b(m-2k)-i c(\nu-2s)\right)z-i f(\nu-2s)\right)^{j+1}$$

$$\left(-\frac{(2(-i\,b(m-2k)-i\,c(v-2s))z-i\,f(v-2s))^2}{-i\,b(m-2k)-i\,c(v-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2},-\frac{(2(-i\,b(m-2k)-i\,c(v-2s))z-i\,f(v-2s))^2}{4(-i\,b(m-2k)-i\,c(v-2s))}\right)+e^{\frac{1}{4}i\left(-\frac{f^2(v-2s)^2}{-2bk+bm+2cs-cv}+4e(m-2k)+2\pi(v-m)\right)}$$

$$(i\,b(m-2k)-i\,c(v-2s))^{-n-1}\sum_{j=0}^{n}2^{j-n}(i\,f(v-2s))^{n-j}(2(i\,b(m-2k)-i\,c(v-2s))z-i\,f(v-2s))^{j+1}$$

$$\left(-\frac{(2(i\,b(m-2k)-i\,c(v-2s))z-i\,f(v-2s))^2}{i\,b(m-2k)-i\,c(v-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2},-\frac{(2(i\,b(m-2k)-i\,c(v-2s))z-i\,f(v-2s))^2}{4(i\,b(m-2k)-i\,c(v-2s))}\right)\Bigg)\Bigg)\Bigg)\,/;\,n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

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$$\int z^n\sin^m\left(\sqrt{z}\,b+e\right)\sin^v\left(\sqrt{z}\,c+f\,z\right)dz = -(-1)^{n+1}2^{-m-v+1}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k(m-2k)^{-2(n+1)}\binom{m}{k}\right.$$

$$\left.\left(e^{i\,e(m-2k)-\frac{i\,m\pi}{2}}\Gamma\left(2(n+1),-i\,b(m-2k)\sqrt{z}\right)+e^{\frac{i\,m\pi}{2}-i\,e(m-2k)}\Gamma\left(2(n+1),i\,b(m-2k)\sqrt{z}\right)\right)\right)b^{-2(n+1)}+$$

$$\frac{2^{-m-v}z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m\bmod 2)(1-v\bmod 2)}{n+1}+2^{-m-2n-v-1}\binom{m}{\frac{m}{2}}(1-m\bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\left(e^{\frac{i(v-2k)c^2}{4f}+\frac{i\pi v}{2}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(-i\,c(v-2k))^{-h-j+2n}\left(-i\,c(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)^{h+j}\right.\right.$$

$$\left(-\frac{i\left(-i\,c(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{f(v-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(-i\,c(v-2k)$$

$$\left(-i\,c(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(-i\,c(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{4f(v-2k)}\right)-2$$

$$i\,f(v-2k)\sqrt{-\frac{i\left(-i\,c(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{f(v-2k)}}$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(-i\,c\,(v-2k)-2\,i\,f\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right)\Bigg)\Bigg)\Bigg)(-i\,f\,(v-2k))^{-2(n+1)}+$$

$$e^{-\frac{i(v-2k)c^2}{4f}-\frac{i\pi v}{2}}\,(i\,f\,(v-2k))^{-2(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2k))^{-h-j+2n}\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^{h+j}$$

$$\left(\frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(c\,i\,(v-2k)\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1), \frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\Bigg)+2\,f\,i\,(v-2k)$$

$$\sqrt{\frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}}\;\Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right)\Bigg)\Bigg)+$$

$$2^{-m-2n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg(e^{-\frac{i(-i\,b\,(m-2k)-i\,c\,(v-2s))^2}{4\,f\,(v-2s)}-i\,e\,(m-2k)+\frac{1}{2}i\,\pi\,(m+v)}$$

$$\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b\,(m-2k)-i\,c\,(v-2s))^{-h-j+2n}\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{1}{f\,(v-2s)}\left(i\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2\right)\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Bigg((-i\,b\,(m-2k)-i\,c\,(v-2s))\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{1}{4\,f\,(v-2s)}\left(i\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2\right)\right)-$$

$$2\,i\,f\,(v-2s)\sqrt{\left(-\frac{1}{f\,(v-2s)}\left(i\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2\right)\right)}$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\frac{1}{4\,f\,(v-2s)}\left(i\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2\right)\right)\Bigg)\Bigg)$$

$$(-i\,f\,(v-2s))^{-2(n+1)}+e^{-\frac{i(i\,b\,(m-2k)-i\,c\,(v-2s))^2}{4\,f\,(v-2s)}+e\,i\,(m-2k)+\frac{1}{2}i\,\pi\,(v-m)}$$

$$\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))^{-h-j+2\,n}\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{i\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\,b\,(m-2\,k)-i\,c\,(v-2\,s))\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)\right.$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{1}{4\,f\,(v-2\,s)}\left(i\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)-$$

$$2\,i\,f\,(v-2\,s)\,\sqrt{\left(-\frac{1}{f\,(v-2\,s)}\left(i\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)}$$

$$\left.\left.\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{1}{4\,f\,(v-2\,s)}\left(i\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)\right)\right)$$

$$(-i\,f\,(v-2\,s))^{-2\,(n+1)}+e^{\frac{i\,(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))^2}{4\,f\,(v-2\,s)}-i\,e\,(m-2\,k)+\frac{1}{2}\,i\,\pi\,(m-v)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))^{-h-j+2\,n}\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\,c\,(v-2\,s)-i\,b\,(m-2\,k))\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)\right.$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,\frac{1}{4\,f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)+$$

$$2\,f\,i\,(v-2\,s)\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{1}{4\,f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)$$

$$\left.\sqrt{\left(\frac{1}{f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2\right)\right)}\right)+$$

$$e^{\frac{i\,(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))^2}{4\,f\,(v-2\,s)}+e\,i\,(m-2\,k)-\frac{1}{2}\,i\,\pi\,(m+v)}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j$$

$$(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))^{-h-j+2\,n}\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(b\,i\,(m-2k)+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{f\,(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((b\,i\,(m-2k)+c\,i\,(v-2s))\left(b\,i\,(m-2k)+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(b\,i\,(m-2k)+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{4\,f\,(v-2s)}\right)+$$

$$2\,f\,i\,(v-2s)\,\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(b\,i\,(m-2k)+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{4\,f\,(v-2s)}\right)$$

$$\sqrt{\frac{i\left(b\,i\,(m-2k)+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{f\,(v-2s)}}\Bigg)\Bigg)\;/;\;n\in\mathbb{N}\land m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving $z^n\sin^m(b\,z^r+d\,z)\sin^v(c\,z^r+f\,z)$

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$$\int z^n\sin^m(b\,z^2+d\,z)\sin^v(c\,z^2+f\,z)\,dz ==$$

$$\frac{(-1)^m\,2^{-m-v}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m\bmod 2)\,(1-v\bmod 2)}{n+1}-i^{-m}\,2^{-m-v-1}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\Bigg(e^{\frac{i\,d^2\,(2k-m)}{4b}}$$

$$\left(\sum_{j=0}^{n}2^{j-n}\,(i\,d\,(2k-m))^{n-j}\,(-i\,d\,(2k-m)-2\,i\,b\,z\,(2k-m))^{j+1}\left(-\frac{i\,(-i\,d\,(2k-m)-2\,i\,b\,z\,(2k-m))^2}{b\,(2k-m)}\right)^{\frac{1}{2}(-j-1)}\right.$$

$$\left.\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,-\frac{i\,(-i\,d\,(2k-m)-2\,i\,b\,z\,(2k-m))^2}{4\,b\,(2k-m)}\right)\right)(-i\,b\,(2k-m))^{-n-1}+$$

$$(-1)^m\,e^{\frac{i\,d^2\,(m-2k)}{4b}}\,(-i\,b\,(m-2k))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(i\,d\,(m-2k))^{n-j}\,(-i\,d\,(m-2k)-2\,i\,b\,z\,(m-2k))^{j+1}$$

$$\left(-\frac{i\,(-i\,d\,(m-2k)-2\,i\,b\,z\,(m-2k))^2}{b\,(m-2k)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,-\frac{i\,(-i\,d\,(m-2k)-2\,i\,b\,z\,(m-2k))^2}{4\,b\,(m-2k)}\right)\Bigg)-$$

$$(-1)^m i^{-v} 2^{-m-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \Bigg((-1)^v e^{-\frac{i f^2 (2k-v)}{4c}}$$

$$\Bigg(\sum_{j=0}^{n} 2^{j-n} (-i f (2k-v))^{n-j} (f i (2k-v) + 2 c i z (2k-v))^{j+1} \left(\frac{i (f i (2k-v) + 2 c i z (2k-v))^2}{c (2k-v)} \right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f i (2k-v) + 2 c i z (2k-v))^2}{4 c (2k-v)} \right) \Bigg) (i c (2k-v))^{-n-1} +$$

$$e^{-\frac{i f^2 (v-2k)}{4c}} (i c (v-2k))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i f (v-2k))^{n-j} (f i (v-2k) + 2 c i z (v-2k))^{j+1}$$

$$\left(\frac{i (f i (v-2k) + 2 c i z (v-2k))^2}{c (v-2k)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f i (v-2k) + 2 c i z (v-2k))^2}{4 c (v-2k)} \right) \Bigg) -$$

$$i^{-m-v} 2^{-m-v-1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Bigg((-1)^v e^{-\frac{(i f (2s-v) - i d (2k-m))^2}{4 (i c (2s-v) - i b (2k-m))}} \Bigg(\sum_{j=0}^{n} 2^{j-n} (i d (2k-m) - i f (2s-v))^{n-j}$$

$$(-i d (2k-m) + f i (2s-v) + 2 (i c (2s-v) - i b (2k-m)) z)^{j+1} \big(-(-i d (2k-m) + f i (2s-v) +$$

$$2 (i c (2s-v) - i b (2k-m)) z)^2 \big/ (i c (2s-v) - i b (2k-m)) \big)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\Big(\frac{j+1}{2},$$

$$-(-i d (2k-m) + f i (2s-v) + 2 (i c (2s-v) - i b (2k-m)) z)^2 \big/ (4 (i c (2s-v) - i b (2k-m))) \Big) \Bigg)$$

$$(i c (2s-v) - i b (2k-m))^{-n-1} + (-1)^{m+v} e^{-\frac{(i f (2s-v) - i d (m-2k))^2}{4 (i c (2s-v) - i b (m-2k))}} (i c (2s-v) - i b (m-2k))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i d (m-2k) - i f (2s-v))^{n-j} (-i d (m-2k) + f i (2s-v) + 2 (i c (2s-v) - i b (m-2k)) z)^{j+1}$$

$$\big(-(-i d (m-2k) + f i (2s-v) + 2 (i c (2s-v) - i b (m-2k)) z)^2 \big/ (i c (2s-v) - i b (m-2k)) \big)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\Big(\frac{j+1}{2}, -(-i d (m-2k) + f i (2s-v) + 2 (i c (2s-v) - i b (m-2k)) z)^2 \big/$$

$$(4 (i c (2s-v) - i b (m-2k))) \Big) + e^{-\frac{(i f (v-2s) - i d (2k-m))^2}{4 (i c (v-2s) - i b (2k-m))}} (i c (v-2s) - i b (2k-m))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i d (2k-m) - i f (v-2s))^{n-j} (-i d (2k-m) + f i (v-2s) + 2 (i c (v-2s) - i b (2k-m)) z)^{j+1}$$

$$\big(-(-i d (2k-m) + f i (v-2s) + 2 (i c (v-2s) - i b (2k-m)) z)^2 \big/ (i c (v-2s) - i b (2k-m)) \big)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\Big(\frac{j+1}{2}, -(-i d (2k-m) + f i (v-2s) + 2 (i c (v-2s) - i b (2k-m)) z)^2 \big/$$

$$(4 (i c (v-2s) - i b (2k-m))) \Big) + (-1)^m e^{-\frac{(i f (v-2s) - i d (m-2k))^2}{4 (i c (v-2s) - i b (m-2k))}} (i c (v-2s) - i b (m-2k))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i\, d (m-2k) - i\, f (v-2s))^{n-j} (-i\, d (m-2k) + f\, i (v-2s) + 2 (i\, c (v-2s) - i\, b (m-2k)) z)^{j+1}$$
$$\left(-(-i\, d (m-2k) + f\, i (v-2s) + 2 (i\, c (v-2s) - i\, b (m-2k)) z)^2 \big/ (i\, c (v-2s) - i\, b (m-2k))\right)^{\frac{1}{2}(-j-1)}$$
$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -(-i\, d (m-2k) + f\, i (v-2s) + 2 (i\, c (v-2s) - i\, b (m-2k)) z)^2 \big/ \right.$$
$$\left.\left.(4 (i\, c (v-2s) - i\, b (m-2k)))\right)\right) /;\, n \in \mathbb{N} \land m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

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$$\int z^n \sin^m\left(\sqrt{z}\, b + d\, z\right) \sin^v\left(\sqrt{z}\, c + f\, z\right) dz ==$$
$$\frac{(-1)^m 2^{-m-v} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2)}{n+1} + i^{-m} 2^{-m-2n-v-1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)$$
$$\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left(e^{\frac{i b^2 (2k-m)}{4d}} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i\, b (2k-m))^{-h-j+2n} \left(-i\, b (2k-m) - 2\, i\, d \sqrt{z}\, (2k-m)\right)^{h+j} \right.\right.$$
$$\left(-\frac{i\left(-i\, b (2k-m) - 2\, i\, d \sqrt{z}\, (2k-m)\right)^2}{d (2k-m)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(-i\, b (2k-m) \right.$$
$$\left(-i\, b (2k-m) - 2\, i\, d \sqrt{z}\, (2k-m)\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(-i\, b (2k-m) - 2\, i\, d \sqrt{z}\, (2k-m)\right)^2}{4 d (2k-m)}\right) -$$
$$2\, i\, d (2k-m) \sqrt{-\frac{i\left(-i\, b (2k-m) - 2\, i\, d \sqrt{z}\, (2k-m)\right)^2}{d (2k-m)}}\; \Gamma\left(\frac{1}{2}(h+j+2), \right.$$
$$\left.\left.\left. -\frac{i\left(-i\, b (2k-m) - 2\, i\, d \sqrt{z}\, (2k-m)\right)^2}{4 d (2k-m)}\right)\right)\right) (-i\, d (2k-m))^{-2n-2} + (-1)^m e^{\frac{i b^2 (m-2k)}{4d}}$$
$$(-i\, d (m-2k))^{-2n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i\, b (m-2k))^{-h-j+2n} \left(-i\, b (m-2k) - 2\, i\, d \sqrt{z}\, (m-2k)\right)^{h+j}$$
$$\left(-\frac{i\left(-i\, b (m-2k) - 2\, i\, d \sqrt{z}\, (m-2k)\right)^2}{d (m-2k)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(-i\, b (m-2k) \right.$$

$$\left(-i\, b\, (m-2\, k)-2\, i\, d\, \sqrt{z}\, (m-2\, k)\right) \Gamma\left(\frac{1}{2}\, (h+j+1),\, -\frac{i\left(-i\, b\, (m-2\, k)-2\, i\, d\, \sqrt{z}\, (m-2\, k)\right)^2}{4\, d\, (m-2\, k)}\right)-$$

$$2\, i\, d\, (m-2\, k) \sqrt{-\frac{i\left(-i\, b\, (m-2\, k)-2\, i\, d\, \sqrt{z}\, (m-2\, k)\right)^2}{d\, (m-2\, k)}}\; \Gamma\left(\frac{1}{2}\, (h+j+2),\right.$$

$$\left.\left.\left. -\frac{i\left(-i\, b\, (m-2\, k)-2\, i\, d\, \sqrt{z}\, (m-2\, k)\right)^2}{4\, d\, (m-2\, k)}\right)\right)\right) + (-1)^m\, i^{-\nu}\, 2^{-m-2\, n-\nu-1} \binom{m}{\frac{m}{2}} (1-m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^\nu\, e^{-\frac{i\, c^2\, (2\, k-\nu)}{4\, f}} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, c\, (2\, k-\nu))^{-h-j+2\, n} \left(c\, i\, (2\, k-\nu)+2\, f\, i\, \sqrt{z}\, (2\, k-\nu)\right)^{h+j}\right.\right.$$

$$\left(\frac{i\left(c\, i\, (2\, k-\nu)+2\, f\, i\, \sqrt{z}\, (2\, k-\nu)\right)^2}{f\, (2\, k-\nu)}\right)^{\frac{1}{2}\, (-h-j-1)} \binom{j}{h} \binom{n}{j} \left(c\, i\, (2\, k-\nu) \left(c\, i\, (2\, k-\nu)+2\, f\, i\, \sqrt{z}\, (2\, k-\nu)\right)\right.$$

$$\Gamma\left(\frac{1}{2}\, (h+j+1),\, \frac{i\left(c\, i\, (2\, k-\nu)+2\, f\, i\, \sqrt{z}\, (2\, k-\nu)\right)^2}{4\, f\, (2\, k-\nu)}\right)+2\, f\, i\, (2\, k-\nu)$$

$$\left.\left.\left.\sqrt{\frac{i\left(c\, i\, (2\, k-\nu)+2\, f\, i\, \sqrt{z}\, (2\, k-\nu)\right)^2}{f\, (2\, k-\nu)}}\; \Gamma\left(\frac{1}{2}\, (h+j+2),\, \frac{i\left(c\, i\, (2\, k-\nu)+2\, f\, i\, \sqrt{z}\, (2\, k-\nu)\right)^2}{4\, f\, (2\, k-\nu)}\right)\right)\right)\right)$$

$$(i\, f\, (2\, k-\nu))^{-2\, n-2}+e^{-\frac{i\, c^2\, (\nu-2\, k)}{4\, f}}\, (i\, f\, (\nu-2\, k))^{-2\, n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, c\, (\nu-2\, k))^{-h-j+2\, n}$$

$$\left(c\, i\, (\nu-2\, k)+2\, f\, i\, \sqrt{z}\, (\nu-2\, k)\right)^{h+j} \left(\frac{i\left(c\, i\, (\nu-2\, k)+2\, f\, i\, \sqrt{z}\, (\nu-2\, k)\right)^2}{f\, (\nu-2\, k)}\right)^{\frac{1}{2}\, (-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\left(c\, i\, (\nu-2\, k) \left(c\, i\, (\nu-2\, k)+2\, f\, i\, \sqrt{z}\, (\nu-2\, k)\right) \Gamma\left(\frac{1}{2}\, (h+j+1),\, \frac{i\left(c\, i\, (\nu-2\, k)+2\, f\, i\, \sqrt{z}\, (\nu-2\, k)\right)^2}{4\, f\, (\nu-2\, k)}\right)+\right.$$

$$2\, f\, i\, (\nu-2\, k) \sqrt{\frac{i\left(c\, i\, (\nu-2\, k)+2\, f\, i\, \sqrt{z}\, (\nu-2\, k)\right)^2}{f\, (\nu-2\, k)}}\; \Gamma\left(\frac{1}{2}\, (h+j+2),\right.$$

$$\left.\left.\left.\frac{i\left(c\,i\,(v-2k)+2\,f\,i\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right)\right)\right)+i^{-m-v}\,2^{-m-2n-v-1}$$

$$\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\sum_{s=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^s\binom{m}{s}\left((-1)^v\,e^{-\frac{(i\,c\,(2k-v)-i\,b\,(2s-m))^2}{4\,(i\,f\,(2k-v)-i\,d\,(2s-m))}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(2k-v)-i\,b\,(2s-m))^{-h-j+2n}\right.\right.$$

$$\left(-i\,b\,(2s-m)+c\,i\,(2k-v)+2\,(i\,f\,(2k-v)-i\,d\,(2s-m))\sqrt{z}\right)^{h+j}$$

$$\left(-\left(-i\,b\,(2s-m)+c\,i\,(2k-v)+2\,(i\,f\,(2k-v)-i\,d\,(2s-m))\sqrt{z}\right)^2\Big/\right.$$

$$\left.(i\,f\,(2k-v)-i\,d\,(2s-m))\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\,c\,(2k-v)-i\,b\,(2s-m))\left(-i\,b\,(2s-m)+c\,i\,(2k-v)+2\,(i\,f\,(2k-v)-i\,d\,(2s-m))\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1),\,-\left(-i\,b\,(2s-m)+c\,i\,(2k-v)+2\,(i\,f\,(2k-v)-i\,d\,(2s-m))\sqrt{z}\right)^2\Big/\right.$$

$$\left.(4\,(i\,f\,(2k-v)-i\,d\,(2s-m)))\right)+2\,(i\,f\,(2k-v)-i\,d\,(2s-m))$$

$$\Gamma\left(\frac{1}{2}(h+j+2),\,-\left(-i\,b\,(2s-m)+c\,i\,(2k-v)+2\,(i\,f\,(2k-v)-i\,d\,(2s-m))\sqrt{z}\right)^2\Big/\right.$$

$$\left.(4\,(i\,f\,(2k-v)-i\,d\,(2s-m)))\right)\sqrt{\left(-\left(-i\,b\,(2s-m)+c\,i\,(2k-v)+\right.\right.}$$

$$\left.\left.\left.\left.2\,(i\,f\,(2k-v)-i\,d\,(2s-m))\sqrt{z}\right)^2\Big/(i\,f\,(2k-v)-i\,d\,(2s-m))\right)\right)\right)$$

$$(i\,f\,(2k-v)-i\,d\,(2s-m))^{-2n-2}+(-1)^{m+v}\,e^{-\frac{(i\,c\,(2k-v)-i\,b\,(m-2s))^2}{4\,(i\,f\,(2k-v)-i\,d\,(m-2s))}}\,(i\,f\,(2k-v)-i\,d\,(m-2s))^{-2n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(2k-v)-i\,b\,(m-2s))^{-h-j+2n}$$

$$\left(-i\,b\,(m-2s)+c\,i\,(2k-v)+2\,(i\,f\,(2k-v)-i\,d\,(m-2s))\sqrt{z}\right)^{h+j}\left(-\left(-i\,b\,(m-2s)+c\,i\,(2k-v)+\right.\right.$$

$$\left.\left.2\,(i\,f\,(2k-v)-i\,d\,(m-2s))\sqrt{z}\right)^2\Big/(i\,f\,(2k-v)-i\,d\,(m-2s))\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\left((i\,c\,(2k-v)-i\,b\,(m-2s))\left(-i\,b\,(m-2s)+c\,i\,(2k-v)+2\,(i\,f\,(2k-v)-i\,d\,(m-2s))\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1),\,-\left(-i\,b\,(m-2s)+c\,i\,(2k-v)+2\,(i\,f\,(2k-v)-i\,d\,(m-2s))\sqrt{z}\right)^2\Big/\right.$$

$$\left.(4\,(i\,f\,(2k-v)-i\,d\,(m-2s)))\right)+2\,(i\,f\,(2k-v)-i\,d\,(m-2s))$$

$$\Gamma\left(\frac{1}{2}(h+j+2),\,-\left(-i\,b\,(m-2s)+c\,i\,(2k-v)+2\,(i\,f\,(2k-v)-i\,d\,(m-2s))\sqrt{z}\right)^2\Big/\right.$$

$$\left.(4\,(i\,f\,(2k-v)-i\,d\,(m-2s)))\right)\sqrt{\left(-\left(-i\,b\,(m-2s)+c\,i\,(2k-v)+\right.\right.}$$

$$\left.\left.2\,(i\,f\,(2k-v)-i\,d\,(m-2s))\sqrt{z}\right)^2\Big/(i\,f\,(2k-v)-i\,d\,(m-2s))\right)\Bigg)+$$

$$e^{-\frac{(i\,c\,(v-2\,k)-i\,b\,(2\,s-m))^2}{4\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))}}\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,k)-i\,b\,(2\,s-m))^{-h-j+2\,n}$$
$$\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\sqrt{z}\right)^{h+j}$$
$$\left(-\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\sqrt{z}\right)^2\Big/\right.$$
$$\left.(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$
$$\Big((i\,c\,(v-2\,k)-i\,b\,(2\,s-m))\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\sqrt{z}\right)$$
$$\Gamma\Big(\frac{1}{2}(h+j+1),\,-\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\sqrt{z}\right)^2\Big/$$
$$(4\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m)))\Big)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))$$
$$\Gamma\Big(\frac{1}{2}(h+j+2),\,-\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\sqrt{z}\right)^2\Big/$$
$$(4\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m)))\Big)\sqrt{\Big(-\big(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+}$$
$$\overline{2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\sqrt{z}\big)^2\Big/(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\Big)}\Big)+$$
$$(-1)^m\,e^{-\frac{(i\,c\,(v-2\,k)-i\,b\,(m-2\,s))^2}{4\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))}}\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,k)-$$
$$i\,b\,(m-2\,s))^{-h-j+2\,n}\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\sqrt{z}\right)^{h+j}$$
$$\left(-\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\sqrt{z}\right)^2\Big/\right.$$
$$\left.(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$
$$\Big((i\,c\,(v-2\,k)-i\,b\,(m-2\,s))\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\sqrt{z}\right)$$
$$\Gamma\Big(\frac{1}{2}(h+j+1),\,-\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\sqrt{z}\right)^2\Big/$$
$$(4\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s)))\Big)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\,\Gamma\Big(\frac{1}{2}(h+j+2),$$
$$-\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\sqrt{z}\right)^2\Big/(4\,(i\,f\,(v-2\,k)-$$
$$i\,d\,(m-2\,s)))\Big)\sqrt{\Big(-\big(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))}$$
$$\overline{\sqrt{z}\big)^2\Big/(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\Big)}\Big)\Big)\,/;\,n\in\mathbb{N}\land m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving $z^n\sin^m(d\,z)\sin^v\left(c\,z^r+f\,z+g\right)$

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$$\int z^n \sin^m(d\,z)\sin^\nu\left(c\,z^2+f\,z+g\right)dz = \frac{2^{-m-\nu} z^{n+1}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)}{n+1} + (-1)^n 2^{-m-\nu}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}$$

$$\left(e^{\frac{i m \pi}{2}}\Gamma(n+1, i\,d\,(m-2k)\,z)\,(-i\,d\,(m-2k))^{-n-1} + e^{-\frac{1}{2} i m \pi}(i\,d\,(m-2k))^{-n-1}\Gamma(n+1, -i\,d\,(m-2k)\,z)\right) -$$

$$2^{-m-\nu-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(e^{\frac{i(\nu-2k)f^2}{4c}+\frac{i\pi\nu}{2}-i\,g\,(\nu-2k)}\right.$$

$$\left(\sum_{j=0}^{n} 2^{j-n}(i\,f\,(\nu-2k))^{n-j}(-i\,f\,(\nu-2k)-2\,i\,c\,z\,(\nu-2k))^{j+1}\left(-\frac{i(-i\,f\,(\nu-2k)-2\,i\,c\,z\,(\nu-2k))^2}{c\,(\nu-2k)}\right)^{\frac{1}{2}(-j-1)}\right.$$

$$\left.\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{i(-i\,f\,(\nu-2k)-2\,i\,c\,z\,(\nu-2k))^2}{4\,c\,(\nu-2k)}\right)\right)(-i\,c\,(\nu-2k))^{-n-1} +$$

$$e^{-\frac{i(\nu-2k)f^2}{4c}-\frac{i\pi\nu}{2}+g\,i\,(\nu-2k)}(i\,c\,(\nu-2k))^{-n-1}\sum_{j=0}^{n}2^{j-n}(-i\,f\,(\nu-2k))^{n-j}(f\,i\,(\nu-2k)+2\,c\,i\,z\,(\nu-2k))^{j+1}$$

$$\left.\left(\frac{i(f\,i\,(\nu-2k)+2\,c\,i\,z\,(\nu-2k))^2}{c\,(\nu-2k)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2}, \frac{i(f\,i\,(\nu-2k)+2\,c\,i\,z\,(\nu-2k))^2}{4\,c\,(\nu-2k)}\right)\right) -$$

$$2^{-m-\nu-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left(e^{-\frac{i(-i\,d\,(m-2k)-i\,f\,(\nu-2s))^2}{4\,c\,(\nu-2s)}+\frac{1}{2}i\pi(m+\nu)-i\,g\,(\nu-2s)}\right.$$

$$\left(\sum_{j=0}^{n}2^{j-n}(d\,i\,(m-2k)+f\,i\,(\nu-2s))^{n-j}(-i\,d\,(m-2k)-i\,f\,(\nu-2s)-2\,i\,c\,(\nu-2s)\,z)^{j+1}\right.$$

$$\left(-\frac{i(-i\,d\,(m-2k)-i\,f\,(\nu-2s)-2\,i\,c\,(\nu-2s)\,z)^2}{c\,(\nu-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\left.\Gamma\left(\frac{j+1}{2}, -\frac{i(-i\,d\,(m-2k)-i\,f\,(\nu-2s)-2\,i\,c\,(\nu-2s)\,z)^2}{4\,c\,(\nu-2s)}\right)\right)(-i\,c\,(\nu-2s))^{-n-1} +$$

$$e^{-\frac{i(i\,d\,(m-2k)-i\,f\,(\nu-2s))^2}{4\,c\,(\nu-2s)}+\frac{1}{2}i\pi(\nu-m)-i\,g\,(\nu-2s)}\left(\sum_{j=0}^{n}2^{j-n}(i\,f\,(\nu-2s)-i\,d\,(m-2k))^{n-j}(d\,i\,(m-2k)-\right.$$

$$\imath\, f\,(v-2\,s)-2\,\imath\, c\,(v-2\,s)\,z)^{j+1}\left(-\frac{\imath\,(d\,\imath\,(m-2\,k)-\imath\, f\,(v-2\,s)-2\,\imath\, c\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,-\frac{\imath\,(d\,\imath\,(m-2\,k)-\imath\, f\,(v-2\,s)-2\,\imath\, c\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\Bigg)(-\imath\, c\,(v-2\,s))^{-n-1}+$$

$$e^{\frac{\imath\,(\imath\, f\,(v-2\,s)-\imath\, d\,(m-2\,k))^2}{4\,c\,(v-2\,s)}+\frac{1}{2}\,\imath\,\pi\,(m-v)+g\,\imath\,(v-2\,s)}\,(\imath\, c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(\imath\, d\,(m-2\,k)-\imath\, f\,(v-2\,s))^{n-j}\,(-\imath\, d\,(m-2\,k)+$$

$$f\,\imath\,(v-2\,s)+2\,c\,\imath\,(v-2\,s)\,z)^{j+1}\left(\frac{\imath\,(-\imath\, d\,(m-2\,k)+f\,\imath\,(v-2\,s)+2\,c\,\imath\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,\frac{\imath\,(-\imath\, d\,(m-2\,k)+f\,\imath\,(v-2\,s)+2\,c\,\imath\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)+$$

$$e^{\frac{\imath\,(d\,\imath\,(m-2\,k)+f\,\imath\,(v-2\,s))^2}{4\,c\,(v-2\,s)}-\frac{1}{2}\,\imath\,\pi\,(m+v)+g\,\imath\,(v-2\,s)}\,(\imath\, c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-\imath\, d\,(m-2\,k)-\imath\, f\,(v-2\,s))^{n-j}$$

$$(d\,\imath\,(m-2\,k)+f\,\imath\,(v-2\,s)+2\,c\,\imath\,(v-2\,s)\,z)^{j+1}\left(\frac{\imath\,(d\,\imath\,(m-2\,k)+f\,\imath\,(v-2\,s)+2\,c\,\imath\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,\frac{\imath\,(d\,\imath\,(m-2\,k)+f\,\imath\,(v-2\,s)+2\,c\,\imath\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\Bigg)\Bigg)\,/;\,n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

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$$\int z^n\sin^m(d\,z)\sin^v\!\left(\sqrt{z}\,c+f\,z+g\right)dz=$$

$$\frac{2^{-m-v}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m\bmod 2)\,(1-v\bmod 2)}{n+1}+(-1)^n\,2^{-m-v}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}$$

$$\left(e^{\frac{\imath\, m\,\pi}{2}}\,\Gamma(n+1,\,\imath\, d\,(m-2\,k)\,z)\,(-\imath\, d\,(m-2\,k))^{-n-1}+e^{-\frac{1}{2}\,\imath\, m\,\pi}\,(\imath\, d\,(m-2\,k))^{-n-1}\,\Gamma(n+1,\,-\imath\, d\,(m-2\,k)\,z)\right)+$$

$$2^{-m-2\,n-v-1}\binom{m}{\frac{m}{2}}(1-m\bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{k+n-1}\,(f\,(v-2\,k))^{-2\,(n+1)}\binom{v}{k}$$

$$\Bigg(e^{-\frac{\imath\,(v-2\,k)\,c^2}{4\,f}-\frac{\imath\,\pi\, v}{2}+g\,\imath\,(v-2\,k)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(\imath\, c\,(v-2\,k))^{-h-j+2\,n}\left(c\,\imath\,(v-2\,k)+2\,f\,\imath\,\sqrt{z}\,(v-2\,k)\right)^{h+j}$$

$$\left(\frac{\imath\left(c\,\imath\,(v-2\,k)+2\,f\,\imath\,\sqrt{z}\,(v-2\,k)\right)^2}{f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(c\,\imath\,(v-2\,k)\left(c\,\imath\,(v-2\,k)+2\,f\,\imath\,\sqrt{z}\,(v-2\,k)\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\ \frac{i\left(c\,i\,(v-2k)+2\,f\,i\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\Bigg)+2\,f\,i\,(v-2k)$$

$$\sqrt{\frac{i\left(c\,i\,(v-2k)+2\,f\,i\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}}\ \Gamma\!\left(\frac{1}{2}(h+j+2),\ \frac{i\left(c\,i\,(v-2k)+2\,f\,i\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right)\Bigg)\Bigg)+$$

$$e^{\frac{i(v-2k)c^2}{4f}+\frac{i\pi v}{2}-i\,g\,(v-2k)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2k))^{-h-j+2n}\left(-i\,c\,(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,c\,(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(-i\,c\,(v-2k)$$

$$\left(-i\,c\,(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\ -\frac{i\left(-i\,c\,(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right)-$$

$$2\,i\,f\,(v-2k)\sqrt{-\frac{i\left(-i\,c\,(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}}\ \Gamma\Bigg(\frac{1}{2}(h+j+2),$$

$$-\frac{i\left(-i\,c\,(v-2k)-2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\Bigg)\Bigg)\Bigg)\Bigg)+$$

$$2^{-m-2n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg(e^{\frac{c^2(v-2s)^2}{4(i\,f\,(v-2s)-i\,d\,(m-2k))}+g\,i\,(v-2s)+\frac{1}{2}i\,\pi\,(m-v)}$$

$$\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2s))^{-h-j+2n}\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\sqrt{z}\right)^2}{i\,f\,(v-2s)-i\,d\,(m-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Big(c\,i\,(v-2s)\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\sqrt{z}\right)$$

$$\Gamma\Bigg(\frac{1}{2}(h+j+1),\ -\left(c\,i\,(v-2s)+2\,(i\,f\,(v-2s)-i\,d\,(m-2k))\sqrt{z}\right)^2\Big/$$

$$(4\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k)))\Big)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\,\Gamma\Big(\frac{1}{2}\,(h+j+2),$$

$$-\left(c\,i\,(v-2\,s)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\,\sqrt{z}\right)^2\Big/(4\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k)))\Big)$$

$$\sqrt{\left(-\left(c\,i\,(v-2\,s)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\,\sqrt{z}\right)^2\Big/(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\right)}\Bigg)$$

$$(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))^{-2\,(n+1)}+e^{\frac{c^2\,(v-2\,s)^2}{4\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))}+g\,i\,(v-2\,s)-\frac{1}{2}\,i\,\pi\,(m+v)}\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s))^{-h-j+2\,n}\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2}{d\,i\,(m-2\,k)+f\,i\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg(c\,i\,(v-2\,s)\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}\,(h+j+1),$$

$$-\frac{\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))}\Bigg)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))$$

$$\Gamma\left(\frac{1}{2}\,(h+j+2),-\frac{\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))}\right)$$

$$\sqrt{\left(-\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2\Big/(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\right)}\Bigg)+$$

$$e^{\frac{c^2\,(v-2\,s)^2}{4\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))}-i\,g\,(v-2\,s)+\frac{1}{2}\,i\,\pi\,(m+v)}\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2\,s))^{-h-j+2\,n}\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^{h+j}$$

$$\left(-\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^2\Big/(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Bigg(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{\left(-\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^2\Big/\right.}$$

$$\left.(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\right)\Gamma\Big(\frac{1}{2}\,(h+j+2),$$

$$-\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^2\Big/(4\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s)))\Big)-$$

$$i\,c\,(v-2\,s)\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)\Gamma\Big(\frac{1}{2}\,(h+j+1),$$

$$-\left(2\left(-i\,d\,(m-2k)-i\,f\,(v-2s)\right)\sqrt{z}-i\,c\,(v-2s)\right)^2\Big/\left(4\left(-i\,d\,(m-2k)-i\,f\,(v-2s)\right)\right)\Bigg)\Bigg)+$$

$$e^{\frac{c^2(v-2s)^2}{4(i\,d\,(m-2k)-i\,f\,(v-2s))}-i\,g\,(v-2s)+\frac{1}{2}i\,\pi\,(v-m)}\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)^{-2(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\left(-i\,c\,(v-2s)\right)^{-h-j+2n}\left(2\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)\sqrt{z}-i\,c\,(v-2s)\right)^{h+j}$$

$$\left(-\frac{\left(2\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)\sqrt{z}-i\,c\,(v-2s)\right)^2}{i\,d\,(m-2k)-i\,f\,(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg(2\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)$$

$$\sqrt{\left(-\left(2\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)\sqrt{z}-i\,c\,(v-2s)\right)^2\Big/\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)\right)}$$

$$\Gamma\left(\frac{1}{2}(h+j+2),\,-\frac{\left(2\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)\sqrt{z}-i\,c\,(v-2s)\right)^2}{4\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)}\right)-$$

$$i\,c\,(v-2s)\left(2\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)\sqrt{z}-i\,c\,(v-2s)\right)\Gamma\Bigg(\frac{1}{2}(h+j+1),$$

$$-\frac{\left(2\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)\sqrt{z}-i\,c\,(v-2s)\right)^2}{4\left(i\,d\,(m-2k)-i\,f\,(v-2s)\right)}\Bigg)\Bigg)\Bigg)\Bigg)\,/;\,n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $z^n\sin^m(d\,z+e)\sin^v\left(c\,z^r+f\,z+g\right)$

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$$\int z^n\sin^m(d\,z+e)\sin^v\left(c\,z^2+f\,z+g\right)dz = \frac{2^{-m-v}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m\bmod 2)(1-v\bmod 2)}{n+1}+$$

$$(-1)^n\,2^{-m-v}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\Bigg(e^{\frac{i\,m\,\pi}{2}-i\,e\,(m-2k)}\,\Gamma(n+1,\,i\,d\,(m-2k)\,z)\left(-i\,d\,(m-2k)\right)^{-n-1}+$$

$$e^{i\,e\,(m-2k)-\frac{i\,m\,\pi}{2}}\left(i\,d\,(m-2k)\right)^{-n-1}\Gamma(n+1,\,-i\,d\,(m-2k)\,z)\Bigg)-$$

$$2^{-m-v-1}\binom{m}{\frac{m}{2}}(1-m\bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\Bigg(e^{\frac{i\,(v-2k)\,f^2}{4c}+\frac{i\,\pi\,v}{2}-i\,g\,(v-2k)}$$

$$\left(\sum_{j=0}^{n} 2^{j-n} (i\, f\, (v-2k))^{n-j} (-i\, f\, (v-2k) - 2\, i\, c\, z\, (v-2k))^{j+1} \left(-\frac{i\, (-i\, f\, (v-2k) - 2\, i\, c\, z\, (v-2k))^2}{c\, (v-2k)}\right)^{\frac{1}{2}(-j-1)}\right.$$

$$\left.\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i\, (-i\, f\, (v-2k) - 2\, i\, c\, z\, (v-2k))^2}{4\, c\, (v-2k)}\right)\right) (-i\, c\, (v-2k))^{-n-1} +$$

$$e^{-\frac{i (v-2k) f^2}{4c} - \frac{i \pi v}{2} + g\, i\, (v-2k)} (i\, c\, (v-2k))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i\, f\, (v-2k))^{n-j} (f\, i\, (v-2k) + 2\, c\, i\, z\, (v-2k))^{j+1}$$

$$\left(\frac{i\, (f\, i\, (v-2k) + 2\, c\, i\, z\, (v-2k))^2}{c\, (v-2k)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i\, (f\, i\, (v-2k) + 2\, c\, i\, z\, (v-2k))^2}{4\, c\, (v-2k)}\right)\Bigg) -$$

$$2^{-m-v-1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(e^{-\frac{i (-i d (m-2k) - i f (v-2s))^2}{4 c (v-2s)} - i\, e\, (m-2k) + \frac{1}{2} i \pi (m+v) - i\, g\, (v-2s)}\right.$$

$$\left(\sum_{j=0}^{n} 2^{j-n} (d\, i\, (m-2k) + f\, i\, (v-2s))^{n-j} (-i\, d\, (m-2k) - i\, f\, (v-2s) - 2\, i\, c\, (v-2s)\, z)^{j+1}\right.$$

$$\left(-\frac{i\, (-i\, d\, (m-2k) - i\, f\, (v-2s) - 2\, i\, c\, (v-2s)\, z)^2}{c\, (v-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}$$

$$\left.\Gamma\left(\frac{j+1}{2}, -\frac{i\, (-i\, d\, (m-2k) - i\, f\, (v-2s) - 2\, i\, c\, (v-2s)\, z)^2}{4\, c\, (v-2s)}\right)\right) (-i\, c\, (v-2s))^{-n-1} +$$

$$e^{-\frac{i (i d (m-2k) - i f (v-2s))^2}{4 c (v-2s)} + e\, i\, (m-2k) - i\, g\, (v-2s) + \frac{1}{2} i (v-m) \pi} \left(\sum_{j=0}^{n} 2^{j-n} (i\, f\, (v-2s) - i\, d\, (m-2k))^{n-j} (d\, i\, (m-2k) -\right.$$

$$i\, f\, (v-2s) - 2\, i\, c\, (v-2s)\, z)^{j+1} \left(-\frac{i\, (d\, i\, (m-2k) - i\, f\, (v-2s) - 2\, i\, c\, (v-2s)\, z)^2}{c\, (v-2s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i\, (d\, i\, (m-2k) - i\, f\, (v-2s) - 2\, i\, c\, (v-2s)\, z)^2}{4\, c\, (v-2s)}\right)\right)$$

$$(-i\, c\, (v-2s))^{-n-1} + e^{\frac{i (i f (v-2s) - i d (m-2k))^2}{4 c (v-2s)} - i\, e\, (m-2k) + \frac{1}{2} i \pi (m-v) + g\, i\, (v-2s)} (i\, c\, (v-2s))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i\, d\, (m-2k) - i\, f\, (v-2s))^{n-j} (-i\, d\, (m-2k) + f\, i\, (v-2s) + 2\, c\, i\, (v-2s)\, z)^{j+1}$$

$$\left(\frac{i\, (-i\, d\, (m-2k) + f\, i\, (v-2s) + 2\, c\, i\, (v-2s)\, z)^2}{c\, (v-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2}, \frac{i\,(-i\,d\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)+$$

$$e^{\frac{i\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))^2}{4\,c\,(v-2\,s)}+e\,i\,(m-2\,k)+g\,i\,(v-2\,s)-\frac{1}{2}\,i\,(m+v)\,\pi}\,(i\,c\,(v-2\,s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^{n-j}$$

$$(d\,i\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^{j+1}\left(\frac{i\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\left.\binom{n}{j}\Gamma\left(\frac{j+1}{2}, \frac{i\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s)+2\,c\,i\,(v-2\,s)\,z)^2}{4\,c\,(v-2\,s)}\right)\right)\right) /;\, n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

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$$\int z^n\,\sin^m(d\,z+e)\,\sin^v\left(\sqrt{z}\;c+f\,z+g\right)dz = \frac{2^{-m-v}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m \bmod 2)\,(1-v \bmod 2)}{n+1}+$$

$$(-1)^n\,2^{-m-v}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(e^{\frac{i\,m\,\pi}{2}-i\,e\,(m-2\,k)}\,\Gamma(n+1,\,i\,d\,(m-2\,k)\,z)\,(-i\,d\,(m-2\,k))^{-n-1}+\right.$$

$$\left.e^{i\,e\,(m-2\,k)-\frac{i\,m\,\pi}{2}}\,(i\,d\,(m-2\,k))^{-n-1}\,\Gamma(n+1,\,-i\,d\,(m-2\,k)\,z)\right)+2^{-m-2\,n-v-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{k+n-1}\binom{v}{k}$$

$$(f\,(v-2\,k))^{-2\,(n+1)}\left(e^{-\frac{i\,(v-2\,k)\,c^2}{4\,f}-\frac{i\,\pi\,v}{2}+g\,i\,(v-2\,k)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,k))^{-h-j+2\,n}\left(c\,i\,(v-2\,k)+2\,f\,i\sqrt{z}\;(v-2\,k)\right)^{h+j}\right.$$

$$\left(\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\sqrt{z}\;(v-2\,k)\right)^2}{f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(c\,i\,(v-2\,k)\left(c\,i\,(v-2\,k)+2\,f\,i\sqrt{z}\;(v-2\,k)\right)\Gamma\left(\right.\right.$$

$$\left.\frac{1}{2}\,(h+j+1),\,\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\sqrt{z}\;(v-2\,k)\right)^2}{4\,f\,(v-2\,k)}\right)+2\,f\,i\,(v-2\,k)$$

$$\left.\left.\sqrt{\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\sqrt{z}\;(v-2\,k)\right)^2}{f\,(v-2\,k)}}\;\Gamma\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\sqrt{z}\;(v-2\,k)\right)^2}{4\,f\,(v-2\,k)}\right)\right)\right)+$$

$$e^{\frac{i\,(v-2\,k)\,c^2}{4\,f}+\frac{i\,\pi\,v}{2}-i\,g\,(v-2\,k)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2\,k))^{-h-j+2\,n}\left(-i\,c\,(v-2\,k)-2\,i\,f\sqrt{z}\;(v-2\,k)\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,c\,(v-2\,k)-2\,i\,f\,\sqrt{z}\,(v-2\,k)\right)^2}{f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(-i\,c\,(v-2\,k)\left(-i\,c\,(v-2\,k)-2\,i\,f\,\sqrt{z}\,(v-2\,k)\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(-i\,c\,(v-2\,k)-2\,i\,f\,\sqrt{z}\,(v-2\,k)\right)^2}{4\,f\,(v-2\,k)}\right)-2\,i\,f\,(v-2\,k)\sqrt{-\frac{i\left(-i\,c\,(v-2\,k)-2\,i\,f\,\sqrt{z}\,(v-2\,k)\right)^2}{f\,(v-2\,k)}}\;\Gamma\left(\frac{1}{2}(h+j+2),-\frac{i\left(-i\,c\,(v-2\,k)-2\,i\,f\,\sqrt{z}\,(v-2\,k)\right)^2}{4\,f\,(v-2\,k)}\right)\right)\Bigg)\Bigg)+$$

$$2^{-m-2\,n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left(e^{\frac{c^2\,(v-2\,s)^2}{4\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))}+g\,i\,(v-2\,s)-i\,e\,(m-2\,k)+\frac{1}{2}\,i\,\pi\,(m-v)}\right.$$

$$\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s))^{-h-j+2\,n}\left(c\,i\,(v-2\,s)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{\left(c\,i\,(v-2\,s)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\sqrt{z}\right)^2}{i\,f\,(v-2\,s)-i\,d\,(m-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Bigg(c\,i\,(v-2\,s)\left(c\,i\,(v-2\,s)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1),-\left(c\,i\,(v-2\,s)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\sqrt{z}\right)^2\Big/(4\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k)))\right)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\,\Gamma\left(\frac{1}{2}(h+j+2),-\left(c\,i\,(v-2\,s)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\sqrt{z}\right)^2\Big/(4\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k)))\right)$$

$$\sqrt{\left(-\left(c\,i\,(v-2\,s)+2\,(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\sqrt{z}\right)^2\Big/(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))\right)}\Bigg)\Bigg)$$

$$(i\,f\,(v-2\,s)-i\,d\,(m-2\,k))^{-2\,(n+1)}+e^{\frac{c^2\,(v-2\,s)^2}{4\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))}+g\,i\,(v-2\,s)+e\,i\,(m-2\,k)-\frac{1}{2}\,i\,(m+v)\,\pi}$$

$$(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^{j}\,(i\,c\,(v-2\,s))^{-h-j+2\,n}\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^{2}}{d\,i\,(m-2\,k)+f\,i\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(c\,i\,(v-2\,s)\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\right.\right.$$

$$\left.-\frac{\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^{2}}{4\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))}\right)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^{2}}{4\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))}\right)$$

$$\left.\sqrt{\left(-\left(c\,i\,(v-2\,s)+2\,(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\,\sqrt{z}\right)^{2}\Big/(d\,i\,(m-2\,k)+f\,i\,(v-2\,s))\right)}\right)+$$

$$e^{\frac{c^{2}\,(v-2\,s)^{2}}{4\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))}-i\,g\,(v-2\,s)-i\,e\,(m-2\,k)+\frac{1}{2}\,i\,\pi\,(m+v)}\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^{j}\,(-i\,c\,(v-2\,s))^{-h-j+2\,n}\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^{h+j}$$

$$\left(-\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^{2}\Big/(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\sqrt{\left(-\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^{2}\Big/\right.}\right.$$

$$\left.(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\right)\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.$$

$$\left.-\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^{2}\Big/(4\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s)))\right)-$$

$$i\,c\,(v-2\,s)\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\right.$$

$$\left.\left.-\left(2\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^{2}\Big/(4\,(-i\,d\,(m-2\,k)-i\,f\,(v-2\,s)))\right)\right)+$$

$$e^{\frac{c^{2}\,(v-2\,s)^{2}}{4\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))}-i\,g\,(v-2\,s)+e\,i\,(m-2\,k)+\frac{1}{2}\,i\,(v-m)\,\pi}\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^{j}\,(-i\,c\,(v-2\,s))^{-h-j+2\,n}\left(2\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\,\sqrt{z}-i\,c\,(v-2\,s)\right)^{h+j}$$

$$\left(-\frac{\left(2\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\sqrt{z}\,-i\,c\,(v-2\,s)\right)^2}{i\,d\,(m-2\,k)-i\,f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg(2\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))$$

$$\sqrt{\left(-\left(2\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\sqrt{z}\,-i\,c\,(v-2\,s)\right)^2\Big/(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\right)}$$

$$\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{\left(2\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\sqrt{z}\,-i\,c\,(v-2\,s)\right)^2}{4\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))}\right)-$$

$$i\,c\,(v-2\,s)\left(2\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\sqrt{z}\,-i\,c\,(v-2\,s)\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\right.$$

$$\left.\left.\left.-\frac{\left(2\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))\sqrt{z}\,-i\,c\,(v-2\,s)\right)^2}{4\,(i\,d\,(m-2\,k)-i\,f\,(v-2\,s))}\right)\right)\right)\Bigg)\;/;\; n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $z^n \sin^m\left(b\, z^r\right) \sin^v\left(c\, z^r + f\, z + g\right)$

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$$\int z^n \sin^m\left(b\,z^2\right)\sin^v\left(c\,z^2+f\,z+g\right)dz = \frac{2^{-m-v}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m \bmod 2)\,(1-v \bmod 2)}{n+1}-$$

$$2^{-m-v-1}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(e^{-\frac{1}{2}i\,m\,\pi}\,z^{n+1}\,\Gamma\!\left(\frac{n+1}{2},\,-i\,b\,(m-2\,k)\,z^2\right)\left(-i\,b\,(m-2\,k)\,z^2\right)^{\frac{1}{2}(-n-1)}+\right.$$

$$\left.e^{\frac{i\,m\,\pi}{2}}\,z^{n+1}\left(i\,b\,(m-2\,k)\,z^2\right)^{\frac{1}{2}(-n-1)}\,\Gamma\!\left(\frac{n+1}{2},\,i\,b\,(m-2\,k)\,z^2\right)\right)-$$

$$2^{-m-v-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\Bigg(e^{\frac{i\,(v-2\,k)\,f^2}{4\,c}+\frac{i\,\pi\,v}{2}-i\,g\,(v-2\,k)}$$

$$\left(\sum_{j=0}^{n}2^{j-n}\,(i\,f\,(v-2\,k))^{n-j}\,(-i\,f\,(v-2\,k)-2\,i\,c\,z\,(v-2\,k))^{j+1}\left(-\frac{i\,(-i\,f\,(v-2\,k)-2\,i\,c\,z\,(v-2\,k))^2}{c\,(v-2\,k)}\right)^{\frac{1}{2}(-j-1)}\right.$$

$$\left.\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,-\frac{i\,(-i\,f\,(v-2\,k)-2\,i\,c\,z\,(v-2\,k))^2}{4\,c\,(v-2\,k)}\right)\right)(-i\,c\,(v-2\,k))^{-n-1}+$$

$$e^{-\frac{i(v-2k)f^2}{4c}-\frac{i\pi v}{2}+g\,i\,(v-2k)}\,(i\,c\,(v-2k))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,f\,(v-2k))^{n-j}\,(f\,i\,(v-2k)+2\,c\,i\,z\,(v-2k))^{j+1}$$

$$\left(\frac{i\,(f\,i\,(v-2k)+2\,c\,i\,z\,(v-2k))^2}{c\,(v-2k)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,\frac{i\,(f\,i\,(v-2k)+2\,c\,i\,z\,(v-2k))^2}{4\,c\,(v-2k)}\right)\Bigg)-$$

$$2^{-m-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg(e^{-\frac{1}{4}i\left(-\frac{f^2(v-2s)^2}{-2bk+bm+2cs-cv}-4g(v-2s)-2\pi(m-v)\right)}\Bigg(\sum_{j=0}^{n}2^{j-n}\,(-i\,f\,(v-2s))^{n-j}\,(f\,i\,(v-2s)+$$

$$2\,(i\,c\,(v-2s)-i\,b\,(m-2k))\,z)^{j+1}\left(-\frac{(f\,i\,(v-2s)+2\,(i\,c\,(v-2s)-i\,b\,(m-2k))\,z)^2}{i\,c\,(v-2s)-i\,b\,(m-2k)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,-\frac{(f\,i\,(v-2s)+2\,(i\,c\,(v-2s)-i\,b\,(m-2k))\,z)^2}{4\,(i\,c\,(v-2s)-i\,b\,(m-2k))}\right)\Bigg)(i\,c\,(v-2s)-i\,b\,(m-2k))^{-n-1}+$$

$$e^{\frac{1}{4}i\left(\frac{f^2(v-2s)^2}{2bk-bm+2cs-cv}+4g(v-2s)-2\pi(m+v)\right)}\,(b\,i\,(m-2k)+c\,i\,(v-2s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-i\,f\,(v-2s))^{n-j}\,(f\,i\,(v-2s)+$$

$$2\,(b\,i\,(m-2k)+c\,i\,(v-2s))\,z)^{j+1}\left(-\frac{(f\,i\,(v-2s)+2\,(b\,i\,(m-2k)+c\,i\,(v-2s))\,z)^2}{b\,i\,(m-2k)+c\,i\,(v-2s)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},\,-\frac{(f\,i\,(v-2s)+2\,(b\,i\,(m-2k)+c\,i\,(v-2s))\,z)^2}{4\,(b\,i\,(m-2k)+c\,i\,(v-2s))}\right)+e^{-\frac{1}{4}i\left(\frac{f^2(v-2s)^2}{2bk-bm+2cs-cv}+4g(v-2s)-2\pi(m+v)\right)}$$

$$(-i\,b\,(m-2k)-i\,c\,(v-2s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(i\,f\,(v-2s))^{n-j}\,(2\,(-i\,b\,(m-2k)-i\,c\,(v-2s))\,z-i\,f\,(v-2s))^{j+1}$$

$$\left(-\frac{(2\,(-i\,b\,(m-2k)-i\,c\,(v-2s))\,z-i\,f\,(v-2s))^2}{-i\,b\,(m-2k)-i\,c\,(v-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\Gamma\!\left(\frac{j+1}{2},\,-\frac{(2\,(-i\,b\,(m-2k)-i\,c\,(v-2s))\,z-i\,f\,(v-2s))^2}{4\,(-i\,b\,(m-2k)-i\,c\,(v-2s))}\right)+e^{\frac{1}{4}i\left(-\frac{f^2(v-2s)^2}{-2bk+bm+2cs-cv}-4g(v-2s)+2\pi(v-m)\right)}$$

$$(i\,b\,(m-2k)-i\,c\,(v-2s))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(i\,f\,(v-2s))^{n-j}\,(2\,(i\,b\,(m-2k)-i\,c\,(v-2s))\,z-i\,f\,(v-2s))^{j+1}$$

$$\left(-\frac{(2\,(i\,b\,(m-2k)-i\,c\,(v-2s))\,z-i\,f\,(v-2s))^2}{i\,b\,(m-2k)-i\,c\,(v-2s)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\Gamma\!\left(\frac{j+1}{2},\,-\frac{(2\,(i\,b\,(m-2k)-i\,c\,(v-2s))\,z-i\,f\,(v-2s))^2}{4\,(i\,b\,(m-2k)-i\,c\,(v-2s))}\right)\Bigg)\Bigg)\,/;\;n\in\mathbb{N}\land m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

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$$\int z^n \sin^m\left(b\sqrt{z}\right)\sin^v\left(\sqrt{z}\,c + f\,z + g\right)dz = -(-1)^{n+1}\,2^{-m-v+1}\binom{v}{\frac{v}{2}}(1 - v \bmod 2)$$

$$\left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\,(m-2k)^{-2(n+1)}\binom{m}{k}\left(e^{-\frac{1}{2}i\,m\,\pi}\,\Gamma\left(2(n+1),\,-i\,b\,(m-2k)\sqrt{z}\right) + e^{\frac{i\,m\,\pi}{2}}\,\Gamma\left(2(n+1),\,i\,b\,(m-2k)\sqrt{z}\right)\right)\right)$$

$$b^{-2(n+1)} + \frac{2^{-m-v}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1 - m \bmod 2)\,(1 - v \bmod 2)}{n+1} + 2^{-m-2n-v-1}\binom{m}{\frac{m}{2}}(1 - m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\left(e^{\frac{i(v-2k)c^2}{4f}+\frac{i\pi v}{2}-i\,g\,(v-2k)}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,c\,(v-2k))^{-h-j+2n}\left(-i\,c\,(v-2k) - 2\,i\,f\sqrt{z}\,(v-2k)\right)^{h+j}\right.\right.$$

$$\left(-\frac{i\left(-i\,c\,(v-2k) - 2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(-i\,c\,(v-2k)\right.$$

$$\left(-i\,c\,(v-2k) - 2\,i\,f\sqrt{z}\,(v-2k)\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,c\,(v-2k) - 2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right) - 2$$

$$i\,f\,(v-2k)\sqrt{-\frac{i\left(-i\,c\,(v-2k) - 2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(-i\,c\,(v-2k) - 2\,i\,f\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right)\right)\right)(-i\,f\,(v-2k))^{-2(n+1)} + e^{-\frac{i(v-2k)c^2}{4f}-\frac{i\pi v}{2}+g\,i\,(v-2k)}$$

$$(i\,f\,(v-2k))^{-2(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2k))^{-h-j+2n}\left(c\,i\,(v-2k) + 2\,f\,i\sqrt{z}\,(v-2k)\right)^{h+j}$$

$$\left(\frac{i\left(c\,i\,(v-2k) + 2\,f\,i\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(c\,i\,(v-2k)\left(c\,i\,(v-2k) + 2\,f\,i\sqrt{z}\,(v-2k)\right)\Gamma\left(\right.\right.$$

$$\left.\frac{1}{2}(h+j+1),\,\frac{i\left(c\,i\,(v-2k) + 2\,f\,i\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right) + 2\,f\,i\,(v-2k)$$

$$\sqrt{\frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,\frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right)\Bigg)\Bigg)+$$

$$2^{-m-2n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg(e^{-\frac{i\,(i\,b\,(m-2k)-i\,c\,(v-2s))^2}{4\,f\,(v-2s)}+\frac{1}{2}\,i\,\pi\,(v-m)-i\,g\,(v-2s)}$$

$$\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b\,(m-2k)-i\,c\,(v-2s))^{-h-j+2n}\left(b\,i\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(b\,i\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2}{f\,(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\,b\,(m-2k)-i\,c\,(v-2s))\left(b\,i\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{1}{4\,f\,(v-2s)}\left(i\left(b\,i\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2\right)\right)-$$

$$2\,i\,f\,(v-2s)\sqrt{\left(-\frac{1}{f\,(v-2s)}\left(i\left(b\,i\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2\right)\right)}$$

$$\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{1}{4\,f\,(v-2s)}\left(i\left(b\,i\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2\right)\right)\Bigg)\Bigg)$$

$$(-i\,f\,(v-2s))^{-2(n+1)}+e^{-\frac{i\,(-i\,b\,(m-2k)-i\,c\,(v-2s))^2}{4\,f\,(v-2s)}+\frac{1}{2}\,i\,\pi\,(m+v)-i\,g\,(v-2s)}\,\mathrm{Sum}\Big(\mathrm{Sum}\Big((-1)^{j-h}\,4^j$$

$$(-i\,b\,(m-2k)-i\,c\,(v-2s))^{-h-j+2n}\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{1}{f\,(v-2s)}\left(i\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2\right)\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Big((-i\,b\,(m-2k)-i\,c\,(v-2s))\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{1}{4\,f\,(v-2s)}\left(i\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2\right)\right)-2\,i\,f$$

$$(v-2s)\sqrt{\left(-\frac{1}{f\,(v-2s)}\left(i\left(-i\,b\,(m-2k)-i\,c\,(v-2s)-2\,i\,f\,(v-2s)\,\sqrt{z}\right)^2\right)\right)}\,\Gamma\!\left(\frac{1}{2}(h+j+2),\right.$$

$$-\frac{1}{4 f (v-2 s)} \left(i \left(-i b (m-2 k) - i c (v-2 s) - 2 i f (v-2 s) \sqrt{z}\right)^2\right)\Bigg)\Bigg), \{h, 0, j\}\Bigg), \{j, 0, n\}\Bigg)$$

$$(-i f (v-2 s))^{-2 (n+1)} + e^{\frac{i (i c (v-2 s) - i b (m-2 k))^2}{4 f (v-2 s)} + \frac{1}{2} i \pi (m-v) + g i (v-2 s)} (i f (v-2 s))^{-2 (n+1)}$$

$$\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i c (v-2 s) - i b (m-2 k))^{-h-j+2 n} \left(-i b (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)^{h+j}$$

$$\left(\frac{i \left(-i b (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)^2}{f (v-2 s)}\right)^{\frac{1}{2} (-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\Bigg((i c (v-2 s) - i b (m-2 k)) \left(-i b (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2} (h+j+1), \frac{1}{4 f (v-2 s)} \left(i \left(-i b (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)^2\right)\right) +$$

$$2 f i (v-2 s) \Gamma\left(\frac{1}{2} (h+j+2), \frac{1}{4 f (v-2 s)} \left(i \left(-i b (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)^2\right)\right)$$

$$\sqrt{\left(\frac{1}{f (v-2 s)} \left(i \left(-i b (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)^2\right)\right)}\Bigg) +$$

$$e^{\frac{i (b i (m-2 k) + c i (v-2 s))^2}{4 f (v-2 s)} - \frac{1}{2} i \pi (m+v) + g i (v-2 s)} (i f (v-2 s))^{-2 (n+1)} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j$$

$$(b i (m-2 k) + c i (v-2 s))^{-h-j+2 n} \left(b i (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)^{h+j}$$

$$\left(\frac{i \left(b i (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)^2}{f (v-2 s)}\right)^{\frac{1}{2} (-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\Bigg((b i (m-2 k) + c i (v-2 s)) \left(b i (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2} (h+j+1), \frac{i \left(b i (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)^2}{4 f (v-2 s)}\right) +$$

$$2 f i (v-2 s) \Gamma\left(\frac{1}{2} (h+j+2), \frac{i \left(b i (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)^2}{4 f (v-2 s)}\right)$$

$$\sqrt{\frac{i \left(b i (m-2 k) + c i (v-2 s) + 2 f i (v-2 s) \sqrt{z}\right)^2}{f (v-2 s)}}\Bigg)\Bigg) /; n \in \mathbb{N} \bigwedge m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

Involving $z^n \sin^m\left(b z^r + e\right) \sin^v\left(c z^r + f z + g\right)$

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$$\int z^n \sin^m\left(b z^2 + e\right) \sin^v\left(c z^2 + f z + g\right) dz = \frac{2^{-m-v} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2)}{n+1} -$$

$$2^{-m-v-1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left(e^{i e (m-2k) - \frac{i m \pi}{2}} z^{n+1} \Gamma\left(\frac{n+1}{2}, -i b (m-2k) z^2\right) \left(-i b (m-2k) z^2\right)^{\frac{1}{2}(-n-1)} + \right.$$

$$\left. e^{\frac{i m \pi}{2} - i e (m-2k)} z^{n+1} \left(i b (m-2k) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, i b (m-2k) z^2\right) \right) -$$

$$2^{-m-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \left(e^{\frac{i (v-2k) f^2}{4c} + \frac{i \pi v}{2} - i g (v-2k)} \right.$$

$$\left(\sum_{j=0}^{n} 2^{j-n} \left(i f (v-2k)\right)^{n-j} \left(-i f (v-2k) - 2 i c z (v-2k)\right)^{j+1} \left(-\frac{i \left(-i f (v-2k) - 2 i c z (v-2k)\right)^2}{c (v-2k)} \right)^{\frac{1}{2}(-j-1)} \right.$$

$$\left. \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i \left(-i f (v-2k) - 2 i c z (v-2k)\right)^2}{4 c (v-2k)} \right) \right) \left(-i c (v-2k)\right)^{-n-1} +$$

$$e^{-\frac{i (v-2k) f^2}{4c} - \frac{i \pi v}{2} + g i (v-2k)} \left(i c (v-2k)\right)^{-n-1} \sum_{j=0}^{n} 2^{j-n} \left(-i f (v-2k)\right)^{n-j} \left(f i (v-2k) + 2 c i z (v-2k)\right)^{j+1}$$

$$\left. \left(\frac{i \left(f i (v-2k) + 2 c i z (v-2k)\right)^2}{c (v-2k)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i \left(f i (v-2k) + 2 c i z (v-2k)\right)^2}{4 c (v-2k)} \right) \right) -$$

$$2^{-m-v-1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(e^{-\frac{1}{4} i \left(-\frac{f^2 (v-2s)^2}{-2bk + bm + 2cs - cv} - 4 g (v-2s) + 4 e (m-2k) - 2\pi (m-v) \right)} \right.$$

$$\left(\sum_{j=0}^{n} 2^{j-n} \left(-i f (v-2s)\right)^{n-j} \left(f i (v-2s) + 2 \left(i c (v-2s) - i b (m-2k)\right) z\right)^{j+1} \right.$$

$$\left(-\frac{\left(f i (v-2s) + 2 \left(i c (v-2s) - i b (m-2k)\right) z\right)^2}{i c (v-2s) - i b (m-2k)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j}$$

$$\left. \Gamma\left(\frac{j+1}{2}, -\frac{\left(f i (v-2s) + 2 \left(i c (v-2s) - i b (m-2k)\right) z\right)^2}{4 \left(i c (v-2s) - i b (m-2k)\right)} \right) \right) \left(i c (v-2s) - i b (m-2k)\right)^{-n-1} +$$

$$e^{\frac{1}{4} i \left(\frac{f^2 (v-2s)^2}{2bk - bm + 2cs - cv} + 4 g (v-2s) + 4 e (m-2k) - 2\pi (m+v) \right)} \left(b i (m-2k) + c i (v-2s)\right)^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (-i f (v-2s))^{n-j} (f i (v-2s) + 2(b i (m-2k) + c i (v-2s)) z)^{j+1}$$

$$\left(-\frac{(f i (v-2s) + 2(b i (m-2k) + c i (v-2s)) z)^2}{b i (m-2k) + c i (v-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2},\right.$$

$$\left.-\frac{(f i (v-2s) + 2(b i (m-2k) + c i (v-2s)) z)^2}{4(b i (m-2k) + c i (v-2s))}\right) + e^{-\frac{1}{4} i \left(\frac{f^2 (v-2s)^2}{2bk - bm + 2cs - cv} + 4g(v-2s) + 4e(m-2k) - 2\pi(m+v)\right)}$$

$$(-i b (m-2k) - i c (v-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i f (v-2s))^{n-j} (2(-i b (m-2k) - i c (v-2s)) z - i f (v-2s))^{j+1}$$

$$\left(-\frac{(2(-i b (m-2k) - i c (v-2s)) z - i f (v-2s))^2}{-i b (m-2k) - i c (v-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2},\right.$$

$$\left.-\frac{(2(-i b (m-2k) - i c (v-2s)) z - i f (v-2s))^2}{4(-i b (m-2k) - i c (v-2s))}\right) + e^{\frac{1}{4} i \left(-\frac{f^2 (v-2s)^2}{-2bk + bm + 2cs - cv} - 4g(v-2s) + 4e(m-2k) + 2\pi(v-m)\right)}$$

$$(i b (m-2k) - i c (v-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i f (v-2s))^{n-j} (2(i b (m-2k) - i c (v-2s)) z - i f (v-2s))^{j+1}$$

$$\left(-\frac{(2(i b (m-2k) - i c (v-2s)) z - i f (v-2s))^2}{i b (m-2k) - i c (v-2s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}$$

$$\left.\left.\Gamma\left(\frac{j+1}{2}, -\frac{(2(i b (m-2k) - i c (v-2s)) z - i f (v-2s))^2}{4(i b (m-2k) - i c (v-2s))}\right)\right)\right) /; n \in \mathbb{N} \wedge m \in \mathbb{N}^+ \wedge v \in \mathbb{N}^+$$

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$$\int z^n \sin^m\left(\sqrt{z}\, b + e\right) \sin^v\left(\sqrt{z}\, c + f z + g\right) dz = -2^{-m-v+1} (-1)^{n+1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \left(\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} (m-2k)^{-2(n+1)}\right.$$

$$\left.\left(e^{i e (m-2k) - \frac{i m \pi}{2}} \Gamma\left(2(n+1), -i b (m-2k) \sqrt{z}\right) + e^{\frac{i m \pi}{2} - i e (m-2k)} \Gamma\left(2(n+1), i b (m-2k) \sqrt{z}\right)\right)\right) b^{-2(n+1)} +$$

$$\frac{2^{-m-v} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2)}{n+1} + 2^{-m-2n-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \left(e^{\frac{i (v-2k) c^2}{4f} + \frac{i \pi v}{2} - i g (v-2k)} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i c (v-2k))^{-h-j+2n} \left(-i c (v-2k) - 2 i f \sqrt{z}\, (v-2k)\right)^{h+j}\right.\right.$$

$$\left(-\frac{i\left(-i\,c\,(v-2\,k)-2\,i\,f\,\sqrt{z}\,(v-2\,k)\right)^2}{f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(-i\,c\,(v-2\,k)$$

$$\left(-i\,c\,(v-2\,k)-2\,i\,f\,\sqrt{z}\,(v-2\,k)\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,c\,(v-2\,k)-2\,i\,f\,\sqrt{z}\,(v-2\,k)\right)^2}{4\,f\,(v-2\,k)}\right)-2$$

$$i\,f\,(v-2\,k)\sqrt{-\frac{i\left(-i\,c\,(v-2\,k)-2\,i\,f\,\sqrt{z}\,(v-2\,k)\right)^2}{f\,(v-2\,k)}}\;\Gamma\Bigg(\frac{1}{2}(h+j+2),$$

$$-\frac{i\left(-i\,c\,(v-2\,k)-2\,i\,f\,\sqrt{z}\,(v-2\,k)\right)^2}{4\,f\,(v-2\,k)}\Bigg)\Bigg)\Bigg)(-i\,f\,(v-2\,k))^{-2\,(n+1)}+e^{-\frac{i\,(v-2\,k)\,c^2}{4\,f}-\frac{i\,\pi\,v}{2}+g\,i\,(v-2\,k)}$$

$$(i\,f\,(v-2\,k))^{-2\,(n+1)}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,k))^{-h-j+2\,n}\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)^{h+j}$$

$$\left(\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)^2}{f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(c\,i\,(v-2\,k)\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\,\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)^2}{4\,f\,(v-2\,k)}\Bigg)+2\,f\,i\,(v-2\,k)$$

$$\sqrt{\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)^2}{f\,(v-2\,k)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)^2}{4\,f\,(v-2\,k)}\right)\Bigg)\Bigg)+$$

$$2^{-m-2\,n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg(e^{-\frac{i\,(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))^2}{4\,f\,(v-2\,s)}+e\,i\,(m-2\,k)-i\,g\,(v-2\,s)+\frac{1}{2}\,i\,(v-m)\,\pi}$$

$$\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))^{-h-j+2\,n}\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(b\,i\,(m-2\,k)-i\,c\,(v-2\,s)-2\,i\,f\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i b (m-2k) - i c (v-2s)) \left(b i (m-2k) - i c (v-2s) - 2 i f (v-2s)\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{1}{4 f (v-2s)} \left(i \left(b i (m-2k) - i c (v-2s) - 2 i f (v-2s)\sqrt{z}\right)^2\right)\right) -$$

$$2 i f (v-2s) \sqrt{\left(-\frac{1}{f (v-2s)}\left(i\left(b i (m-2k) - i c (v-2s) - 2 i f (v-2s)\sqrt{z}\right)^2\right)\right)}$$

$$\left.\Gamma\left(\frac{1}{2}(h+j+2), -\frac{1}{4 f (v-2s)}\left(i\left(b i (m-2k) - i c (v-2s) - 2 i f (v-2s)\sqrt{z}\right)^2\right)\right)\right)$$

$$(-i f (v-2s))^{-2(n+1)} + e^{-\frac{i(-i b (m-2k) - i c (v-2s))^2}{4 f (v-2s)} - i e (m-2k) + \frac{1}{2} i \pi (m+v) - i g (v-2s)} \mathrm{Sum}\left(\right.$$

$$\mathrm{Sum}\left((-1)^{j-h} 4^j (-i b (m-2k) - i c (v-2s))^{-h-j+2n} \left(-i b (m-2k) - i c (v-2s) - 2 i f (v-2s)\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{1}{f (v-2s)}\left(i\left(-i b (m-2k) - i c (v-2s) - 2 i f (v-2s)\sqrt{z}\right)^2\right)\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}$$

$$\binom{n}{j}\left((-i b (m-2k) - i c (v-2s))\left(-i b (m-2k) - i c (v-2s) - 2 i f (v-2s)\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{1}{4 f (v-2s)}\left(i\left(-i b (m-2k) - i c (v-2s) - 2 i f (v-2s)\sqrt{z}\right)^2\right)\right) - 2 i f$$

$$(v-2s)\sqrt{\left(-\frac{1}{f (v-2s)}\left(i\left(-i b (m-2k) - i c (v-2s) - 2 i f (v-2s)\sqrt{z}\right)^2\right)\right)}\,\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{1}{4 f (v-2s)}\left(i\left(-i b (m-2k) - i c (v-2s) - 2 i f (v-2s)\sqrt{z}\right)^2\right)\right)\right), \{h, 0, j\}\right), \{j, 0, n\}\right)$$

$$(-i f (v-2s))^{-2(n+1)} + e^{\frac{i(i c (v-2s) - i b (m-2k))^2}{4 f (v-2s)} - i e (m-2k) + \frac{1}{2} i \pi (m-v) + g i (v-2s)} (i f (v-2s))^{-2(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h} 4^j (i c (v-2s) - i b (m-2k))^{-h-j+2n} \left(-i b (m-2k) + c i (v-2s) + 2 f i (v-2s)\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(-i b (m-2k) + c i (v-2s) + 2 f i (v-2s)\sqrt{z}\right)^2}{f (v-2s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}$$

$$\left((i c (v-2s) - i b (m-2k))\left(-i b (m-2k) + c i (v-2s) + 2 f i (v-2s)\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1), \frac{1}{4 f (v-2s)}\left(i\left(-i b (m-2k) + c i (v-2s) + 2 f i (v-2s)\sqrt{z}\right)^2\right)\right) +$$

$$2 f i (v-2s)\,\Gamma\left(\frac{1}{2}(h+j+2), \frac{1}{4 f (v-2s)}\left(i\left(-i b (m-2k) + c i (v-2s) + 2 f i (v-2s)\sqrt{z}\right)^2\right)\right)$$

$$\sqrt{\left(\frac{1}{f\,(v-2\,s)}\left(i\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^2\right)\right)}\Bigg)\Bigg)+$$

$$e^{\frac{i\,(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))^2}{4\,f\,(v-2\,s)}+e\,i\,(m-2\,k)+g\,i\,(v-2\,s)-\frac{1}{2}\,i\,(m+v)\,\pi}\,(i\,f\,(v-2\,s))^{-2\,(n+1)}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(b\,i\,(m-2\,k)+c\,i\,(v-2\,s))^{-h-j+2\,n}\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((b\,i\,(m-2\,k)+c\,i\,(v-2\,s))\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+$$

$$2\,f\,i\,(v-2\,s)\,\Gamma\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)$$

$$\sqrt{\frac{i\left(b\,i\,(m-2\,k)+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}}\Bigg)\Bigg)\,/;\,n\in\mathbb{N}\land m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving $z^n \sin^m(b\,z^r+d\,z)\sin^v(c\,z^r+f\,z+g)$

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$$\int z^n\sin^m\left(b\,z^2+d\,z\right)\sin^v\left(c\,z^2+f\,z+g\right)dz=$$

$$\frac{(-1)^m\,2^{-m-v}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m\bmod 2)\,(1-v\bmod 2)}{n+1}-i^{-m}\,2^{-m-v-1}\binom{v}{\frac{v}{2}}(1-v\bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\Bigg(e^{\frac{i\,d^2\,(2\,k-m)}{4\,b}}$$

$$\left(\sum_{j=0}^{n}2^{j-n}\,(i\,d\,(2\,k-m))^{n-j}\,(-i\,d\,(2\,k-m)-2\,i\,b\,z\,(2\,k-m))^{j+1}\left(-\frac{i\,(-i\,d\,(2\,k-m)-2\,i\,b\,z\,(2\,k-m))^2}{b\,(2\,k-m)}\right)^{\frac{1}{2}\,(-j-1)}\right.$$

$$\left.\binom{n}{j}\Gamma\left(\frac{j+1}{2},\,-\frac{i\,(-i\,d\,(2\,k-m)-2\,i\,b\,z\,(2\,k-m))^2}{4\,b\,(2\,k-m)}\right)\right)(-i\,b\,(2\,k-m))^{-n-1}+$$

$$(-1)^m e^{\frac{i d^2 (m-2k)}{4b}} (-i b (m-2k))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i d (m-2k))^{n-j} (-i d (m-2k) - 2 i b z (m-2k))^{j+1}$$

$$\left(-\frac{i(-i d (m-2k) - 2 i b z (m-2k))^2}{b (m-2k)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i(-i d (m-2k) - 2 i b z (m-2k))^2}{4 b (m-2k)}\right)\Bigg) -$$

$$(-1)^m i^{-v} 2^{-m-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \Bigg((-1)^v e^{i g (2k-v) - \frac{i f^2 (2k-v)}{4c}}$$

$$\left(\sum_{j=0}^{n} 2^{j-n} (-i f (2k-v))^{n-j} (f i (2k-v) + 2 c i z (2k-v))^{j+1} \left(\frac{i (f i (2k-v) + 2 c i z (2k-v))^2}{c (2k-v)}\right)^{\frac{1}{2}(-j-1)}\right.$$

$$\left.\binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f i (2k-v) + 2 c i z (2k-v))^2}{4 c (2k-v)}\right)\right) (i c (2k-v))^{-n-1} +$$

$$e^{i g (v-2k) - \frac{i f^2 (v-2k)}{4c}} (i c (v-2k))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i f (v-2k))^{n-j} (f i (v-2k) + 2 c i z (v-2k))^{j+1}$$

$$\left(\frac{i (f i (v-2k) + 2 c i z (v-2k))^2}{c (v-2k)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f i (v-2k) + 2 c i z (v-2k))^2}{4 c (v-2k)}\right)\Bigg) -$$

$$i^{-m-v} 2^{-m-v-1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Bigg((-1)^v e^{i g (2s-v) - \frac{(i f (2s-v) - i d (2k-m))^2}{4 (i c (2s-v) - i b (2k-m))}} \Bigg(\sum_{j=0}^{n} 2^{j-n} (i d (2k-m) - i f (2s-v))^{n-j}$$

$$(-i d (2k-m) + f i (2s-v) + 2 (i c (2s-v) - i b (2k-m)) z)^{j+1} \big(-(-i d (2k-m) + f i (2s-v) +$$

$$2 (i c (2s-v) - i b (2k-m)) z)^2 \big/ (i c (2s-v) - i b (2k-m))\big)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\Bigg(\frac{j+1}{2},$$

$$-(-i d (2k-m) + f i (2s-v) + 2 (i c (2s-v) - i b (2k-m)) z)^2 \big/ (4 (i c (2s-v) - i b (2k-m)))\Bigg)\Bigg)$$

$$(i c (2s-v) - i b (2k-m))^{-n-1} + (-1)^{m+v} e^{i g (2s-v) - \frac{(i f (2s-v) - i d (m-2k))^2}{4 (i c (2s-v) - i b (m-2k))}} (i c (2s-v) - i b (m-2k))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i d (m-2k) - i f (2s-v))^{n-j} (-i d (m-2k) + f i (2s-v) + 2 (i c (2s-v) - i b (m-2k)) z)^{j+1}$$

$$\big(-(-i d (m-2k) + f i (2s-v) + 2 (i c (2s-v) - i b (m-2k)) z)^2 \big/ (i c (2s-v) - i b (m-2k))\big)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\Bigg(\frac{j+1}{2}, -(-i d (m-2k) + f i (2s-v) + 2 (i c (2s-v) - i b (m-2k)) z)^2 \big/$$

$$(4 (i c (2s-v) - i b (m-2k)))\Bigg) + e^{i g (v-2s) - \frac{(i f (v-2s) - i d (2k-m))^2}{4 (i c (v-2s) - i b (2k-m))}} (i c (v-2s) - i b (2k-m))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i d (2k-m) - i f (v-2s))^{n-j} (-i d (2k-m) + f i (v-2s) + 2 (i c (v-2s) - i b (2k-m)) z)^{j+1}$$

$$\left(-(-i\,d\,(2k-m)+f\,i\,(v-2s)+2\,(i\,c\,(v-2s)-i\,b\,(2k-m))\,z)^2 \big/ (i\,c\,(v-2s)-i\,b\,(2k-m))\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}\,\Gamma\!\left(\frac{j+1}{2},\,-(-i\,d\,(2k-m)+f\,i\,(v-2s)+2\,(i\,c\,(v-2s)-i\,b\,(2k-m))\,z)^2 \big/ (4\,(i\,c\,(v-2s)-i\,b\,(2k-m)))\right)+(-1)^m\,e^{i\,g\,(v-2s)-\frac{(i\,f\,(v-2s)-i\,d\,(m-2k))^2}{4\,(i\,c\,(v-2s)-i\,b\,(m-2k))}}\,(i\,c\,(v-2s)-i\,b\,(m-2k))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n}\,(i\,d\,(m-2k)-i\,f\,(v-2s))^{n-j}\,(-i\,d\,(m-2k)+f\,i\,(v-2s)+2\,(i\,c\,(v-2s)-i\,b\,(m-2k))\,z)^{j+1}$$

$$\left(-(-i\,d\,(m-2k)+f\,i\,(v-2s)+2\,(i\,c\,(v-2s)-i\,b\,(m-2k))\,z)^2 \big/ (i\,c\,(v-2s)-i\,b\,(m-2k))\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}\,\Gamma\!\left(\frac{j+1}{2},\,-(-i\,d\,(m-2k)+f\,i\,(v-2s)+2\,(i\,c\,(v-2s)-i\,b\,(m-2k))\,z)^2 \big/ (4\,(i\,c\,(v-2s)-i\,b\,(m-2k)))\right)\Bigg)\Bigg) /;\ n\in\mathbb{N}\land m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

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$$\int z^n\sin^m\!\left(\sqrt{z}\;b+d\,z\right)\sin^v\!\left(\sqrt{z}\;c+g+f\,z\right)dz=$$

$$\frac{(-1)^m\,2^{-m-v}\,z^{n+1}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}(1-m\bmod 2)\,(1-v\bmod 2)}{n+1}+i^{-m}\,2^{-m-2n-v-1}\binom{v}{\frac{v}{2}}(1-v\bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\Bigg(e^{\frac{i\,b^2\,(2k-m)}{4d}}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b\,(2k-m))^{-h-j+2n}\left(-i\,b\,(2k-m)-2\,i\,d\sqrt{z}\;(2k-m)\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,b\,(2k-m)-2\,i\,d\sqrt{z}\;(2k-m)\right)^2}{d\,(2k-m)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(-i\,b\,(2k-m)$$

$$\left(-i\,b\,(2k-m)-2\,i\,d\sqrt{z}\;(2k-m)\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,b\,(2k-m)-2\,i\,d\sqrt{z}\;(2k-m)\right)^2}{4\,d\,(2k-m)}\right)-$$

$$2\,i\,d\,(2k-m)\sqrt{-\frac{i\left(-i\,b\,(2k-m)-2\,i\,d\sqrt{z}\;(2k-m)\right)^2}{d\,(2k-m)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.-\frac{i\left(-i\,b\,(2k-m)-2\,i\,d\sqrt{z}\;(2k-m)\right)^2}{4\,d\,(2k-m)}\right)\Bigg)\Bigg)\Bigg)(-i\,d\,(2k-m))^{-2n-2}+(-1)^m\,e^{\frac{i\,b^2\,(m-2k)}{4d}}$$

$$(-i\,d\,(m-2k))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b\,(m-2k))^{-h-j+2n}\left(-i\,b\,(m-2k)-2\,i\,d\sqrt{z}\;(m-2k)\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,b\,(m-2\,k)-2\,i\,d\,\sqrt{z}\,(m-2\,k)\right)^2}{d\,(m-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(-i\,b\,(m-2\,k)$$

$$\left(-i\,b\,(m-2\,k)-2\,i\,d\,\sqrt{z}\,(m-2\,k)\right)\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{i\left(-i\,b\,(m-2\,k)-2\,i\,d\,\sqrt{z}\,(m-2\,k)\right)^2}{4\,d\,(m-2\,k)}\right)-$$

$$2\,i\,d\,(m-2\,k)\sqrt{-\frac{i\left(-i\,b\,(m-2\,k)-2\,i\,d\,\sqrt{z}\,(m-2\,k)\right)^2}{d\,(m-2\,k)}}\;\Gamma\Bigg(\frac{1}{2}(h+j+2),$$

$$-\frac{i\left(-i\,b\,(m-2\,k)-2\,i\,d\,\sqrt{z}\,(m-2\,k)\right)^2}{4\,d\,(m-2\,k)}\Bigg)\Bigg)\Bigg)\Bigg)+(-1)^m\,i^{-v}\,2^{-m-2\,n-v-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\Bigg((-1)^v\,e^{i\,g\,(2\,k-v)-\frac{i\,c^2\,(2\,k-v)}{4\,f}}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(2\,k-v))^{-h-j+2\,n}\left(c\,i\,(2\,k-v)+2\,f\,i\,\sqrt{z}\,(2\,k-v)\right)^{h+j}$$

$$\left(\frac{i\left(c\,i\,(2\,k-v)+2\,f\,i\,\sqrt{z}\,(2\,k-v)\right)^2}{f\,(2\,k-v)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(c\,i\,(2\,k-v)\left(c\,i\,(2\,k-v)+2\,f\,i\,\sqrt{z}\,(2\,k-v)\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(c\,i\,(2\,k-v)+2\,f\,i\,\sqrt{z}\,(2\,k-v)\right)^2}{4\,f\,(2\,k-v)}\right)+2\,f\,i\,(2\,k-v)$$

$$\sqrt{\frac{i\left(c\,i\,(2\,k-v)+2\,f\,i\,\sqrt{z}\,(2\,k-v)\right)^2}{f\,(2\,k-v)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(c\,i\,(2\,k-v)+2\,f\,i\,\sqrt{z}\,(2\,k-v)\right)^2}{4\,f\,(2\,k-v)}\right)\Bigg)\Bigg)$$

$$(i\,f\,(2\,k-v))^{-2\,n-2}+e^{i\,g\,(v-2\,k)-\frac{i\,c^2\,(v-2\,k)}{4\,f}}\,(i\,f\,(v-2\,k))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,k))^{-h-j+2\,n}$$

$$\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)^{h+j}\left(\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)^2}{f\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg(c\,i\,(v-2\,k)\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(c\,i\,(v-2\,k)+2\,f\,i\,\sqrt{z}\,(v-2\,k)\right)^2}{4\,f\,(v-2\,k)}\right)+$$

$$2\, f\, i\, (v-2\,k) \sqrt{\frac{i \left(c\, i\, (v-2\,k)+2\, f\, i \sqrt{z}\, (v-2\,k)\right)^2}{f\,(v-2\,k)}}\; \Gamma\left(\frac{1}{2}\,(h+j+2),\right.$$

$$\left.\left.\left.\frac{i \left(c\, i\, (v-2\,k)+2\, f\, i \sqrt{z}\, (v-2\,k)\right)^2}{4\, f\,(v-2\,k)}\right)\right)\right) + i^{-m-v}\, 2^{-m-2\,n-v-1}$$

$$\sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^s \binom{m}{s} \left((-1)^v\, e^{i\, g\,(2\,k-v)-\frac{(i\, c\,(2\,k-v)-i\, b\,(2\,s-m))^2}{4\,(i\, f\,(2\,k-v)-i\, d\,(2\,s-m))}} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, c\,(2\,k-v)-i\, b\,(2\,s-m))^{-h-j+2\,n} \right.\right.$$

$$\left(-i\, b\,(2\,s-m)+c\, i\,(2\,k-v)+2\,(i\, f\,(2\,k-v)-i\, d\,(2\,s-m))\sqrt{z}\right)^{h+j}$$

$$\left(-\left(-i\, b\,(2\,s-m)+c\, i\,(2\,k-v)+2\,(i\, f\,(2\,k-v)-i\, d\,(2\,s-m))\sqrt{z}\right)^2 \right/$$

$$\left.(i\, f\,(2\,k-v)-i\, d\,(2\,s-m))\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\left((i\, c\,(2\,k-v)-i\, b\,(2\,s-m))\left(-i\, b\,(2\,s-m)+c\, i\,(2\,k-v)+2\,(i\, f\,(2\,k-v)-i\, d\,(2\,s-m))\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}\,(h+j+1),\, -\left(-i\, b\,(2\,s-m)+c\, i\,(2\,k-v)+2\,(i\, f\,(2\,k-v)-i\, d\,(2\,s-m))\sqrt{z}\right)^2 \right/$$

$$\left.(4\,(i\, f\,(2\,k-v)-i\, d\,(2\,s-m)))\right) + 2\,(i\, f\,(2\,k-v)-i\, d\,(2\,s-m))$$

$$\Gamma\left(\frac{1}{2}\,(h+j+2),\, -\left(-i\, b\,(2\,s-m)+c\, i\,(2\,k-v)+2\,(i\, f\,(2\,k-v)-i\, d\,(2\,s-m))\sqrt{z}\right)^2 \right/$$

$$\left.(4\,(i\, f\,(2\,k-v)-i\, d\,(2\,s-m)))\right) \sqrt{\left(-\left(-i\, b\,(2\,s-m)+c\, i\,(2\,k-v)+\right.\right.}$$

$$\left.\left.\left.\left. 2\,(i\, f\,(2\,k-v)-i\, d\,(2\,s-m))\sqrt{z}\right)^2 \right/ (i\, f\,(2\,k-v)-i\, d\,(2\,s-m))\right)\right)\right)$$

$$(i\, f\,(2\,k-v)-i\, d\,(2\,s-m))^{-2\,n-2} + (-1)^{m+v}\, e^{i\, g\,(2\,k-v)-\frac{(i\, c\,(2\,k-v)-i\, b\,(m-2\,s))^2}{4\,(i\, f\,(2\,k-v)-i\, d\,(m-2\,s))}}\, (i\, f\,(2\,k-v)-i\, d\,(m-2\,s))^{-2\,n-2}$$

$$\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i\, c\,(2\,k-v)-i\, b\,(m-2\,s))^{-h-j+2\,n}$$

$$\left(-i\, b\,(m-2\,s)+c\, i\,(2\,k-v)+2\,(i\, f\,(2\,k-v)-i\, d\,(m-2\,s))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i\, b\,(m-2\,s)+c\, i\,(2\,k-v)+2\,(i\, f\,(2\,k-v)-i\, d\,(m-2\,s))\sqrt{z}\right)^2}{i\, f\,(2\,k-v)-i\, d\,(m-2\,s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\left((i\, c\,(2\,k-v)-i\, b\,(m-2\,s))\left(-i\, b\,(m-2\,s)+c\, i\,(2\,k-v)+2\,(i\, f\,(2\,k-v)-i\, d\,(m-2\,s))\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}\,(h+j+1),\, -\left(-i\, b\,(m-2\,s)+c\, i\,(2\,k-v)+2\,(i\, f\,(2\,k-v)-i\, d\,(m-2\,s))\sqrt{z}\right)^2 \right/$$

$$(4\,(i\,f\,(2\,k-v)-i\,d\,(m-2\,s)))\Big)+2\,(i\,f\,(2\,k-v)-i\,d\,(m-2\,s))$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\left(-i\,b\,(m-2\,s)+c\,i\,(2\,k-v)+2\,(i\,f\,(2\,k-v)-i\,d\,(m-2\,s))\,\sqrt{z}\right)^2\Big/\right.$$

$$\left.(4\,(i\,f\,(2\,k-v)-i\,d\,(m-2\,s)))\right)\sqrt{\left(-\left(-i\,b\,(m-2\,s)+c\,i\,(2\,k-v)+\right.\right.}$$

$$\left.\left.2\,(i\,f\,(2\,k-v)-i\,d\,(m-2\,s))\,\sqrt{z}\right)^2\Big/(i\,f\,(2\,k-v)-i\,d\,(m-2\,s))\right)\Big)+$$

$$(-1)^m\,e^{i\,g\,(v-2\,k)-\frac{(i\,c\,(v-2\,k)-i\,b\,(m-2\,s))^2}{4\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))}}\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,k)-$$

$$i\,b\,(m-2\,s))^{-h-j+2\,n}\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\,\sqrt{z}\right)^2}{i\,f\,(v-2\,k)-i\,d\,(m-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Big(\left(i\,c\,(v-2\,k)-i\,b\,(m-2\,s)\right)\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\,\sqrt{z}\right)^2\Big/\right.$$

$$\left.(4\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s)))\right)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\,\sqrt{z}\right)^2\Big/\right.$$

$$\left.(4\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s)))\right)\sqrt{\left(-\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+\right.\right.}$$

$$\left.\left.2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\,\sqrt{z}\right)^2\Big/(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\right)\Big)+$$

$$e^{i\,g\,(v-2\,k)-\frac{(i\,c\,(v-2\,k)-i\,b\,(2\,s-m))^2}{4\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))}}\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,k)-$$

$$i\,b\,(2\,s-m))^{-h-j+2\,n}\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\,\sqrt{z}\right)^2}{i\,f\,(v-2\,k)-i\,d\,(2\,s-m)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Big(\left(i\,c\,(v-2\,k)-i\,b\,(2\,s-m)\right)\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\,\sqrt{z}\right)^2\Big/\right.$$

$$\left.(4\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m)))\right)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.$$

$$-\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\,\sqrt{z}\right)^2\Big/(4\,(i\,f\,(v-2\,k)-$$

$$\left.i\,d\,(2\,s-m)))\right)\sqrt{\left(-\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\right.\right.}$$

Involving $z^n \sin^m(b z^r + d z + e) \sin^v(c z^r + f z + g)$

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$$\int z^n \sin^m(b z^2 + d z + e) \sin^v(c z^2 + f z + g)\, dz = \frac{(-1)^m 2^{-m-v} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2)}{n+1} - i^{-m} 2^{-m-v-1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left(e^{\frac{i d^2 (2k-m)}{4b} - i e (2k-m)} \left(\sum_{j=0}^{n} 2^{j-n} (i d (2k-m))^{n-j} (-i d (2k-m) - 2 i b z (2k-m))^{j+1} \right.\right.$$

$$\left. \left(-\frac{i (-i d (2k-m) - 2 i b z (2k-m))^2}{b (2k-m)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d (2k-m) - 2 i b z (2k-m))^2}{4 b (2k-m)} \right) \right)$$

$$(-i b (2k-m))^{-n-1} + (-1)^m e^{\frac{i d^2 (m-2k)}{4b} - i e (m-2k)} (-i b (m-2k))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i d (m-2k))^{n-j} (-i d (m-2k) - 2 i b z (m-2k))^{j+1}$$

$$\left. \left(-\frac{i (-i d (m-2k) - 2 i b z (m-2k))^2}{b (m-2k)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (-i d (m-2k) - 2 i b z (m-2k))^2}{4 b (m-2k)} \right) \right) -$$

$$(-1)^m i^{-v} 2^{-m-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \left((-1)^v e^{i g (2k-v) - \frac{i f^2 (2k-v)}{4c}} \right.$$

$$\left(\sum_{j=0}^{n} 2^{j-n} (-i f (2k-v))^{n-j} (f i (2k-v) + 2 c i z (2k-v))^{j+1} \left(\frac{i (f i (2k-v) + 2 c i z (2k-v))^2}{c (2k-v)} \right)^{\frac{1}{2}(-j-1)} \right.$$

$$\left. \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f i (2k-v) + 2 c i z (2k-v))^2}{4 c (2k-v)} \right) \right) (i c (2k-v))^{-n-1} +$$

$$e^{i g (v-2k) - \frac{i f^2 (v-2k)}{4c}} (i c (v-2k))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i f (v-2k))^{n-j} (f i (v-2k) + 2 c i z (v-2k))^{j+1}$$

$$\left. \left(\frac{i (f i (v-2k) + 2 c i z (v-2k))^2}{c (v-2k)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (f i (v-2k) + 2 c i z (v-2k))^2}{4 c (v-2k)} \right) \right) -$$

$$2^{-m-v-1} i^{-m-v} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left((-1)^v e^{-\frac{(i f (2s-v) - i d (2k-m))^2}{4 (i c (2s-v) - i b (2k-m))} - i e (2k-m) + g i (2s-v)} \right.$$

$$\left(\sum_{j=0}^{n} 2^{j-n} (i\, d\, (2\, k - m) - i\, f\, (2\, s - v))^{n-j} (-i\, d\, (2\, k - m) + f\, i\, (2\, s - v) + 2\, (i\, c\, (2\, s - v) - i\, b\, (2\, k - m))\, z)^{j+1} \left(-(-i\, d\, (2\, k - m) + f\, i\, (2\, s - v) + 2\, (i\, c\, (2\, s - v) - i\, b\, (2\, k - m))\, z)^2 \big/ (i\, c\, (2\, s - v) - i\, b\, (2\, k - m))\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -(-i\, d\, (2\, k - m) + f\, i\, (2\, s - v) + 2\, (i\, c\, (2\, s - v) - i\, b\, (2\, k - m))\, z)^2 \big/ (4\, (i\, c\, (2\, s - v) - i\, b\, (2\, k - m)))\right)\right) (i\, c\, (2\, s - v) - i\, b\, (2\, k - m))^{-n-1} +$$

$$(-1)^{m+v}\, e^{-\frac{(i\, f\, (2\, s-v) - i\, d\, (m-2\, k))^2}{4\, (i\, c\, (2\, s-v) - i\, b\, (m-2\, k))} - i\, e\, (m-2\, k) + g\, i\, (2\, s-v)} (i\, c\, (2\, s - v) - i\, b\, (m - 2\, k))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i\, d\, (m - 2\, k) - i\, f\, (2\, s - v))^{n-j} (-i\, d\, (m - 2\, k) + f\, i\, (2\, s - v) + 2\, (i\, c\, (2\, s - v) - i\, b\, (m - 2\, k))\, z)^{j+1} \left(-(-i\, d\, (m - 2\, k) + f\, i\, (2\, s - v) + 2\, (i\, c\, (2\, s - v) - i\, b\, (m - 2\, k))\, z)^2 \big/ (i\, c\, (2\, s - v) - i\, b\, (m - 2\, k))\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -(-i\, d\, (m - 2\, k) + f\, i\, (2\, s - v) + 2\, (i\, c\, (2\, s - v) - i\, b\, (m - 2\, k))\, z)^2 \big/ (4\, (i\, c\, (2\, s - v) - i\, b\, (m - 2\, k)))\right) + e^{-\frac{(i\, f\, (v-2\, s) - i\, d\, (2\, k-m))^2}{4\, (i\, c\, (v-2\, s) - i\, b\, (2\, k-m))} - i\, e\, (2\, k-m) + g\, i\, (v-2\, s)} (i\, c\, (v - 2\, s) - i\, b\, (2\, k - m))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i\, d\, (2\, k - m) - i\, f\, (v - 2\, s))^{n-j} (-i\, d\, (2\, k - m) + f\, i\, (v - 2\, s) + 2\, (i\, c\, (v - 2\, s) - i\, b\, (2\, k - m))\, z)^{j+1} \left(-(-i\, d\, (2\, k - m) + f\, i\, (v - 2\, s) + 2\, (i\, c\, (v - 2\, s) - i\, b\, (2\, k - m))\, z)^2 \big/ (i\, c\, (v - 2\, s) - i\, b\, (2\, k - m))\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -(-i\, d\, (2\, k - m) + f\, i\, (v - 2\, s) + 2\, (i\, c\, (v - 2\, s) - i\, b\, (2\, k - m))\, z)^2 \big/ (4\, (i\, c\, (v - 2\, s) - i\, b\, (2\, k - m)))\right) + (-1)^m\, e^{-\frac{(i\, f\, (v-2\, s) - i\, d\, (m-2\, k))^2}{4\, (i\, c\, (v-2\, s) - i\, b\, (m-2\, k))} - i\, e\, (m-2\, k) + g\, i\, (v-2\, s)} (i\, c\, (v - 2\, s) - i\, b\, (m - 2\, k))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (i\, d\, (m - 2\, k) - i\, f\, (v - 2\, s))^{n-j} (-i\, d\, (m - 2\, k) + f\, i\, (v - 2\, s) + 2\, (i\, c\, (v - 2\, s) - i\, b\, (m - 2\, k))\, z)^{j+1} \left(-(-i\, d\, (m - 2\, k) + f\, i\, (v - 2\, s) + 2\, (i\, c\, (v - 2\, s) - i\, b\, (m - 2\, k))\, z)^2 \big/ (i\, c\, (v - 2\, s) - i\, b\, (m - 2\, k))\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -(-i\, d\, (m - 2\, k) + f\, i\, (v - 2\, s) + 2\, (i\, c\, (v - 2\, s) - i\, b\, (m - 2\, k))\, z)^2 \big/ (4\, (i\, c\, (v - 2\, s) - i\, b\, (m - 2\, k)))\right)\Bigg) /;\ n \in \mathbb{N} \land m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

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$$\int z^n \sin^m\left(\sqrt{z}\ b + d\, z + e\right) \sin^v\left(\sqrt{z}\ c + f\, z + g\right) dz = \frac{(-1)^m\, 2^{-m-v}\, z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)\, (1 - v \bmod 2)}{n+1} + i^{-m}\, 2^{-m-2\, n-v-1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(e^{\frac{i b^2(2k-m)}{4d}-i e(2k-m)}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i b(2k-m))^{-h-j+2n}\left(-i b(2k-m)-2 i d\sqrt{z}\,(2k-m)\right)^{h+j}\right.\right.$$

$$\left(-\frac{i\left(-i b(2k-m)-2 i d\sqrt{z}\,(2k-m)\right)^2}{d(2k-m)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(-i b(2k-m)\right.$$

$$\left(-i b(2k-m)-2 i d\sqrt{z}\,(2k-m)\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(-i b(2k-m)-2 i d\sqrt{z}\,(2k-m)\right)^2}{4d(2k-m)}\right)-$$

$$2 i d(2k-m)\sqrt{-\frac{i\left(-i b(2k-m)-2 i d\sqrt{z}\,(2k-m)\right)^2}{d(2k-m)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(-i b(2k-m)-2 i d\sqrt{z}\,(2k-m)\right)^2}{4d(2k-m)}\right)\right)\right)(-i d(2k-m))^{-2n-2}+(-1)^m e^{\frac{i b^2(m-2k)}{4d}-i e(m-2k)}$$

$$(-i d(m-2k))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i b(m-2k))^{-h-j+2n}\left(-i b(m-2k)-2 i d\sqrt{z}\,(m-2k)\right)^{h+j}$$

$$\left(-\frac{i\left(-i b(m-2k)-2 i d\sqrt{z}\,(m-2k)\right)^2}{d(m-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(-i b(m-2k)\right.$$

$$\left(-i b(m-2k)-2 i d\sqrt{z}\,(m-2k)\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{i\left(-i b(m-2k)-2 i d\sqrt{z}\,(m-2k)\right)^2}{4d(m-2k)}\right)-$$

$$2 i d(m-2k)\sqrt{-\frac{i\left(-i b(m-2k)-2 i d\sqrt{z}\,(m-2k)\right)^2}{d(m-2k)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(-i b(m-2k)-2 i d\sqrt{z}\,(m-2k)\right)^2}{4d(m-2k)}\right)\right)\right)+(-1)^m i^{-\nu}\,2^{-m-2n-\nu-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left((-1)^\nu e^{i g(2k-\nu)-\frac{i c^2(2k-\nu)}{4f}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i c(2k-\nu))^{-h-j+2n}\left(c\, i(2k-\nu)+2 f i\sqrt{z}\,(2k-\nu)\right)^{h+j}\right.\right.$$

$$\left(\frac{i\left(c\,i\,(2k-v)+2\,f\,i\,\sqrt{z}\,(2k-v)\right)^2}{f\,(2k-v)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(c\,i\,(2k-v)\left(c\,i\,(2k-v)+2\,f\,i\,\sqrt{z}\,(2k-v)\right)$$

$$\Gamma\!\left(\frac{1}{2}(h+j+1),\,\frac{i\left(c\,i\,(2k-v)+2\,f\,i\,\sqrt{z}\,(2k-v)\right)^2}{4\,f\,(2k-v)}\right)+2\,f\,i\,(2k-v)$$

$$\sqrt{\frac{i\left(c\,i\,(2k-v)+2\,f\,i\,\sqrt{z}\,(2k-v)\right)^2}{f\,(2k-v)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,\frac{i\left(c\,i\,(2k-v)+2\,f\,i\,\sqrt{z}\,(2k-v)\right)^2}{4\,f\,(2k-v)}\right)\Bigg)\Bigg)$$

$$(i\,f\,(2k-v))^{-2n-2}+e^{i\,g\,(v-2k)-\frac{i\,c^2\,(v-2k)}{4f}}\,(i\,f\,(v-2k))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2k))^{-h-j+2n}$$

$$\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^{h+j}\left(\frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg(c\,i\,(v-2k)\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,\frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\right)+$$

$$2\,f\,i\,(v-2k)\sqrt{\frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{f\,(v-2k)}}\;\Gamma\Bigg($$

$$\frac{1}{2}(h+j+2),\,\frac{i\left(c\,i\,(v-2k)+2\,f\,i\,\sqrt{z}\,(v-2k)\right)^2}{4\,f\,(v-2k)}\Bigg)\Bigg)\Bigg)+$$

$$2^{-m-2n-v-1}\,i^{-m-v}\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\sum_{s=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^s\binom{m}{s}\Bigg((-1)^v\,e^{-\frac{(i\,c\,(2k-v)-i\,b\,(2s-m))^2}{4\,(i\,f\,(2k-v)-i\,d\,(2s-m))}-i\,e\,(2s-m)+g\,i\,(2k-v)}$$

$$\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(2k-v)-i\,b\,(2s-m))^{-h-j+2n}\,\Big(-i\,b\,(2s-m)+c\,i\,(2k-v)+$$

$$2\,(i\,f\,(2k-v)-i\,d\,(2s-m))\,\sqrt{z}\Big)^{h+j}\,\Big(-\Big(-i\,b\,(2s-m)+c\,i\,(2k-v)+$$

$$2\,(i\,f\,(2k-v)-i\,d\,(2s-m))\,\sqrt{z}\Big)^2\Big/(i\,f\,(2k-v)-i\,d\,(2s-m))\Big)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Big((i\,c\,(2k-v)-i\,b\,(2s-m))\left(-i\,b\,(2s-m)+c\,i\,(2k-v)+2\,(i\,f\,(2k-v)-i\,d\,(2s-m))\,\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\left(-i\,b(2s-m)+c\,i(2k-v)+2(i\,f(2k-v)-i\,d(2s-m))\sqrt{z}\right)^2 \Big/ (4(i\,f(2k-v)-i\,d(2s-m)))\right)+2(i\,f(2k-v)-i\,d(2s-m))$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\left(-i\,b(2s-m)+c\,i(2k-v)+2(i\,f(2k-v)-i\,d(2s-m))\sqrt{z}\right)^2 \Big/ (4(i\,f(2k-v)-i\,d(2s-m)))\right)\sqrt{\left(-\left(-i\,b(2s-m)+c\,i(2k-v)+2(i\,f(2k-v)-i\,d(2s-m))\sqrt{z}\right)^2 \Big/ (i\,f(2k-v)-i\,d(2s-m))\right)}\Bigg)$$

$$(i\,f(2k-v)-i\,d(2s-m))^{-2n-2}+(-1)^{m+v}\,e^{-\frac{(i\,c(2k-v)-i\,b(m-2s))^2}{4(i\,f(2k-v)-i\,d(m-2s))}-i\,e(m-2s)+g\,i(2k-v)}$$

$$(i\,f(2k-v)-i\,d(m-2s))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c(2k-v)-i\,b(m-2s))^{-h-j+2n}$$

$$\left(-i\,b(m-2s)+c\,i(2k-v)+2(i\,f(2k-v)-i\,d(m-2s))\sqrt{z}\right)^{h+j}\left(-\left(-i\,b(m-2s)+c\,i(2k-v)+2(i\,f(2k-v)-i\,d(m-2s))\sqrt{z}\right)^2 \Big/ (i\,f(2k-v)-i\,d(m-2s))\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}$$

$$\binom{n}{j}\Bigg((i\,c(2k-v)-i\,b(m-2s))\left(-i\,b(m-2s)+c\,i(2k-v)+2(i\,f(2k-v)-i\,d(m-2s))\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\left(-i\,b(m-2s)+c\,i(2k-v)+2(i\,f(2k-v)-i\,d(m-2s))\sqrt{z}\right)^2 \Big/ (4(i\,f(2k-v)-i\,d(m-2s)))\right)+2(i\,f(2k-v)-i\,d(m-2s))$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\left(-i\,b(m-2s)+c\,i(2k-v)+2(i\,f(2k-v)-i\,d(m-2s))\sqrt{z}\right)^2 \Big/ (4(i\,f(2k-v)-i\,d(m-2s)))\right)\sqrt{\left(-\left(-i\,b(m-2s)+c\,i(2k-v)+2(i\,f(2k-v)-i\,d(m-2s))\sqrt{z}\right)^2 \Big/ (i\,f(2k-v)-i\,d(m-2s))\right)}\Bigg)+$$

$$e^{-\frac{(i\,c(v-2k)-i\,b(2s-m))^2}{4(i\,f(v-2k)-i\,d(2s-m))}-i\,e(2s-m)+g\,i(v-2k)}\,(i\,f(v-2k)-i\,d(2s-m))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j$$

$$(i\,c(v-2k)-i\,b(2s-m))^{-h-j+2n}\left(-i\,b(2s-m)+c\,i(v-2k)+2(i\,f(v-2k)-i\,d(2s-m))\sqrt{z}\right)^{h+j}\left(-\left(-i\,b(2s-m)+c\,i(v-2k)+2(i\,f(v-2k)-i\,d(2s-m))\sqrt{z}\right)^2 \Big/ (i\,f(v-2k)-i\,d(2s-m))\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\,c(v-2k)-i\,b(2s-m))\left(-i\,b(2s-m)+c\,i(v-2k)+2(i\,f(v-2k)-i\,d(2s-m))\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\left(-i\,b(2s-m)+c\,i(v-2k)+2(i\,f(v-2k)-i\,d(2s-m))\sqrt{z}\right)^2 \Big/ (4(i\,f(v-2k)-i\,d(2s-m)))\right)+2(i\,f(v-2k)-i\,d(2s-m))$$

$$\Gamma\left(\frac{1}{2}(h+j+2), -\left(-i\,b(2s-m)+c\,i(v-2k)+2(i\,f(v-2k)-i\,d(2s-m))\sqrt{z}\right)^2 \Big/\right.$$

$$\left.\left.(4\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\right)\sqrt{\left(-\left(-i\,b\,(2\,s-m)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\sqrt{z}\right)^2\Big/(i\,f\,(v-2\,k)-i\,d\,(2\,s-m))\right)}\right)+$$

$$(-1)^m\,e^{-\frac{(i\,c\,(v-2\,k)-i\,b\,(m-2\,s))^2}{4\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))}-i\,e\,(m-2\,s)+g\,i\,(v-2\,k)}\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,k)-i\,b\,(m-2\,s))^{-h-j+2\,n}$$

$$\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\sqrt{z}\right)^{h+j}$$

$$\left(-\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\sqrt{z}\right)^2\Big/\right.$$

$$\left.(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\,c\,(v-2\,k)-i\,b\,(m-2\,s))\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\sqrt{z}\right)\right.$$

$$\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\sqrt{z}\right)^2\Big/\right.$$

$$\left.(4\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s)))\right)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\,\Gamma\!\left(\frac{1}{2}(h+j+2),\right.$$

$$-\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\sqrt{z}\right)^2\Big/(4\,(i\,f\,(v-2\,k)-$$

$$\left.i\,d\,(m-2\,s)))\right)\sqrt{\left(-\left(-i\,b\,(m-2\,s)+c\,i\,(v-2\,k)+2\,(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\right.\right.}$$

$$\left.\left.\left.\sqrt{z}\right)^2\Big/(i\,f\,(v-2\,k)-i\,d\,(m-2\,s))\right)\right)\Bigg)\;/;\;n\in\mathbb{N}\land m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving products of powers of several direct functions and a power function

Involving $z^{\alpha-1}\sin^2(a\,z)\sin(b\,z)\sin(c\,z)$

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$$\int z^{\alpha-1}\sin^2(a\,z)\sin(b\,z)\sin(c\,z)\,dz==$$

$$\frac{1}{16}z^\alpha\left(-(-i\,(2\,a-b-c)\,z)^{-\alpha}\,\Gamma(\alpha,-i\,(2\,a-b-c)\,z)-(i\,(2\,a-b-c)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(2\,a-b-c)\,z)-\right.$$
$$2\,(-i\,(b-c)\,z)^{-\alpha}\,\Gamma(\alpha,-i\,(b-c)\,z)-2\,(i\,(b-c)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(b-c)\,z)+(-i\,(2\,a+b-c)\,z)^{-\alpha}\,\Gamma(\alpha,-i\,(2\,a+b-c)\,z)+$$
$$(i\,(2\,a+b-c)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(2\,a+b-c)\,z)+(-i\,(2\,a-b+c)\,z)^{-\alpha}\,\Gamma(\alpha,-i\,(2\,a-b+c)\,z)+$$
$$(i\,(2\,a-b+c)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(2\,a-b+c)\,z)+2\,(-i\,(b+c)\,z)^{-\alpha}\,\Gamma(\alpha,-i\,(b+c)\,z)+2\,(i\,(b+c)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(b+c)\,z)-$$
$$\left.(-i\,(2\,a+b+c)\,z)^{-\alpha}\,\Gamma(\alpha,-i\,(2\,a+b+c)\,z)-(i\,(2\,a+b+c)\,z)^{-\alpha}\,\Gamma(\alpha,i\,(2\,a+b+c)\,z)\right)$$

01.06.21.1249.01

$$\int\frac{\sin^2(a\,z)\sin(b\,z)\sin(c\,z)}{z}\,dz==$$

$$\frac{1}{8}\left(\mathrm{Ci}((2\,a-b-c)\,z)+2\,\mathrm{Ci}((b-c)\,z)-\mathrm{Ci}((2\,a+b-c)\,z)-\mathrm{Ci}((2\,a-b+c)\,z)-2\,\mathrm{Ci}((b+c)\,z)+\mathrm{Ci}((2\,a+b+c)\,z)\right)$$

Involving rational functions of the direct function and a power function

Involving $\frac{z}{a+b\sin(c z+d)}$

01.06.21.1250.01

$$\int \frac{z}{1-\sin(z)}\,dz = \frac{2\sin\left(\frac{z}{2}\right)z}{\cos\left(\frac{z}{2}\right)-\sin\left(\frac{z}{2}\right)} + z - 2\tanh^{-1}\left(\tan\left(\frac{z}{2}\right)\right) + \log(\cos(z))$$

01.06.21.1251.01

$$\int \frac{z}{\sin(z)+1}\,dz = \frac{2\sin\left(\frac{z}{2}\right)z}{\cos\left(\frac{z}{2}\right)+\sin\left(\frac{z}{2}\right)} - z + 2\tanh^{-1}\left(\tan\left(\frac{z}{2}\right)\right) + \log(\cos(z))$$

01.06.21.1252.01

$$\int \frac{z}{a+b\sin(c\,z)}\,dz = \frac{1}{c^2}\left(\frac{\pi\tan^{-1}\left(\frac{b+a\tan\left(\frac{c\,z}{2}\right)}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} + \frac{1}{\sqrt{b^2-a^2}}\left((\pi-2\,c\,z)\tanh^{-1}\left(\frac{(a+b)\cot\left(\frac{1}{4}(\pi-2\,c\,z)\right)}{\sqrt{b^2-a^2}}\right) + 2\cos^{-1}\left(-\frac{a}{b}\right)\tanh^{-1}\left(\frac{(a-b)\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)}{\sqrt{b^2-a^2}}\right) + \left(\cos^{-1}\left(-\frac{a}{b}\right) - 2\,i\tanh^{-1}\left(\frac{(a+b)\cot\left(\frac{1}{4}(\pi-2\,c\,z)\right)}{\sqrt{b^2-a^2}}\right) - 2\,i\tanh^{-1}\left(\frac{(a-b)\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)}{\sqrt{b^2-a^2}}\right)\right)\log\left(\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\sqrt{b^2-a^2}\;e^{\frac{i\,c\,z}{2}}}{\sqrt{b}\;\sqrt{a+b\sin(c\,z)}}\right) + \left(\cos^{-1}\left(-\frac{a}{b}\right) + 2\,i\left(\tanh^{-1}\left(\frac{(a+b)\cot\left(\frac{1}{4}(\pi-2\,c\,z)\right)}{\sqrt{b^2-a^2}}\right) + \tanh^{-1}\left(\frac{(a-b)\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)}{\sqrt{b^2-a^2}}\right)\right)\right)\log\left(\frac{\left(\frac{1}{2}+\frac{i}{2}\right)\sqrt{b^2-a^2}\;e^{-\frac{1}{2}i\,c\,z}}{\sqrt{b}\;\sqrt{a+b\sin(c\,z)}}\right) - \left(\cos^{-1}\left(-\frac{a}{b}\right) - 2\,i\tanh^{-1}\left(\frac{(a-b)\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)}{\sqrt{b^2-a^2}}\right)\right)\log\left(\frac{(a+b)\left(i\,a-i\,b+\sqrt{b^2-a^2}\right)\left(i+\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)\right)}{b\left(a+b+\sqrt{b^2-a^2}\;\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)\right)}\right) - \left(\cos^{-1}\left(-\frac{a}{b}\right) + 2\,i\tanh^{-1}\left(\frac{(a-b)\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)}{\sqrt{b^2-a^2}}\right)\right)\log\left(\frac{(a+b)\left(-a+b-i\sqrt{b^2-a^2}\right)\left(i\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)+1\right)}{b\left(a+b+\sqrt{b^2-a^2}\;\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)\right)}\right) + i\left(\mathrm{Li}_2\left(\frac{\left(a-i\sqrt{b^2-a^2}\right)\left(a+b-\sqrt{b^2-a^2}\;\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)\right)}{b\left(a+b+\sqrt{b^2-a^2}\;\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)\right)}\right) - \mathrm{Li}_2\left(\frac{\left(a+i\sqrt{b^2-a^2}\right)\left(a+b-\sqrt{b^2-a^2}\;\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)\right)}{b\left(a+b+\sqrt{b^2-a^2}\;\tan\left(\frac{1}{4}(\pi-2\,c\,z)\right)\right)}\right)\right)\right)\right)$$

01.06.21.1253.01

$$\int \frac{z}{a+b\sin(d+c\,z)}\,dz = \frac{1}{c^2}\left(\frac{\pi\tan^{-1}\left(\frac{b+a\tan\left(\frac{1}{2}(d+c\,z)\right)}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}}+\frac{1}{\sqrt{b^2-a^2}}\left(-(2\,d+2\,c\,z-\pi)\tanh^{-1}\left(\frac{(a+b)\cot\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)}{\sqrt{b^2-a^2}}\right)-\right.\right.$$

$$2\left(d-\cos^{-1}\left(-\frac{a}{b}\right)\right)\tanh^{-1}\left(\frac{(a-b)\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)}{\sqrt{b^2-a^2}}\right)+$$

$$\left(\cos^{-1}\left(-\frac{a}{b}\right)+2\,i\left(\tanh^{-1}\left(\frac{(a+b)\cot\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)}{\sqrt{b^2-a^2}}\right)+\tanh^{-1}\left(\frac{(a-b)\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)}{\sqrt{b^2-a^2}}\right)\right)\right)$$

$$\log\left(\frac{\sqrt[4]{-1}\,\sqrt{b^2-a^2}\,e^{-\frac{1}{2}i(d+c\,z)}}{\sqrt{2}\,\sqrt{b}\,\sqrt{a+b\sin(d+c\,z)}}\right)+$$

$$\left(\cos^{-1}\left(-\frac{a}{b}\right)-2\,i\tanh^{-1}\left(\frac{(a+b)\cot\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)}{\sqrt{b^2-a^2}}\right)-2\,i\tanh^{-1}\left(\frac{(a-b)\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)}{\sqrt{b^2-a^2}}\right)\right)$$

$$\log\left(-\frac{(-1)^{3/4}\sqrt{b^2-a^2}\,e^{\frac{1}{2}i(d+c\,z)}}{\sqrt{2}\,\sqrt{b}\,\sqrt{a+b\sin(d+c\,z)}}\right)-\left(\cos^{-1}\left(-\frac{a}{b}\right)-2\,i\tanh^{-1}\left(\frac{(a-b)\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)}{\sqrt{b^2-a^2}}\right)\right)$$

$$\log\left(\frac{(a+b)\left(i\,a-i\,b+\sqrt{b^2-a^2}\right)\left(i+\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)\right)}{b\left(a+b+\sqrt{b^2-a^2}\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)\right)}\right)-$$

$$\left(\cos^{-1}\left(-\frac{a}{b}\right)+2\,i\tanh^{-1}\left(\frac{(a-b)\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)}{\sqrt{b^2-a^2}}\right)\right)$$

$$\log\left(\frac{(a+b)\left(-a+b-i\sqrt{b^2-a^2}\right)\left(i\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)+1\right)}{b\left(a+b+\sqrt{b^2-a^2}\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)\right)}\right)+$$

$$i\left(\mathrm{Li}_2\left(\frac{\left(a-i\sqrt{b^2-a^2}\right)\left(a+b-\sqrt{b^2-a^2}\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)\right)}{b\left(a+b+\sqrt{b^2-a^2}\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)\right)}\right)-\right.$$

$$\left.\left.\left.\mathrm{Li}_2\left(\frac{\left(a+i\sqrt{b^2-a^2}\right)\left(a+b-\sqrt{b^2-a^2}\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)\right)}{b\left(a+b+\sqrt{b^2-a^2}\tan\left(\frac{1}{4}(-2\,d-2\,c\,z+\pi)\right)\right)}\right)\right)\right)\right)$$

Involving $\frac{z \sin(c z)}{a+b \sin(2 c z)}$

01.06.21.1254.01

$$\int \frac{z \sin(c z)}{a + b \sin(2 c z)} \, dz = -b \left(\frac{1}{\sqrt{a^2 - b^2} - a} \left(\frac{1}{2} e^{3 i c z} \Phi\left(\frac{i b e^{2 i c z}}{a - \sqrt{a^2 - b^2}}, 2, \frac{3}{2} \right) + \frac{1}{(-i b)^{5/2}} \left(b \sqrt{\sqrt{a^2 - b^2} - a} \left(c z \left(-2 \left(\sqrt{a^2 - b^2} - a \right) \tanh^{-1}\left(\frac{\sqrt{-i b} \, e^{i c z}}{\sqrt{\sqrt{a^2 - b^2} - a}} \right) + 2 \sqrt{-i b} \sqrt{\sqrt{a^2 - b^2} - a} \, e^{i c z} - i b \log\left(\frac{e^{i c z} \sqrt{-i b}}{\sqrt{\sqrt{a^2 - b^2} - a}} + 1 \right) + b i \log\left(1 - \frac{\sqrt{-i b} \, e^{i c z}}{\sqrt{\sqrt{a^2 - b^2} - a}} \right) \right) + b \operatorname{Li}_2\left(\frac{\sqrt{-i b} \, e^{i c z}}{\sqrt{\sqrt{a^2 - b^2} - a}} \right) - b \operatorname{Li}_2\left(-\frac{\sqrt{-i b} \, e^{i c z}}{\sqrt{\sqrt{a^2 - b^2} - a}} \right) \right) \right) \right) + \frac{1}{a + \sqrt{a^2 - b^2}} \left(\frac{1}{2} e^{3 i c z} \Phi\left(\frac{i b e^{2 i c z}}{a + \sqrt{a^2 - b^2}}, 2, \frac{3}{2} \right) + \frac{1}{\sqrt{-i b} \, b} \left(\sqrt{a + \sqrt{a^2 - b^2}} \left(c z \left(-2 \left(a + \sqrt{a^2 - b^2} \right) \tan^{-1}\left(\frac{\sqrt{-i b} \, e^{i c z}}{\sqrt{a + \sqrt{a^2 - b^2}}} \right) + 2 \sqrt{-i b} \sqrt{a + \sqrt{a^2 - b^2}} \, e^{i c z} - b \log\left(1 - \frac{i \sqrt{-i b} \, e^{i c z}}{\sqrt{a + \sqrt{a^2 - b^2}}} \right) + b \log\left(\frac{e^{i c z} b}{\sqrt{-i b} \sqrt{a + \sqrt{a^2 - b^2}}} + 1 \right) \right) - i b \operatorname{Li}_2\left(-\frac{i \sqrt{-i b} \, e^{i c z}}{\sqrt{a + \sqrt{a^2 - b^2}}} \right) + b i \operatorname{Li}_2\left(\frac{b e^{i c z}}{\sqrt{-i b} \sqrt{a + \sqrt{a^2 - b^2}}} \right) \right) \right) \right) \right)$$

Involving algebraic functions of the direct function and a power function

Involving $\frac{z\sin(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{\beta}}$

01.06.21.1255.01

$$\int \frac{z\sin(c\,z)}{\left(a+b\sin^2(c\,z)\right)^{3/2}}\,dz = \frac{1}{(a+b)\,c^2}\left(\frac{1}{\sqrt{-b}}\tan^{-1}\left(\frac{\sqrt{2}\,\sqrt{-b}\,\sin(c\,z)}{\sqrt{2\,a+b-b\cos(2\,c\,z)}}\right)-\frac{\sqrt{2}\,c\,z\cos(c\,z)}{\sqrt{2\,a+b-b\cos(2\,c\,z)}}\right)$$

Involving functions of the direct function and algebraic functions

Involving products of the direct function and algebraic functions

Involving products of two direct functions and algebraic functions

Involving $(f+e\,z)^{\alpha-1}\sin(d+c\,z)\sin(b+a\,z)$

01.06.21.1256.01

$$\int (f+e\,z)^{\alpha-1}\sin(d+c\,z)\sin(b+a\,z)\,dz = \frac{1}{4\,e}\left((f+e\,z)^{\alpha}\left(\frac{(a-c)^2\,(f+e\,z)^2}{e^2}\right)^{-\alpha}\left(\frac{(a+c)^2\,(f+e\,z)^2}{e^2}\right)^{-\alpha}\right.$$
$$\left(\left(\Gamma\left(\alpha,-\frac{i\,(a+c)\,(f+e\,z)}{e}\right)\left(\cos\left(b+d-\frac{(a+c)\,f}{e}\right)+i\sin\left(b+d-\frac{(a+c)\,f}{e}\right)\right)\left(\frac{i\,(a+c)\,(f+e\,z)}{e}\right)^{\alpha}+\right.\right.$$
$$\left.\left(-\frac{i\,(a+c)\,(f+e\,z)}{e}\right)^{\alpha}\Gamma\left(\alpha,\frac{i\,(a+c)\,(f+e\,z)}{e}\right)\left(\cos\left(b+d-\frac{(a+c)\,f}{e}\right)-i\sin\left(b+d-\frac{(a+c)\,f}{e}\right)\right)\right)$$
$$\left(\frac{(a-c)^2\,(f+e\,z)^2}{e^2}\right)^{\alpha}-\left(\frac{i\,(a-c)\,(f+e\,z)}{e}\right)^{\alpha}\left(\frac{(a+c)^2\,(f+e\,z)^2}{e^2}\right)^{\alpha}\Gamma\left(\alpha,\frac{i\,(c-a)\,(f+e\,z)}{e}\right)$$
$$\left(\cos\left(b-d+\frac{(c-a)\,f}{e}\right)+i\sin\left(b-d+\frac{(c-a)\,f}{e}\right)\right)-\left(\frac{i\,(c-a)\,(f+e\,z)}{e}\right)^{\alpha}\left(\frac{(a+c)^2\,(f+e\,z)^2}{e^2}\right)^{\alpha}$$
$$\left.\left.\Gamma\left(\alpha,\frac{i\,(a-c)\,(f+e\,z)}{e}\right)\left(\cos\left(b-d+\frac{(c-a)\,f}{e}\right)-i\sin\left(b-d+\frac{(c-a)\,f}{e}\right)\right)\right)\right)$$

01.06.21.1257.01

$$\int \frac{\sin(d+c\,z)\sin(b+a\,z)}{f+e\,z}\,dz =$$
$$\frac{1}{2\,e}\left(\cos\left(\frac{b\,e-d\,e-a\,f+c\,f}{e}\right)\mathrm{Ci}\left(\frac{(a-c)\,(f+e\,z)}{e}\right)-\cos\left(b+d-\frac{(a+c)\,f}{e}\right)\mathrm{Ci}\left(\frac{(a+c)\,(f+e\,z)}{e}\right)-\right.$$
$$\left.\sin\left(\frac{b\,e-d\,e-a\,f+c\,f}{e}\right)\mathrm{Si}\left(\frac{(a-c)\,(f+e\,z)}{e}\right)+\sin\left(b+d-\frac{(a+c)\,f}{e}\right)\mathrm{Si}\left(\frac{(a+c)\,(f+e\,z)}{e}\right)\right)$$

01.06.21.1258.01

$$\int \frac{\sin(a\,z)\sin(b+a\,z)}{b+a\,z}\,dz = -\frac{\cos(b)\,\mathrm{Ci}(2\,(b+a\,z))-\cos(b)\log(b+a\,z)+\sin(b)\,\mathrm{Si}(2\,(b+a\,z))}{2\,a}$$

Involving functions of the direct function and exponential function

Involving powers of the direct function and exponential function

Involving powers of sin and exp

Involving $e^{bz}\sin^{\nu}(az)$

01.06.21.1259.01

$$\int e^{bz}\sin^{\nu}(az)\,dz = \frac{e^{bz}\left(1-e^{2iaz}\right)^{-\nu}\sin^{\nu}(az)}{b-ia\nu}\,{}_2F_1\!\left(-\frac{ib+a\nu}{2a},-\nu;1-\frac{ib}{2a}-\frac{\nu}{2};e^{2iaz}\right)$$

01.06.21.1260.01

$$\int e^{bz}\sin^{\nu}(az)\,dz = \frac{2^{-\nu}e^{bz}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)}{b}+2^{-\nu}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k e^{-\frac{i\pi\nu}{2}}\left(\frac{e^{(-2aik+b+ia\nu)z}}{-2aik+b+ia\nu}+\frac{e^{i(-az\nu+\pi\nu+2akz-ibz)}}{b+ai(2k-\nu)}\right)\binom{\nu}{k}\;/;\;\nu\in\mathbb{N}$$

01.06.21.1261.01

$$\int e^{bz}\sin^{2}(az)\,dz = \frac{e^{bz}\left(4a^2-2b\sin(2az)a+b^2-b^2\cos(2az)\right)}{2\left(b^3+4a^2b\right)}$$

01.06.21.1262.01

$$\int e^{az}\sin^{2}(az)\,dz = -\frac{e^{az}(\cos(2az)+2\sin(2az)-5)}{10a}$$

01.06.21.1263.01

$$\int e^{2az}\sin^{2}(az)\,dz = -\frac{e^{2az}(\cos(2az)+\sin(2az)-2)}{8a}$$

01.06.21.1264.01

$$\int e^{bz}\sin^{3}(az)\,dz = \frac{1}{4\left(9a^4+10b^2a^2+b^4\right)}\left(e^{bz}\left(-3a\left(9a^2+b^2\right)\cos(az)+3a\left(a^2+b^2\right)\cos(3az)-2b\left(-13a^2-b^2+\left(a^2+b^2\right)\cos(2az)\right)\sin(az)\right)\right)$$

01.06.21.1265.01

$$\int e^{bz}\sin^{4}(az)\,dz = \frac{1}{8\left(b^5+20a^2b^3+64a^4b\right)}\left(e^{bz}\left(192a^4-128b\sin(2az)a^3+16b\sin(4az)a^3+60b^2a^2-8b^3\sin(2az)a+4b^3\sin(4az)a+3b^4-4b^2\left(16a^2+b^2\right)\cos(2az)+b^2\left(4a^2+b^2\right)\cos(4az)\right)\right)$$

01.06.21.1266.01

$$\int e^{2az}\sin^{4}(az)\,dz = \frac{e^{2az}(-10\cos(2az)+\cos(4az)-10\sin(2az)+2\sin(4az)+15)}{80a}$$

01.06.21.1267.01

$$\int e^{-2az}\sin^{4}(az)\,dz = -\frac{e^{-2az}(-10\cos(2az)+\cos(4az)+10\sin(2az)-2\sin(4az)+15)}{80a}$$

01.06.21.1268.01

$$\int \frac{\sin^3(a z)}{\sqrt{e^{b z}}} \, dz = \left(-6 a \left(36 a^2 + b^2\right) \cos(a z) + 6 a \left(4 a^2 + b^2\right) \cos(3 a z) + 2 b \left(-52 a^2 - b^2 + \left(4 a^2 + b^2\right) \cos(2 a z)\right) \sin(a z)\right) \Big/ \left(2 \left(144 a^4 + 40 b^2 a^2 + b^4\right) \sqrt{e^{b z}}\right)$$

Involving $e^{b z + e} \sin^\nu(a z)$

01.06.21.1269.01

$$\int e^{b z + e} \sin^\nu(a z) \, dz = \frac{e^{b z + e} \left(1 - e^{2 i a z}\right)^{-\nu} \sin^\nu(a z)}{b - i a \nu} \, {}_2F_1\left(-\frac{i b + a \nu}{2 a}, -\nu; 1 - \frac{i b}{2 a} - \frac{\nu}{2}; e^{2 i a z}\right)$$

01.06.21.1270.01

$$\int e^{b z + e} \sin^\nu(a z) \, dz = \frac{2^{-\nu} e^{e + b z} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{b} + 2^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{e - \frac{i \pi \nu}{2}} \left(\frac{e^{(-2 a i k + b + i a \nu) z}}{-2 a i k + b + i a \nu} + \frac{e^{i (-a z \nu + \pi \nu + 2 a k z - i b z)}}{b + a i (2 k - \nu)}\right) \binom{\nu}{k} \;/;\; \nu \in \mathbb{N}$$

Involving $e^{p z} \sin^\nu(a z + b)$

01.06.21.1271.01

$$\int e^{p z} \sin^\nu(a z + b) \, dz = \frac{e^{p z} \left(1 - e^{2 i (b + a z)}\right)^{-\nu} \sin^\nu(b + a z)}{p - i a \nu} \, {}_2F_1\left(-\frac{i p + a \nu}{2 a}, -\nu; \frac{1}{2}\left(-\frac{i p}{a} - \nu + 2\right); e^{2 i (b + a z)}\right)$$

01.06.21.1272.01

$$\int e^{p z} \sin^\nu(a z + b) \, dz = \frac{2^{-\nu} e^{p z} (1 - \nu \bmod 2)}{p} \binom{\nu}{\frac{\nu}{2}} + 2^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{-\frac{1}{2} i (\pi \nu + 2 b (2 k + \nu))} \left(\frac{e^{2 i b \nu + (-2 a i k + p + i a \nu) z}}{-2 a i k + p + i a \nu} + \frac{e^{i (4 b k + 2 a z k + \pi \nu - i p z - a \nu z)}}{p + a i (2 k - \nu)}\right) \binom{\nu}{k} \;/;\; \nu \in \mathbb{N}$$

Involving $e^{p z + e} \sin^\nu(a z + b)$

01.06.21.1273.01

$$\int e^{p z + e} \sin^\nu(a z + b) \, dz = \frac{e^{p z + e} \left(1 - e^{2 i (b + a z)}\right)^{-\nu} \sin^\nu(b + a z)}{p - i a \nu} \, {}_2F_1\left(-\frac{i p + a \nu}{2 a}, -\nu; \frac{1}{2}\left(-\frac{i p}{a} - \nu + 2\right); e^{2 i (b + a z)}\right)$$

01.06.21.1274.01

$$\int e^{p z + e} \sin^\nu(a z + b) \, dz = \frac{2^{-\nu} e^{p z + e} (1 - \nu \bmod 2)}{p} \binom{\nu}{\frac{\nu}{2}} + 2^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{e - \frac{1}{2} i (\pi \nu + 2 b (2 k + \nu))} \left(\frac{e^{2 i b \nu + (-2 a i k + p + i a \nu) z}}{-2 a i k + p + i a \nu} + \frac{e^{i (4 b k + 2 a z k + \pi \nu - i p z - a \nu z)}}{p + a i (2 k - \nu)}\right) \binom{\nu}{k} \;/;\; \nu \in \mathbb{N}$$

Involving $e^{b z^r} \sin^\nu(c z)$

01.06.21.1275.01

$$\int e^{b z^2} \sin^\nu(c z)\, dz = \frac{1}{\sqrt{b}} 2^{-\nu-1} \sqrt{\pi} \left(\binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{b}\, z\right) (1 - \nu \bmod 2) + i^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{\frac{c^2 (\nu-2s)^2}{4b}} \binom{\nu}{s} \left((-1)^\nu \operatorname{erfi}\left(\frac{2 i c s - i c \nu + 2 b z}{2\sqrt{b}} \right) + \operatorname{erfi}\left(\frac{c\, i (\nu - 2s) + 2 b z}{2\sqrt{b}} \right) \right) \right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1276.01

$$\int e^{\sqrt{z}\, b} \sin^\nu(c z)\, dz = \frac{2^{1-\nu} e^{\sqrt{z}\, b} \left(b \sqrt{z} - 1\right) \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{b^2} + i^{-\nu} 2^{-\nu-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(2 e^{b\sqrt{z}} \left(\frac{e^{i \pi \nu + (2 i c k - i c \nu) z}}{2 i c k - i c \nu} + \frac{e^{(i c \nu - 2 i c k) z}}{i c \nu - 2 i c k} \right) - \frac{b\, e^{\frac{b^2}{8 i c k - 4 i c \nu}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b + 2 (i c \nu - 2 i c k) \sqrt{z}}{2 \sqrt{i c \nu - 2 i c k}} \right)}{(i c \nu - 2 i c k)^{3/2}} - \frac{b\, e^{\frac{b^2}{4 i c \nu - 8 i c k} + i \pi \nu} \sqrt{\pi} \operatorname{erfi}\left(\frac{b + 2 (2 i c k - i c \nu) \sqrt{z}}{2 \sqrt{2 i c k - i c \nu}} \right)}{(2 i c k - i c \nu)^{3/2}} \right) /;\ \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + e} \sin^\nu(c z)$

01.06.21.1277.01

$$\int e^{b z^2 + e} \sin^\nu(c z)\, dz = \frac{2^{-\nu-1} e^e \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{b}\, z\right) (1 - \nu \bmod 2)}{\sqrt{b}} + \frac{i^{-\nu} 2^{-\nu-1} \sqrt{\pi}}{\sqrt{b}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{-\frac{-c^2 (\nu-2k)^2 - 4 b e}{4b}} \binom{\nu}{k} \left(\operatorname{erfi}\left(\frac{-2 c i k + i c \nu + 2 b z}{2\sqrt{b}} \right) + e^{i \pi \nu} \operatorname{erfi}\left(\frac{2 i c k - i c \nu + 2 b z}{2\sqrt{b}} \right) \right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1278.01

$$\int e^{\sqrt{z}\, b + e} \sin^\nu(c z)\, dz = \frac{2^{1-\nu} e^{\sqrt{z}\, b + e} \left(b \sqrt{z} - 1\right) \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{b^2} + i^{-\nu} 2^{-\nu-1} e^e \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(2 e^{b\sqrt{z}} \left(\frac{e^{i \pi \nu + (2 i c k - i c \nu) z}}{2 i c k - i c \nu} + \frac{e^{(i c \nu - 2 i c k) z}}{i c \nu - 2 i c k} \right) - \frac{b\, e^{\frac{b^2}{8 i c k - 4 i c \nu}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b + 2 (i c \nu - 2 i c k) \sqrt{z}}{2 \sqrt{i c \nu - 2 i c k}} \right)}{(i c \nu - 2 i c k)^{3/2}} - \frac{b\, e^{\frac{b^2}{4 i c \nu - 8 i c k} + i \pi \nu} \sqrt{\pi} \operatorname{erfi}\left(\frac{b + 2 (2 i c k - i c \nu) \sqrt{z}}{2 \sqrt{2 i c k - i c \nu}} \right)}{(2 i c k - i c \nu)^{3/2}} \right) /;\ \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + d z} \sin^\nu(c z)$

01.06.21.1279.01

$$\int e^{b z^2+d z} \sin^\nu(c z)\, dz = \frac{2^{-\nu-1} e^{-\frac{d^2}{4b}} \sqrt{\pi}\, (1-\nu \bmod 2)}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\frac{d+2bz}{2\sqrt{b}}\right) + \frac{1}{\sqrt{b}} 2^{-\nu-1} \sqrt{\pi}\, i^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{-\frac{d^2+2 c i (2s+\nu) d - c^2 (\nu-2s)^2}{4b}} \binom{\nu}{s} \left(e^{\frac{2 i c d s}{b}} \operatorname{erfi}\left(\frac{d-2 i c s + i c \nu + 2 b z}{2\sqrt{b}}\right) + (-1)^\nu e^{\frac{i c d \nu}{b}} \operatorname{erfi}\left(\frac{d+2 i c s - i c \nu + 2 b z}{2\sqrt{b}}\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1280.01

$$\int e^{\sqrt{z}\, b + d z} \sin^\nu(c z)\, dz = 2^{-\nu} \binom{\nu}{\frac{\nu}{2}} \left(\frac{e^{\sqrt{z}\, b + d z}}{d} - \frac{b\, e^{-\frac{b^2}{4d}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b+2 d \sqrt{z}}{2\sqrt{d}}\right)}{2 d^{3/2}}\right)(1-\nu \bmod 2) + 2^{-\nu} i^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{b\sqrt{z}} \left(\frac{(-1)^\nu e^{(d+2 i c s - i c \nu) z}}{d + 2 i c s - i c \nu} + \frac{e^{(d-2 i c s + i c \nu) z}}{d - 2 i c s + i c \nu}\right) - \frac{b\, e^{\frac{b^2}{-4d+8 i c s - 4 i c \nu}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b+2(d-2 i c s + i c \nu)\sqrt{z}}{2\sqrt{d-2 i c s + i c \nu}}\right)}{2 (d - 2 i c s + i c \nu)^{3/2}} - \frac{(-1)^\nu b\, e^{\frac{b^2}{-4d-8 i c s + 4 i c \nu}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b+2(d+2 i c s - i c \nu)\sqrt{z}}{2\sqrt{d+2 i c s - i c \nu}}\right)}{2 (d + 2 i c s - i c \nu)^{3/2}}\right) /;\ \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + d z + e} \sin^\nu(c z)$

01.06.21.1281.01

$$\int e^{b z^2+d z+e} \sin^\nu(c z)\, dz = \frac{2^{-\nu-1} \sqrt{\pi}\, (1-\nu \bmod 2)}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} e^{e-\frac{d^2}{4b}} \operatorname{erfi}\left(\frac{d+2bz}{2\sqrt{b}}\right) + \frac{1}{\sqrt{b}} 2^{-\nu-1} \sqrt{\pi}\, i^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{-\frac{d^2+2 c i (2k+\nu) d - c^2 (\nu-2k)^2 - 4 b e}{4b}} \binom{\nu}{k} \left(e^{\frac{2 i c d k}{b}} \operatorname{erfi}\left(\frac{d-2 i c k + i c \nu + 2 b z}{2\sqrt{b}}\right) + e^{\frac{i c d \nu}{b} + i \pi \nu} \operatorname{erfi}\left(\frac{d+2 i c k - i c \nu + 2 b z}{2\sqrt{b}}\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1282.01

$$\int e^{\sqrt{z}\, b+d z+e} \sin^{\nu}(c z)\, dz = 2^{-\nu} \binom{\nu}{\frac{\nu}{2}} \left(\frac{e^{\sqrt{z}\, b+e+d z}}{d} - \frac{b\, e^{e-\frac{b^2}{4 d}} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b+2 d \sqrt{z}}{2 \sqrt{d}}\right)}{2 d^{3/2}} \right) (1 - \nu \bmod 2) +$$

$$2^{-\nu-1}\, i^{-\nu}\, e^{e} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(2\, e^{b \sqrt{z}} \left(\frac{e^{i \pi \nu+(d+2 i c k-i c \nu) z}}{d+2 i c k-i c \nu} + \frac{e^{(d-2 i c k+i c \nu) z}}{d-2 i c k+i c \nu} \right) - \right.$$

$$\left. \frac{b\, e^{\frac{b^2}{-4 d+8 i c k-4 i c \nu}} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b+2 (d-2 i c k+i c \nu) \sqrt{z}}{2 \sqrt{d-2 i c k+i c \nu}}\right)}{(d-2 i c k+i c \nu)^{3/2}} - \frac{b\, e^{\frac{b^2}{-4 d-8 i c k+4 i c \nu}+i \pi \nu} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b+2 (d+2 i c k-i c \nu) \sqrt{z}}{2 \sqrt{d+2 i c k-i c \nu}}\right)}{(d+2 i c k-i c \nu)^{3/2}} \right) /;\ \nu \in \mathbb{N}^+$$

Involving $e^{b z^r} \sin^{\nu}(f z+g)$

01.06.21.1283.01

$$\int e^{b z^2} \sin^{\nu}(f z+g)\, dz = \frac{2^{-\nu-1} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \mathrm{erfi}\left(\sqrt{b}\, z\right) (1-\nu \bmod 2)}{\sqrt{b}} + i^{-\nu}\, 2^{-\nu-1} \sqrt{\pi}$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\frac{f^2 (\nu-2 k)^2}{4 b}+g i (\nu-2 k)} \mathrm{erfi}\left(\frac{-2 f i k+i f \nu+2 b z}{2 \sqrt{b}}\right)}{\sqrt{b}} - \frac{e^{\frac{1}{4}\left(-\frac{(2 i f k-i f \nu)^2}{b}+8 i g k-4 i g \nu+4 \pi i \nu\right)} \mathrm{erf}\left(\frac{2 i f k-i f \nu+2 b z}{2 \sqrt{-b}}\right)}{\sqrt{-b}} \right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1284.01

$$\int e^{\sqrt{z}\, b} \sin^{\nu}(f z+g)\, dz =$$

$$(2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(-\frac{b\, e^{\frac{i b^2}{4 f (\nu-2 k)}-2 i g k+i g \nu} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b+2 (i f \nu-2 i f k) \sqrt{z}}{2 \sqrt{i f (\nu-2 k)}}\right)}{2 (i f \nu-2 i f k)^{3/2}} + \frac{e^{\sqrt{z}\, b+\frac{1}{2}(-4 i g k+2 i g \nu)+(i f \nu-2 i f k) z}}{i f \nu-2 i f k} + \right.$$

$$\left. \frac{(-1)^{\nu} e^{\sqrt{z}\, b+\frac{1}{2}(4 i g k-2 i g \nu)+(2 i f k-i f \nu) z}}{2 i f k-i f \nu} - \frac{(-1)^{\nu} b\, e^{\frac{i b^2}{4 f (2 k-\nu)}+2 i g k-i g \nu} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b+2 (2 i f k-i f \nu) \sqrt{z}}{2 \sqrt{2 i f k-i f \nu}}\right)}{2 (2 i f k-i f \nu)^{3/2}} \right) +$$

$$\frac{2^{1-\nu} e^{\sqrt{z}\, b} \left(b \sqrt{z} - 1\right) \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{b^2} /;\ \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + e} \sin^\nu(f z + g)$

01.06.21.1285.01

$$\int e^{b z^2+e} \sin^\nu(f z+g)\, dz = \frac{2^{-\nu-1} e^e \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{b}\, z\right)(1-\nu \bmod 2)}{\sqrt{b}} + i^{-\nu} 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\frac{f^2 (\nu-2k)^2}{4b} + g i (\nu-2k)+e} \operatorname{erfi}\left(\frac{-2 f i k + i f \nu + 2 b z}{2\sqrt{b}}\right)}{\sqrt{b}} - \frac{e^{\frac{1}{4}\left(-\frac{(2 i f k - i f \nu)^2}{b} + 4 e + 8 i g k - 4 i g \nu + 4 \pi i \nu\right)} \operatorname{erf}\left(\frac{2 i f k - i f \nu + 2 b z}{2\sqrt{-b}}\right)}{\sqrt{-b}} \right) /; \nu \in \mathbb{N}^+$$

01.06.21.1286.01

$$\int e^{\sqrt{z}\, b+e} \sin^\nu(f z+g)\, dz = (2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(-\frac{b\, e^{\frac{i b^2}{4 f (\nu-2k)} + e - 2 i g k + i g \nu} \sqrt{\pi} \operatorname{erfi}\left(\frac{b + 2 (i f \nu - 2 i f k) \sqrt{z}}{2 \sqrt{i f (\nu-2k)}}\right)}{2 (i f \nu - 2 i f k)^{3/2}} + \frac{e^{\sqrt{z}\, b + \frac{1}{2}(2e - 4 i g k + 2 i g \nu) + (i f \nu - 2 i f k) z}}{i f \nu - 2 i f k} + \frac{(-1)^\nu e^{\sqrt{z}\, b + \frac{1}{2}(2e + 4 i g k - 2 i g \nu) + (2 i f k - i f \nu) z}}{2 i f k - i f \nu} - \frac{(-1)^\nu b\, e^{\frac{i b^2}{4 f (2k-\nu)} + e + 2 i g k - i g \nu} \sqrt{\pi} \operatorname{erfi}\left(\frac{b + 2 (2 i f k - i f \nu) \sqrt{z}}{2 \sqrt{2 i f k - i f \nu}}\right)}{2 (2 i f k - i f \nu)^{3/2}} \right) + \frac{2^{1-\nu} e^{\sqrt{z}\, b+e} \left(b \sqrt{z} - 1\right) \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{b^2} /; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + d z} \sin^\nu(f z + g)$

01.06.21.1287.01

$$\int e^{b z^2+d z} \sin^\nu(g + f z)\, dz = \frac{2^{-\nu-1} e^{-\frac{d^2}{4b}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\frac{d+2 b z}{2\sqrt{b}}\right)(1-\nu \bmod 2)}{\sqrt{b}} + i^{-\nu} 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{-\frac{(d + f i (\nu-2k))^2}{4b} + g i (\nu-2k)} \operatorname{erfi}\left(\frac{d - 2 i f k + i f \nu + 2 b z}{2\sqrt{b}}\right)}{\sqrt{b}} - \frac{e^{\frac{1}{4}\left(-\frac{(d + 2 i f k - i f \nu)^2}{b} + 8 i g k - 4 i g \nu + 4 \pi i \nu\right)} \operatorname{erf}\left(\frac{d + 2 i f k - i f \nu + 2 b z}{2\sqrt{-b}}\right)}{\sqrt{-b}} \right) /; \nu \in \mathbb{N}^+$$

01.06.21.1288.01

$$\int e^{\sqrt{z}\,b+d\,z}\sin^{\nu}(f\,z+g)\,dz = \left(\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{e^{\sqrt{z}\,b+\frac{1}{2}(-4\,i\,g\,k+2\,i\,g\,\nu)+(d-2\,i\,f\,k+i\,f\,\nu)\,z}}{d-2\,i\,f\,k+i\,f\,\nu}-\frac{b\,e^{-\frac{b^2}{4(d+f\,i\,(\nu-2\,k))}-2\,i\,g\,k+i\,g\,\nu}\sqrt{\pi}\,\mathrm{erfi}\left(\frac{b+2\,(d-2\,i\,f\,k+i\,f\,\nu)\sqrt{z}}{2\sqrt{d+f\,i\,(\nu-2\,k)}}\right)}{2\,(d-2\,i\,f\,k+i\,f\,\nu)^{3/2}}+\frac{(-1)^{\nu}\,e^{\sqrt{z}\,b+\frac{1}{2}(4\,i\,g\,k-2\,i\,g\,\nu)+(d+2\,i\,f\,k-i\,f\,\nu)\,z}}{d+2\,i\,f\,k-i\,f\,\nu}-\frac{(-1)^{\nu}\,b\,e^{-\frac{b^2}{4(d+f\,i\,(2\,k-\nu))}+2\,i\,g\,k-i\,g\,\nu}\sqrt{\pi}\,\mathrm{erfi}\left(\frac{b+2\,(d+2\,i\,f\,k-i\,f\,\nu)\sqrt{z}}{2\sqrt{d+2\,i\,f\,k-i\,f\,\nu}}\right)}{2\,(d+2\,i\,f\,k-i\,f\,\nu)^{3/2}}\right)\right)(2\,i)^{-\nu}+2^{-\nu}\left(\frac{e^{\sqrt{z}\,b+d\,z}}{d}-\frac{b\,e^{-\frac{b^2}{4\,d}}\sqrt{\pi}\,\mathrm{erfi}\left(\frac{b+2\,d\sqrt{z}}{2\sqrt{d}}\right)}{2\,d^{3/2}}\right)\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\;/;\;\nu\in\mathbb{N}^+$$

Involving $e^{b\,z^r+d\,z+e}\sin^{\nu}(f\,z+g)$

01.06.21.1289.01

$$\int e^{b\,z^2+d\,z+e}\sin^{\nu}(g+f\,z)\,dz = \frac{2^{-\nu-1}\,e^{e-\frac{d^2}{4\,b}}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}\mathrm{erfi}\left(\frac{d+2\,b\,z}{2\sqrt{b}}\right)(1-\nu \bmod 2)}{\sqrt{b}}+i^{-\nu}\,2^{-\nu-1}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{e^{-\frac{(d+f\,i\,(\nu-2\,k))^2}{4\,b}+e+g\,i\,(\nu-2\,k)}\,\mathrm{erfi}\left(\frac{d-2\,i\,f\,k+i\,f\,\nu+2\,b\,z}{2\sqrt{b}}\right)}{\sqrt{b}}-\frac{e^{\frac{1}{4}\left(-\frac{(d+2\,i\,f\,k-i\,f\,\nu)^2}{b}+4\,e+8\,i\,g\,k-4\,i\,g\,\nu+4\,\pi\,i\,\nu\right)}\,\mathrm{erf}\left(\frac{d+2\,i\,f\,k-i\,f\,\nu+2\,b\,z}{2\sqrt{-b}}\right)}{\sqrt{-b}}\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.1290.01

$$\int e^{\sqrt{z}\, b+d z+e} \sin^{\nu}(f z+g)\, dz = \left(\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\sqrt{z}\, b+\frac{1}{2}(2e-4 i g k+2 i g \nu)+(d-2 i f k+i f \nu) z}}{d-2 i f k+i f \nu} - \frac{b\, e^{-\frac{b^2}{4(d+f i(\nu-2k))}+e-2 i g k+i g \nu} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b+2(d-2 i f k+i f \nu)\sqrt{z}}{2\sqrt{d+f i(\nu-2k)}}\right)}{2(d-2 i f k+i f \nu)^{3/2}} + \frac{(-1)^{\nu} e^{\sqrt{z}\, b+\frac{1}{2}(2e+4 i g k-2 i g \nu)+(d+2 i f k-i f \nu) z}}{d+2 i f k-i f \nu} - \frac{(-1)^{\nu} b\, e^{-\frac{b^2}{4(d+f i(2k-\nu))}+e+2 i g k-i g \nu} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b+2(d+2 i f k-i f \nu)\sqrt{z}}{2\sqrt{d+2 i f k-i f \nu}}\right)}{2(d+2 i f k-i f \nu)^{3/2}} \right)\right)$$

$$(2 i)^{-\nu} + 2^{-\nu} \left(\frac{e^{\sqrt{z}\, b+e+d z}}{d} - \frac{b\, e^{e-\frac{b^2}{4d}} \sqrt{\pi}\, \mathrm{erfi}\left(\frac{b+2d\sqrt{z}}{2\sqrt{d}}\right)}{2 d^{3/2}} \right) \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) /;\ \nu \in \mathbb{N}^+$$

Involving $e^{b z} \sin^{\nu}(c z^r)$

01.06.21.1291.01

$$\int e^{b z} \sin^{\nu}(c z^2)\, dz = \frac{e^{b z}(1-\nu \bmod 2)}{2^{\nu} b} \binom{\nu}{\frac{\nu}{2}} + \frac{i^{-\nu} 2^{-\nu-1} \sqrt{\pi}}{\sqrt{i c}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{(-1)^k}{\sqrt{\nu-2k}} e^{\frac{b^2}{8 i c k-4 i c \nu}} \binom{\nu}{k} \left(e^{\frac{b^2}{2 i c \nu-4 i c k}+i \pi \nu} \mathrm{erf}\left(\frac{2 i c(\nu-2k) z-b}{2\sqrt{i c}\sqrt{\nu-2k}}\right) + \mathrm{erfi}\left(\frac{b+2 c i(\nu-2k) z}{2\sqrt{i c}\sqrt{\nu-2k}}\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1292.01

$$\int e^{b z} \sin^{\nu}(c\sqrt{z})\, dz = \frac{e^{b z}(1-\nu \bmod 2)}{2^{\nu} b} \binom{\nu}{\frac{\nu}{2}} + \frac{2^{-\nu-1} i^{-\nu}}{b^{3/2}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{\frac{(4k^2+\nu^2)c^2}{4b}+i(2k-\nu)\sqrt{z}\, c} \binom{\nu}{k} \left(-i c\, e^{i c\left(\frac{i c k \nu}{b}+(\nu-2k)\sqrt{z}\right)} \sqrt{\pi}\,(2k-\nu)\left((-1)^{\nu} \mathrm{erfi}\left(\frac{2\sqrt{z}\, b+2 i c k-i c \nu}{2\sqrt{b}}\right) + \mathrm{erfi}\left(\frac{-2\sqrt{z}\, b+2 i c k-i c \nu}{2\sqrt{b}}\right)\right) + 2\sqrt{b}\, e^{-\frac{(4k^2+\nu^2)c^2}{4b}+i \pi \nu+b z} + 2\sqrt{b}\, e^{-\frac{(4k^2+\nu^2)c^2}{4b}+2 i(\nu-2k)\sqrt{z}\, c+b z} \right) /;\ \nu \in \mathbb{N}^+$$

Involving $e^{b z+e} \sin^{\nu}(c z^r)$

01.06.21.1293.01

$$\int e^{b z+e} \sin^{\nu}(c z^2)\, dz = \frac{e^{b z+e}(1-\nu \bmod 2)}{2^{\nu} b} \binom{\nu}{\frac{\nu}{2}} + \frac{i^{-\nu} 2^{-\nu-1} \sqrt{\pi}}{\sqrt{i c}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{(-1)^k}{\sqrt{\nu-2k}} e^{\frac{b^2}{8 i c k-4 i c \nu}+e} \binom{\nu}{k} \left(e^{\frac{b^2}{2 i c \nu-4 i c k}+i \pi \nu} \mathrm{erf}\left(\frac{2 i c(\nu-2k) z-b}{2\sqrt{i c}\sqrt{\nu-2k}}\right) + \mathrm{erfi}\left(\frac{b+2 c i(\nu-2k) z}{2\sqrt{i c}\sqrt{\nu-2k}}\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1294.01

$$\int e^{b z+e} \sin^{\nu}\left(c \sqrt{z}\right) dz = \frac{e^{b z+e} (1-\nu \bmod 2)}{2^{\nu} b} \binom{\nu}{\frac{\nu}{2}} + \frac{2^{-\nu-1} i^{-\nu}}{b^{3/2}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{\frac{\left(4 k^2+\nu^2\right) c^2}{4 b} + i (2k-\nu)\sqrt{z}\, c + e} \binom{\nu}{k}$$
$$\left(-i c\, e^{i c\left(\frac{i c k \nu}{b} + (\nu - 2k)\sqrt{z}\right)} \sqrt{\pi}\, (2k-\nu) \left((-1)^{\nu} \operatorname{erfi}\left(\frac{2\sqrt{z}\, b + 2 i c k - i c \nu}{2\sqrt{b}}\right) + \operatorname{erfi}\left(\frac{-2\sqrt{z}\, b + 2 i c k - i c \nu}{2\sqrt{b}}\right)\right) + \right.$$
$$\left. 2\sqrt{b}\, e^{-\frac{\left(4k^2+\nu^2\right)c^2}{4b} + i \pi \nu + b z} + 2\sqrt{b}\, e^{-\frac{\left(4k^2+\nu^2\right)c^2}{4b} + 2 i (\nu - 2k)\sqrt{z}\, c + b z}\right) /; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r} \sin^{\nu}\left(c z^r\right)$

01.06.21.1295.01

$$\int e^{b z^r} \sin^{\nu}(c z^r)\, dz = -\frac{2^{-\nu} z \left(-b z^r\right)^{-1/r} (1-\nu \bmod 2)}{r} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{1}{r}, -b z^r\right) -$$
$$\frac{2^{-\nu} i^{-\nu} z}{r} \sum_{i=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^i \binom{\nu}{i} \left((-1)^{\nu} \Gamma\left(\frac{1}{r}, (i c (\nu - 2i) - b) z^r\right) ((i c (\nu - 2 i) - b) z^r)^{-1/r} + \right.$$
$$\left. ((-b - i c (\nu - 2 i)) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b - i c (\nu - 2i)) z^r\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1296.01

$$\int e^{b z^2} \sin^{\nu}\left(c z^2\right) dz = \frac{2^{-\nu-1} \sqrt{\pi}\, (1-\nu \bmod 2)}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{b}\, z\right) +$$
$$2^{-\nu-1} i^{-\nu} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \left((-1)^s \binom{\nu}{s} \left((-1)^{\nu} \sqrt{b + 2 i c s - i c \nu}\, (b + c i (\nu - 2s)) \operatorname{erfi}\left(\sqrt{b + 2 i c s - i c \nu}\, z\right) + (b + 2 i c s - i c \nu)\right.\right.$$
$$\left.\left. \sqrt{b + c i (\nu - 2s)}\, \operatorname{erfi}\left(\sqrt{b + c i (\nu - 2s)}\, z\right)\right)\right) \Big/ ((b + 2 i c s - i c \nu)(b + c i (\nu - 2s))) /; \nu \in \mathbb{N}^+$$

01.06.21.1297.01

$$\int e^{b\sqrt{z}} \sin^{\nu}\left(c\sqrt{z}\right) dz =$$
$$\frac{2^{1-\nu} e^{b\sqrt{z}} \left(b\sqrt{z} - 1\right) (1-\nu \bmod 2)}{b^2} \binom{\nu}{\frac{\nu}{2}} + 2^{1-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{(b - 2 i c k + i c \nu)\sqrt{z}} \left(\frac{e^{-\frac{1}{2} i \pi \nu} \sqrt{z}}{b - 2 i c k + i c \nu} - \frac{e^{-\frac{1}{2} i \pi \nu}}{(b - 2 i c k + i c \nu)^2}\right) + \right.$$
$$\left. e^{(b + 2 i c k - i c \nu)\sqrt{z}} \left(\frac{e^{\frac{i \pi \nu}{2}} \sqrt{z}}{b + 2 i c k - i c \nu} - \frac{e^{\frac{i \pi \nu}{2}}}{(b + 2 i c k - i c \nu)^2}\right)\right) /; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + e} \sin^{\nu}\left(c z^r\right)$

01.06.21.1298.01

$$\int e^{b z^r + e} \sin^\nu(c z^r)\, dz = -\frac{2^{-\nu} e^e z (-b z^r)^{-1/r} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{1}{r}, -b z^r\right)(1 - \nu \bmod 2)}{r} - \frac{(2 i)^{-\nu} z}{r} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^e \binom{\nu}{k} \left((-1)^\nu \Gamma\left(\frac{1}{r}, (-b - 2 i c k + i c \nu) z^r\right) ((-b - 2 i c k + i c \nu) z^r)^{-1/r} + ((-b - i c (\nu - 2k)) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b - i c (\nu - 2k)) z^r\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1299.01

$$\int e^{b z^2 + e} \sin^\nu(c z^2)\, dz = \frac{2^{-\nu-1} e^e \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{b}\, z\right)(1 - \nu \bmod 2)}{\sqrt{b}} + i^{-\nu} 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^e \operatorname{erfi}\left(\frac{2 b z - 4 i c k z + 2 i c \nu z}{2\sqrt{b - 2 i c k + i c \nu}}\right)}{\sqrt{b - 2 i c k + i c \nu}} - \frac{e^{e + i \pi \nu} \operatorname{erf}\left(\frac{2 b z + 4 i c k z - 2 i c \nu z}{2\sqrt{-b - 2 i c k + i c \nu}}\right)}{\sqrt{-b - 2 i c k + i c \nu}}\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1300.01

$$\int e^{\sqrt{z}\, b + e} \sin^\nu\left(c \sqrt{z}\right) dz = \frac{2^{1-\nu} e^{\sqrt{z}\, b + e} \left(b \sqrt{z} - 1\right) \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{b^2} + 2^{2-\nu} e^{\sqrt{z}\, b + e} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{\left(b^2 + c^2 (2k - \nu)^2\right)^2} \left((-1)^k \binom{\nu}{k} \left(\left(\sqrt{z}\, b^3 - b^2 + c^2 (2k - \nu)^2 \sqrt{z}\, b + c^2 (2k - \nu)^2\right) \cos\left(c \sqrt{z} (2k - \nu) + \frac{\pi \nu}{2}\right) + c (2k - \nu) \left(\sqrt{z}\, b^2 - 2b + c^2 (2k - \nu)^2 \sqrt{z}\right) \sin\left(c \sqrt{z} (2k - \nu) + \frac{\pi \nu}{2}\right)\right)\right) /; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + d z} \sin^\nu(c z^r)$

01.06.21.1301.01

$$\int e^{b z^2 + d z} \sin^\nu(c z^2)\, dz = \frac{2^{-\nu-1} \sqrt{\pi}\, (1 - \nu \bmod 2)}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} e^{-\frac{d^2}{4b}} \operatorname{erfi}\left(\frac{d + 2 b z}{2\sqrt{b}}\right) + 2^{-\nu-1} i^{-\nu} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{-\frac{d^2}{4(b - 2 i c k + i c \nu)}} \operatorname{erfi}\left(\frac{d + 2(b - 2 i c k + i c \nu) z}{2\sqrt{b + c i (\nu - 2k)}}\right)}{\sqrt{b + c i (\nu - 2k)}} - \frac{e^{\frac{d^2}{-4b - 8 i c k + 4 i c \nu} + i \pi \nu} \operatorname{erf}\left(\frac{d + 2(b + 2 i c k - i c \nu) z}{2\sqrt{i c (\nu - 2k) - b}}\right)}{\sqrt{i c (\nu - 2k) - b}}\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1302.01

$$\int e^{\sqrt{z}\, b+d z} \sin^{\nu}\left(c \sqrt{z}\right) dz = 2^{-\nu} \binom{\nu}{\frac{\nu}{2}} \left(\frac{e^{\sqrt{z}\, b+d z}}{d} - \frac{b\, e^{-\frac{b^2}{4 d}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+2 d \sqrt{z}}{2 \sqrt{d}}\right)}{2 d^{3/2}} \right) (1-\nu \bmod 2) + \frac{i^{-\nu} 2^{-\nu-1}}{d^{3/2}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{-\frac{b^2+2 c i (2 k+\nu) b-c^2 \left(4 k^2+\nu^2\right)}{4 d}} \binom{\nu}{k} \left(-e^{\frac{\left(-k c^2+i b c+\pi i d\right)\nu}{d}} \sqrt{\pi}\, (b+2 i c k-i c \nu) \operatorname{erfi}\left(\frac{b+2 i c k-i c \nu+2 d \sqrt{z}}{2 \sqrt{d}}\right) + 2 \sqrt{d}\, e^{\frac{b^2+2\left(2 \sqrt{z}\, d+c i (2 k+\nu)\right) b-c^2 \left(4 k^2+\nu^2\right)+4 d^2 z+4 c d i (\nu-2 k) \sqrt{z}}{4 d}} + 2 \sqrt{d}\, e^{\frac{b^2+2\left(2 \sqrt{z}\, d+c i (2 k+\nu)\right) b-c^2 \left(4 k^2+\nu^2\right)+4 d (i \pi \nu+d z)+4 c d i (2 k-\nu) \sqrt{z}}{4 d}} - e^{\frac{i c k (2 b+i c \nu)}{d}} \sqrt{\pi}\, (b+c i (\nu-2 k)) \operatorname{erfi}\left(\frac{b+c i (\nu-2 k)+2 d \sqrt{z}}{2 \sqrt{d}}\right) \right) /;\ \nu \in \mathbb{N}^+$$

Involving $e^{b z^r+d z+e} \sin^{\nu}\left(c z^r\right)$

01.06.21.1303.01

$$\int e^{b z^2+d z+e} \sin^{\nu}\left(c z^2\right) dz = \frac{2^{-\nu-1} \sqrt{\pi}\, (1-\nu \bmod 2)}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} e^{e-\frac{d^2}{4 b}} \operatorname{erfi}\left(\frac{d+2 b z}{2 \sqrt{b}}\right) + 2^{-\nu-1} e^{e} \sqrt{\pi}\, i^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{-\frac{d^2}{4 (b-2 i c k+i c \nu)}} \operatorname{erfi}\left(\frac{d+2 (b-2 i c k+i c \nu) z}{2 \sqrt{b+c i (\nu-2 k)}}\right)}{\sqrt{b+c i (\nu-2 k)}} - \frac{e^{\frac{d^2}{-4 b-8 i c k+4 i c \nu}+i \pi \nu} \operatorname{erf}\left(\frac{d+2 (b+2 i c k-i c \nu) z}{2 \sqrt{i c (\nu-2 k)-b}}\right)}{\sqrt{i c (\nu-2 k)-b}} \right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1304.01

$$\int e^{\sqrt{z}\, b+e+d z} \sin^{\nu}\left(c \sqrt{z}\right) dz = 2^{-\nu} \binom{\nu}{\frac{\nu}{2}} \left(\frac{e^{\sqrt{z}\, b+e+d z}}{d} - \frac{b\, e^{e-\frac{b^2}{4 d}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+2 d \sqrt{z}}{2 \sqrt{d}}\right)}{2 d^{3/2}} \right) (1-\nu \bmod 2) + \frac{i^{-\nu} 2^{-\nu-1}}{d^{3/2}} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{-\frac{b^2+2 c i (2 k+\nu) b-4 d e-c^2 \left(4 k^2+\nu^2\right)}{4 d}} \binom{\nu}{k} \left(-e^{\frac{\left(-k c^2+i b c+\pi i d\right)\nu}{d}} \sqrt{\pi}\, (b+2 i c k-i c \nu) \operatorname{erfi}\left(\frac{b+2 i c k-i c \nu+2 d \sqrt{z}}{2 \sqrt{d}}\right) + 2 \sqrt{d}\, e^{\frac{b^2+2\left(2 \sqrt{z}\, d+c i (2 k+\nu)\right) b-c^2 \left(4 k^2+\nu^2\right)+4 d^2 z+4 c d i (\nu-2 k) \sqrt{z}}{4 d}} + 2 \sqrt{d}\, e^{\frac{b^2+2\left(2 \sqrt{z}\, d+c i (2 k+\nu)\right) b-c^2 \left(4 k^2+\nu^2\right)+4 d (i \pi \nu+d z)+4 c d i (2 k-\nu) \sqrt{z}}{4 d}} - e^{\frac{i c k (2 b+i c \nu)}{d}} \sqrt{\pi}\, (b+c i (\nu-2 k)) \operatorname{erfi}\left(\frac{b+c i (\nu-2 k)+2 d \sqrt{z}}{2 \sqrt{d}}\right) \right) /;\ \nu \in \mathbb{N}^+$$

Involving $e^{d z} \sin^{\nu}\left(c z^r+g\right)$

01.06.21.1305.01

$$\int e^{dz}\sin^{\nu}(c z^2+g)\,dz = \frac{2^{-\nu} e^{dz}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)}{d} + i^{-\nu}\, 2^{-\nu-1}\sqrt{\pi} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{e^{\frac{i d^2}{4c(\nu-2k)}+g i(\nu-2k)}\operatorname{erfi}\left(\frac{d-4ickz+2icvz}{2\sqrt{icv-2ick}}\right)}{\sqrt{icv-2ick}} - \frac{e^{\frac{1}{4}\left(-\frac{d^2}{2ick-icv}+8igk-4igv+4\pi i v\right)}\operatorname{erf}\left(\frac{d+4ickz-2icvz}{2\sqrt{icv-2ick}}\right)}{\sqrt{icv-2ick}}\right) /;\ \nu\in\mathbb{N}^+$$

01.06.21.1306.01

$$\int e^{dz}\sin^{\nu}(\sqrt{z}\,c+g)\,dz = (2i)^{-\nu}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{e^{\sqrt{z}\,(icv-2ick)+\frac{1}{2}(2igv-4igk)+dz}}{d} + \frac{(-1)^{\nu} e^{\sqrt{z}\,(2ick-icv)+\frac{1}{2}(4igk-2igv)+dz}}{d} - \frac{(-1)^{\nu} e^{\frac{c^2(2k-\nu)^2}{4d}+2igk-igv}\sqrt{\pi}\,(2ick-icv)\operatorname{erfi}\left(\frac{2\sqrt{z}\,d+ci(2k-\nu)}{2\sqrt{d}}\right)}{2d^{3/2}} - \frac{ic\,e^{\frac{c^2(\nu-2k)^2}{4d}-2igk+igv}\sqrt{\pi}\,(\nu-2k)\operatorname{erfi}\left(\frac{2\sqrt{z}\,d+ci(\nu-2k)}{2\sqrt{d}}\right)}{2d^{3/2}}\right) + \frac{2^{-\nu} e^{dz}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)}{d} /;\ \nu\in\mathbb{N}^+$$

Involving $e^{dz+e}\sin^{\nu}(c z^r+g)$

01.06.21.1307.01

$$\int e^{dz+e}\sin^{\nu}(c z^2+g)\,dz = \frac{2^{-\nu} e^{e+dz}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)}{d} + i^{-\nu}\, 2^{-\nu-1}\sqrt{\pi} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{e^{\frac{i d^2}{4c(\nu-2k)}+e+g i(\nu-2k)}\operatorname{erfi}\left(\frac{d-4ickz+2icvz}{2\sqrt{icv-2ick}}\right)}{\sqrt{icv-2ick}} - \frac{e^{\frac{1}{4}\left(-\frac{d^2}{2ick-icv}+4e+8igk-4igv+4\pi i v\right)}\operatorname{erf}\left(\frac{d+4ickz-2icvz}{2\sqrt{icv-2ick}}\right)}{\sqrt{icv-2ick}}\right) /;\ \nu\in\mathbb{N}^+$$

01.06.21.1308.01

$$\int e^{d z+e} \sin^{\nu}\left(\sqrt{z}\, c+g\right) dz = \left(\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\sqrt{z}\,(i c \nu - 2 i c k)+\frac{1}{2}(2 e - 4 i g k + 2 i g \nu)+d z}}{d} + \frac{(-1)^{\nu} e^{\sqrt{z}\,(2 i c k - i c \nu)+\frac{1}{2}(2 e + 4 i g k - 2 i g \nu)+d z}}{d} - \frac{(-1)^{\nu} e^{\frac{c^2 (2k-\nu)^2}{4d}+e+2 i g k - i g \nu} \sqrt{\pi}\, (2 i c k - i c \nu) \operatorname{erfi}\left(\frac{2\sqrt{z}\, d + c\, i\, (2k-\nu)}{2\sqrt{d}}\right)}{2 d^{3/2}} - \frac{i c\, e^{\frac{c^2 (\nu-2k)^2}{4d}+e-2 i g k + i g \nu} \sqrt{\pi}\, (\nu - 2k) \operatorname{erfi}\left(\frac{2\sqrt{z}\, d + c\, i\, (\nu-2k)}{2\sqrt{d}}\right)}{2 d^{3/2}}\right)\right)(2 i)^{-\nu} + \frac{2^{-\nu} e^{e+d z} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{d} /; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r} \sin^{\nu}(c z^r + g)$

01.06.21.1309.01

$$\int e^{b z^r} \sin^{\nu}(c z^r + g)\, dz = -\frac{2^{-\nu} z\, (-b z^r)^{-1/r} (1 - \nu \bmod 2)}{r} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{1}{r}, -b z^r\right) - \frac{2^{-\nu} z\, i^{-\nu}}{r} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{-2 i g k - i g \nu} \binom{\nu}{k} \left((-1)^{\nu} e^{4 i g k}\, \Gamma\left(\frac{1}{r}, (-b - 2 i c k + i c \nu) z^r\right) ((-b - 2 i c k + i c \nu) z^r)^{-1/r} + e^{2 i g \nu} ((-b - i c (\nu - 2k)) z^r)^{-1/r}\, \Gamma\left(\frac{1}{r}, (-b - i c (\nu - 2k)) z^r\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1310.01

$$\int e^{b z^2} \sin^{\nu}\left(c z^2 + g\right) dz = \frac{2^{-\nu-1} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{b}\, z\right) (1 - \nu \bmod 2)}{\sqrt{b}} + i^{-\nu}\, 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{g i (\nu - 2k)} \operatorname{erfi}\left(\frac{2 b z - 4 i c k z + 2 i c \nu z}{2\sqrt{b - 2 i c k + i c \nu}}\right)}{\sqrt{b - 2 i c k + i c \nu}} - \frac{e^{2 i g k - i g \nu + i \pi \nu} \operatorname{erf}\left(\frac{2 b z + 4 i c k z - 2 i c \nu z}{2\sqrt{-b - 2 i c k + i c \nu}}\right)}{\sqrt{-b - 2 i c k + i c \nu}}\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1311.01

$$\int e^{\sqrt{z}\, b} \sin^{\nu}\left(\sqrt{z}\, c + g\right) dz = \frac{2^{1-\nu} e^{\sqrt{z}\, b} \left(b\sqrt{z} - 1\right) \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{b^2} + 2^{2-\nu} e^{\sqrt{z}\, b} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{\left(b^2 + c^2 (2k - \nu)^2\right)^2} \left((-1)^k \binom{\nu}{k} \left(\left(\sqrt{z}\, b^3 - b^2 + c^2 (2k - \nu)^2 \sqrt{z}\, b + c^2 (2k - \nu)^2\right) \cos\left(c\sqrt{z}\, (2k - \nu) + \frac{\pi \nu}{2} - g (\nu - 2k)\right) + c (2k - \nu) \left(\sqrt{z}\, b^2 - 2b + c^2 (2k - \nu)^2 \sqrt{z}\right) \sin\left(c\sqrt{z}\, (2k - \nu) + \frac{\pi \nu}{2} - g (\nu - 2k)\right)\right)\right) /; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r+e} \sin^v(c z^r + g)$

01.06.21.1312.01

$$\int e^{b z^r+e} \sin^v(c z^r + g)\, dz = -\frac{2^{-v} e^e z (-b z^r)^{-1/r} (1 - v \bmod 2)}{r} \binom{v}{\frac{v}{2}} \Gamma\left(\frac{1}{r}, -b z^r\right) - \frac{2^{-v} z i^{-v}}{r} \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k e^{e-2 i g k - i g v} \binom{v}{k} \Big((-1)^v e^{4 i g k} \Gamma\left(\frac{1}{r}, (-b - 2 i c k + i c v) z^r\right) ((-b - 2 i c k + i c v) z^r)^{-1/r} + e^{2 i g v} ((-b - i c (v - 2k)) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b - i c (v - 2k)) z^r\right)\Big) /; v \in \mathbb{N}^+$$

01.06.21.1313.01

$$\int e^{b z^2+e} \sin^v(c z^2 + g)\, dz = \frac{2^{-v-1} e^e \sqrt{\pi} \binom{v}{\frac{v}{2}} \operatorname{erfi}(\sqrt{b}\, z) (1 - v \bmod 2)}{\sqrt{b}} + i^{-v} 2^{-v-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \left(\frac{e^{e+g i (v-2k)} \operatorname{erfi}\left(\frac{2 b z - 4 i c k z + 2 i c v z}{2 \sqrt{b - 2 i c k + i c v}}\right)}{\sqrt{b - 2 i c k + i c v}} - \frac{e^{e + 2 i g k - i g v + i \pi v} \operatorname{erf}\left(\frac{2 b z + 4 i c k z - 2 i c v z}{2 \sqrt{-b - 2 i c k + i c v}}\right)}{\sqrt{-b - 2 i c k + i c v}} \right) /; v \in \mathbb{N}^+$$

01.06.21.1314.01

$$\int e^{\sqrt{z}\, b+e} \sin^v(\sqrt{z}\, c + g)\, dz = \frac{2^{1-v} e^{\sqrt{z}\, b+e} (b \sqrt{z} - 1) \binom{v}{\frac{v}{2}} (1 - v \bmod 2)}{b^2} + 2^{2-v} e^{\sqrt{z}\, b+e} \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} \frac{1}{(b^2 + c^2 (2k - v)^2)^2} \left((-1)^k \binom{v}{k} \left(\left(\sqrt{z}\, b^3 - b^2 + c^2 (2k - v)^2 \sqrt{z}\, b + c^2 (2k - v)^2\right) \cos\left(c \sqrt{z}\, (2k - v) + \frac{\pi v}{2} - g (v - 2k)\right) + c (2k - v) \left(\sqrt{z}\, b^2 - 2b + c^2 (2k - v)^2 \sqrt{z}\right) \sin\left(c \sqrt{z}\, (2k - v) + \frac{\pi v}{2} - g (v - 2k)\right)\right)\right) /; v \in \mathbb{N}^+$$

Involving $e^{b z^r+d z} \sin^v(c z^r + g)$

01.06.21.1315.01

$$\int e^{b z^2+d z} \sin^v(c z^2 + g)\, dz = \frac{2^{-v-1} e^{-\frac{d^2}{4b}} \sqrt{\pi} \binom{v}{\frac{v}{2}} \operatorname{erfi}\left(\frac{d + 2 b z}{2 \sqrt{b}}\right) (1 - v \bmod 2)}{\sqrt{b}} + i^{-v} 2^{-v-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \left(\frac{e^{-\frac{d^2}{4 (b + c i (v - 2k))} + g i (v - 2k)} \operatorname{erfi}\left(\frac{d + 2 b z - 4 i c k z + 2 i c v z}{2 \sqrt{b - 2 i c k + i c v}}\right)}{\sqrt{b - 2 i c k + i c v}} - \frac{e^{\frac{1}{4}\left(-\frac{d^2}{b + 2 i c k - i c v} + 8 i g k - 4 i g v + 4 \pi i v\right)} \operatorname{erf}\left(\frac{d + 2 b z + 4 i c k z - 2 i c v z}{2 \sqrt{-b - 2 i c k + i c v}}\right)}{\sqrt{-b - 2 i c k + i c v}} \right) /; v \in \mathbb{N}^+$$

01.06.21.1316.01

$$\int e^{\sqrt{z}\,b+d\,z}\sin^{v}\left(\sqrt{z}\,c+g\right)dz = (2\,i)^{-v}\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{k}\binom{v}{k}\left(\frac{e^{\sqrt{z}\,(b-2\,i\,c\,k+i\,c\,v)+\frac{1}{2}(-4\,i\,g\,k+2\,i\,g\,v)+d\,z}}{d}+\frac{(-1)^{v}\,e^{\sqrt{z}\,(b+2\,i\,c\,k-i\,c\,v)+\frac{1}{2}(4\,i\,g\,k-2\,i\,g\,v)+d\,z}}{d}-\frac{1}{2\,d^{3/2}}\left((-1)^{v}\,e^{-\frac{(b+c\,i\,(2\,k-v))^{2}}{4\,d}+2\,i\,g\,k-i\,g\,v}\sqrt{\pi}\,(b+2\,i\,c\,k-i\,c\,v)\operatorname{erfi}\left(\frac{b+c\,i\,(2\,k-v)+2\,d\,\sqrt{z}}{2\,\sqrt{d}}\right)\right)-\frac{e^{-\frac{(b+c\,i\,(v-2\,k))^{2}}{4\,d}-2\,i\,g\,k+i\,g\,v}\sqrt{\pi}\,(b+c\,i\,(v-2\,k))\operatorname{erfi}\left(\frac{b+c\,i\,(v-2\,k)+2\,d\,\sqrt{z}}{2\,\sqrt{d}}\right)}{2\,d^{3/2}}\right)+2^{-v}\left(\frac{e^{\sqrt{z}\,b+d\,z}}{d}-\frac{b\,e^{-\frac{b^{2}}{4\,d}}\sqrt{\pi}\operatorname{erfi}\left(\frac{b+2\,d\,\sqrt{z}}{2\,\sqrt{d}}\right)}{2\,d^{3/2}}\right)\binom{v}{\frac{v}{2}}(1-v\bmod 2)\;/;\;v\in\mathbb{N}^{+}$$

Involving $e^{b\,z^{r}+d\,z+e}\sin^{v}\left(c\,z^{r}+g\right)$

01.06.21.1317.01

$$\int e^{b\,z^{2}+d\,z+e}\sin^{v}\left(c\,z^{2}+g\right)dz = \frac{2^{-v-1}\,e^{e-\frac{d^{2}}{4\,b}}\sqrt{\pi}\binom{v}{\frac{v}{2}}\operatorname{erfi}\left(\frac{d+2\,b\,z}{2\,\sqrt{b}}\right)(1-v\bmod 2)}{\sqrt{b}}+i^{-v}\,2^{-v-1}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{k}\binom{v}{k}\left(\frac{e^{-\frac{d^{2}}{4\,(b+c\,i\,(v-2\,k))}+e+g\,i\,(v-2\,k)}\operatorname{erfi}\left(\frac{d+2\,b\,z-4\,i\,c\,k\,z+2\,i\,c\,v\,z}{2\,\sqrt{b-2\,i\,c\,k+i\,c\,v}}\right)}{\sqrt{b-2\,i\,c\,k+i\,c\,v}}-\frac{e^{\frac{1}{4}\left(-\frac{d^{2}}{b+2\,i\,c\,k-i\,c\,v}+4\,e+8\,i\,g\,k-4\,i\,g\,v+4\,\pi\,i\,v\right)}\operatorname{erf}\left(\frac{d+2\,b\,z+4\,i\,c\,k\,z-2\,i\,c\,v\,z}{2\,\sqrt{-b-2\,i\,c\,k+i\,c\,v}}\right)}{\sqrt{-b-2\,i\,c\,k+i\,c\,v}}\right)\;/;\;v\in\mathbb{N}^{+}$$

01.06.21.1318.01

$$\int e^{\sqrt{z}\, b+d z+e} \sin^{\nu}\left(\sqrt{z}\, c+g\right) dz == (2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\sqrt{z}\, (b-2 i c k+i c \nu)+\frac{1}{2}(2 e-4 i g k+2 i g \nu)+d z}}{d} + \frac{(-1)^{\nu} e^{\sqrt{z}\, (b+2 i c k-i c \nu)+\frac{1}{2}(2 e+4 i g k-2 i g \nu)+d z}}{d} - \frac{1}{2 d^{3/2}} \left((-1)^{\nu} e^{-\frac{(b+c i (2k-\nu))^2}{4 d}+e+2 i g k-i g \nu} \sqrt{\pi}\, (b+2 i c k-i c \nu) \operatorname{erfi}\left(\frac{b+c i (2 k-\nu)+2 d \sqrt{z}}{2 \sqrt{d}} \right) \right) - \frac{e^{-\frac{(b+c i (\nu-2k))^2}{4 d}+e-2 i g k+i g \nu} \sqrt{\pi}\, (b+c i (\nu-2 k)) \operatorname{erfi}\left(\frac{b+c i (\nu-2k)+2 d \sqrt{z}}{2 \sqrt{d}} \right)}{2 d^{3/2}} \right) + 2^{-\nu} \left(\frac{e^{\sqrt{z}\, b+e+d z}}{d} - \frac{b\, e^{e-\frac{b^2}{4 d}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+2 d \sqrt{z}}{2 \sqrt{d}} \right)}{2 d^{3/2}} \right) \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{d z} \sin^{\nu}\left(c z^r + f z\right)$

01.06.21.1319.01

$$\int e^{d z} \sin^{\nu}\left(c z^2 + f z\right) dz == \frac{2^{-\nu} e^{d z} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{d} + i^{-\nu} 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\frac{i (d+f i (\nu-2k))^2}{4 c (\nu-2k)}} \operatorname{erfi}\left(\frac{d-2 i f k+i f \nu-4 i c k z+2 i c \nu z}{2 \sqrt{i c \nu-2 i c k}} \right)}{\sqrt{i c \nu-2 i c k}} - \frac{e^{\frac{1}{4}\left(-\frac{(d+2 i f k-i f \nu)^2}{2 i c k-i c \nu}+4 \pi i \nu\right)} \operatorname{erf}\left(\frac{d+2 i f k-i f \nu+4 i c k z-2 i c \nu z}{2 \sqrt{i c \nu-2 i c k}} \right)}{\sqrt{i c \nu-2 i c k}} \right) \;/;\; \nu \in \mathbb{N}^+$$

01.06.21.1320.01

$$\int e^{d z} \sin^{\nu}\left(\sqrt{z}\, c + f z\right) dz = (2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{(d - 2 i f k + i f \nu) z + (i c \nu - 2 i c k) \sqrt{z}}}{d - 2 i f k + i f \nu} - \frac{i c\, e^{\frac{c^2 (\nu - 2k)^2}{4 (d + f i (\nu - 2k))}} \sqrt{\pi}\, (\nu - 2k) \operatorname{erfi}\left(\frac{c\, i (\nu - 2k) + 2 (d - 2 i f k + i f \nu) \sqrt{z}}{2 \sqrt{d + f i (\nu - 2k)}} \right)}{2 (d - 2 i f k + i f \nu)^{3/2}} + \frac{(-1)^{\nu} e^{(d + 2 i f k - i f \nu) z + (2 i c k - i c \nu) \sqrt{z}}}{d + 2 i f k - i f \nu} - \frac{(-1)^{\nu} e^{\frac{c^2 (2k - \nu)^2}{4 (d + f i (2k - \nu))}} \sqrt{\pi}\, (2 i c k - i c \nu) \operatorname{erfi}\left(\frac{c\, i (2k - \nu) + 2 (d + 2 i f k - i f \nu) \sqrt{z}}{2 \sqrt{d + 2 i f k - i f \nu}} \right)}{2 (d + 2 i f k - i f \nu)^{3/2}} \right) + \frac{2^{-\nu} e^{d z} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{d} \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{d z + e} \sin^{\nu}\left(c z^r + f z\right)$

01.06.21.1321.01

$$\int e^{d z + e} \sin^{\nu}\left(c z^2 + f z\right) dz = \frac{2^{-\nu} e^{e + d z} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{d} + i^{-\nu} 2^{-\nu - 1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\frac{i (d + f i (\nu - 2k))^2}{4 c (\nu - 2k)} + e} \operatorname{erfi}\left(\frac{d - 2 i f k + i f \nu - 4 i c k z + 2 i c \nu z}{2 \sqrt{i c \nu - 2 i c k}} \right)}{\sqrt{i c \nu - 2 i c k}} - \frac{e^{\frac{1}{4} \left(-\frac{(d + 2 i f k - i f \nu)^2}{2 i c k - i c \nu} + 4 e + 4 \pi i \nu \right)} \operatorname{erf}\left(\frac{d + 2 i f k - i f \nu + 4 i c k z - 2 i c \nu z}{2 \sqrt{i c \nu - 2 i c k}} \right)}{\sqrt{i c \nu - 2 i c k}} \right) \;/;\; \nu \in \mathbb{N}^+$$

01.06.21.1322.01

$$\int e^{d z+e} \sin^{\nu}\left(\sqrt{z}\, c + f z\right) dz = (2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{e+(d-2 i f k+i f \nu) z+(i c \nu-2 i c k) \sqrt{z}}}{d-2 i f k+i f \nu} - \frac{i c\, e^{\frac{c^2 (\nu-2 k)^2}{4 (d+f i (\nu-2 k))}+e} \sqrt{\pi}\, (\nu-2 k) \operatorname{erfi}\left(\frac{c i (\nu-2 k)+2 (d-2 i f k+i f \nu) \sqrt{z}}{2 \sqrt{d+f i (\nu-2 k)}}\right)}{2 (d-2 i f k+i f \nu)^{3/2}} + \frac{(-1)^{\nu} e^{e+(d+2 i f k-i f \nu) z+(2 i c k-i c \nu) \sqrt{z}}}{d+2 i f k-i f \nu} - \left((-1)^{\nu} e^{\frac{c^2 (2 k-\nu)^2}{4 (d+f i (2 k-\nu))}+e} \sqrt{\pi}\, (2 i c k-i c \nu) \operatorname{erfi}\left(\frac{c i (2 k-\nu)+2 (d+2 i f k-i f \nu) \sqrt{z}}{2 \sqrt{d+2 i f k-i f \nu}}\right)\right) \Big/ \left(2 (d+2 i f k-i f \nu)^{3/2}\right) \right) + \frac{2^{-\nu} e^{e+d z} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{d} \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r} \sin^{\nu}\left(c z^r + f z\right)$

01.06.21.1323.01

$$\int e^{b z^2} \sin^{\nu}\left(c z^2 + f z\right) dz = \frac{2^{-\nu-1} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{b}\, z\right) (1-\nu \bmod 2)}{\sqrt{b}} + i^{-\nu} 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\frac{f^2 (\nu-2 k)^2}{4 (b+c i (\nu-2 k))}} \operatorname{erfi}\left(\frac{-2 f i k-4 i c z k+i f \nu+2 b z+2 i c \nu z}{2 \sqrt{b-2 i c k+i c \nu}}\right)}{\sqrt{b-2 i c k+i c \nu}} - \frac{e^{\frac{1}{4}\left(-\frac{(2 i f k-i f \nu)^2}{b+2 i c k-i c \nu}+4 \pi i \nu\right)} \operatorname{erf}\left(\frac{2 i f k+4 i c z k-i f \nu+2 b z-2 i c \nu z}{2 \sqrt{-b-2 i c k+i c \nu}}\right)}{\sqrt{-b-2 i c k+i c \nu}} \right) \;/;\; \nu \in \mathbb{N}^+$$

01.06.21.1324.01

$$\int e^{\sqrt{z}\, b} \sin^{\nu}\left(\sqrt{z}\, c + f z\right) dz = (2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{(i f \nu - 2 i f k) z + (b - 2 i c k + i c \nu)\sqrt{z}}}{i f \nu - 2 i f k} - \frac{e^{\frac{i (b + c i (\nu - 2k))^2}{4 f (\nu - 2k)}} \sqrt{\pi}\, (b + c i (\nu - 2k)) \operatorname{erfi}\left(\frac{b + c i (\nu - 2k) + 2 (i f \nu - 2 i f k)\sqrt{z}}{2\sqrt{i f (\nu - 2k)}}\right)}{2 (i f \nu - 2 i f k)^{3/2}} + \frac{(-1)^{\nu} e^{(2 i f k - i f \nu) z + (b + 2 i c k - i c \nu)\sqrt{z}}}{2 i f k - i f \nu} - \left((-1)^{\nu} e^{\frac{i (b + c i (2k - \nu))^2}{4 f (2k - \nu)}} \sqrt{\pi}\, (b + 2 i c k - i c \nu) \operatorname{erfi}\left(\frac{b + c i (2k - \nu) + 2 (2 i f k - i f \nu)\sqrt{z}}{2\sqrt{2 i f k - i f \nu}}\right)\right) \Big/ \left(2 (2 i f k - i f \nu)^{3/2}\right) \right) + \frac{2^{1-\nu} e^{\sqrt{z}\, b} \left(b\sqrt{z} - 1\right) \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{b^2} /;\ \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + e} \sin^{\nu}\left(c z^r + f z\right)$

01.06.21.1325.01

$$\int e^{b z^2 + e} \sin^{\nu}\left(c z^2 + f z\right) dz = \frac{2^{-\nu-1} e^{e} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{b}\, z\right) (1 - \nu \bmod 2)}{\sqrt{b}} + i^{-\nu} 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\frac{f^2 (\nu - 2k)^2}{4 (b + c i (\nu - 2k))} + e} \operatorname{erfi}\left(\frac{-2 f i k - 4 i c z k + i f \nu + 2 b z + 2 i c \nu z}{2\sqrt{b - 2 i c k + i c \nu}}\right)}{\sqrt{b - 2 i c k + i c \nu}} - \frac{e^{\frac{1}{4}\left(-\frac{(2 i f k - i f \nu)^2}{b + 2 i c k - i c \nu} + 4 e + 4 \pi i \nu\right)} \operatorname{erf}\left(\frac{2 i f k + 4 i c z k - i f \nu + 2 b z - 2 i c \nu z}{2\sqrt{-b - 2 i c k + i c \nu}}\right)}{\sqrt{-b - 2 i c k + i c \nu}} \right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1326.01

$$\int e^{\sqrt{z}\, b+e} \sin^{\nu}\left(\sqrt{z}\, c + f z\right) dz = (2\,i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{e+(i f \nu - 2 i f k) z + (b - 2 i c k + i c \nu)\sqrt{z}}}{i f \nu - 2 i f k} - \frac{e^{\frac{i (b + c i (\nu - 2k))^2}{4 f (\nu - 2k)} + e} \sqrt{\pi}\, (b + c\, i (\nu - 2k)) \operatorname{erfi}\left(\frac{b + c\, i (\nu - 2k) + 2 (i f \nu - 2 i f k) \sqrt{z}}{2 \sqrt{i f (\nu - 2k)}} \right)}{2 (i f \nu - 2 i f k)^{3/2}} + \frac{(-1)^{\nu} e^{e + (2 i f k - i f \nu) z + (b + 2 i c k - i c \nu)\sqrt{z}}}{2 i f k - i f \nu} - \left((-1)^{\nu} e^{\frac{i (b + c i (2k - \nu))^2}{4 f (2k - \nu)} + e} \sqrt{\pi}\, (b + 2 i c k - i c \nu) \operatorname{erfi}\left(\frac{b + c\, i (2k - \nu) + 2 (2 i f k - i f \nu) \sqrt{z}}{2 \sqrt{2 i f k - i f \nu}} \right) \right) \Big/ \left(2 (2 i f k - i f \nu)^{3/2} \right) \right) + \frac{2^{1-\nu} e^{\sqrt{z}\, b + e} \left(b \sqrt{z} - 1 \right) \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{b^2} \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + d z} \sin^{\nu}\left(c z^r + f z\right)$

01.06.21.1327.01

$$\int e^{b z^2 + d z} \sin^{\nu}\left(c z^2 + f z\right) dz = \frac{2^{-\nu-1} e^{-\frac{d^2}{4b}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\frac{d + 2 b z}{2 \sqrt{b}} \right) (1 - \nu \bmod 2)}{\sqrt{b}} + i^{-\nu}\, 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{-\frac{(d + f i (\nu - 2k))^2}{4 (b + c i (\nu - 2k))}} \operatorname{erfi}\left(\frac{d - 2 i f k + i f \nu + 2 b z - 4 i c k z + 2 i c \nu z}{2 \sqrt{b - 2 i c k + i c \nu}} \right)}{\sqrt{b - 2 i c k + i c \nu}} - \frac{e^{\frac{1}{4}\left(4 \pi i \nu - \frac{(d + 2 i f k - i f \nu)^2}{b + 2 i c k - i c \nu} \right)} \operatorname{erf}\left(\frac{d + 2 i f k - i f \nu + 2 b z + 4 i c k z - 2 i c \nu z}{2 \sqrt{-b - 2 i c k + i c \nu}} \right)}{\sqrt{-b - 2 i c k + i c \nu}} \right) \;/;\; \nu \in \mathbb{N}^+$$

01.06.21.1328.01

$$\int e^{\sqrt{z}\, b+d z} \sin^{\nu}\left(\sqrt{z}\, c+f z\right) dz = (2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\sqrt{z}\, (b-2 i c k+i c \nu)+(d-2 i f k+i f \nu) z}}{d-2 i f k+i f \nu} - \frac{e^{-\frac{(b+c i (\nu-2 k))^2}{4 (d+f i (\nu-2 k))}} \sqrt{\pi}\, (b+c i (\nu-2 k)) \operatorname{erfi}\left(\frac{b+c i (\nu-2 k)+2 (d-2 i f k+i f \nu) \sqrt{z}}{2 \sqrt{d+f i (\nu-2 k)}} \right)}{2 (d-2 i f k+i f \nu)^{3/2}} + \frac{(-1)^{\nu} e^{\sqrt{z}\, (b+2 i c k-i c \nu)+(d+2 i f k-i f \nu) z}}{d+2 i f k-i f \nu} - \left((-1)^{\nu} e^{-\frac{(b+c i (2 k-\nu))^2}{4 (d+f i (2 k-\nu))}} \sqrt{\pi}\, (b+2 i c k-i c \nu) \operatorname{erfi}\left(\frac{b+c i (2 k-\nu)+2 (d+2 i f k-i f \nu) \sqrt{z}}{2 \sqrt{d+2 i f k-i f \nu}} \right) \right) \Big/ \left(2 (d+2 i f k-i f \nu)^{3/2} \right) \right) + 2^{-\nu} \left(\frac{e^{\sqrt{z}\, b+d z}}{d} - \frac{b\, e^{-\frac{b^2}{4 d}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+2 d \sqrt{z}}{2 \sqrt{d}} \right)}{2 d^{3/2}} \right) \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + d z + e} \sin^{\nu}\left(c z^r + f z\right)$

01.06.21.1329.01

$$\int e^{b z^2+d z+e} \sin^{\nu}\left(c z^2+f z\right) dz = \frac{2^{-\nu-1} e^{e-\frac{d^2}{4 b}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\frac{d+2 b z}{2 \sqrt{b}} \right) (1-\nu \bmod 2)}{\sqrt{b}} + i^{-\nu}\, 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{e-\frac{(d+f i (\nu-2 k))^2}{4 (b+c i (\nu-2 k))}} \operatorname{erfi}\left(\frac{d-2 i f k+i f \nu+2 b z-4 i c k z+2 i c \nu z}{2 \sqrt{b-2 i c k+i c \nu}} \right)}{\sqrt{b-2 i c k+i c \nu}} - \frac{e^{\frac{1}{4}\left(-\frac{(d+2 i f k-i f \nu)^2}{b+2 i c k-i c \nu}+4 e+4 \pi i \nu \right)} \operatorname{erf}\left(\frac{d+2 i f k-i f \nu+2 b z+4 i c k z-2 i c \nu z}{2 \sqrt{-b-2 i c k+i c \nu}} \right)}{\sqrt{-b-2 i c k+i c \nu}} \right) \;/;\; \nu \in \mathbb{N}^+$$

01.06.21.1330.01

$$\int e^{\sqrt{z}\, b+d z+e} \sin^{\nu}\left(\sqrt{z}\, c+f z\right) dz = (2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{e+(d-2 i f k+i f \nu) z+(b-2 i c k+i c \nu) \sqrt{z}}}{d-2 i f k+i f \nu} - \frac{e^{e-\frac{(b+c i (\nu-2 k))^2}{4 (d+f i (\nu-2 k))}} \sqrt{\pi}\, (b+c i (\nu-2 k)) \operatorname{erfi}\left(\frac{b+c i (\nu-2 k)+2 (d-2 i f k+i f \nu) \sqrt{z}}{2 \sqrt{d+f i (\nu-2 k)}}\right)}{2 (d-2 i f k+i f \nu)^{3/2}} + \frac{(-1)^{\nu} e^{e+(d+2 i f k-i f \nu) z+(b+2 i c k-i c \nu) \sqrt{z}}}{d+2 i f k-i f \nu} - \left((-1)^{\nu} e^{e-\frac{(b+c i (2 k-\nu))^2}{4 (d+f i (2 k-\nu))}} \sqrt{\pi}\, (b+2 i c k-i c \nu) \operatorname{erfi}\left(\frac{b+c i (2 k-\nu)+2 (d+2 i f k-i f \nu) \sqrt{z}}{2 \sqrt{d+2 i f k-i f \nu}}\right)\right) \Big/ \left(2 (d+2 i f k-i f \nu)^{3/2}\right) \right) + 2^{-\nu} \left(\frac{e^{\sqrt{z}\, b+e+d z}}{d} - \frac{b\, e^{e-\frac{b^2}{4 d}} \sqrt{\pi} \operatorname{erfi}\left(\frac{b+2 d \sqrt{z}}{2 \sqrt{d}}\right)}{2 d^{3/2}} \right) \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{d z} \sin^{\nu}\left(c z^r + f z + g\right)$

01.06.21.1331.01

$$\int e^{d z} \sin^{\nu}\left(c z^2+f z+g\right) dz = \frac{2^{-\nu} e^{d z} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{d} + i^{-\nu} 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\frac{i (d+f i (\nu-2 k))^2}{4 c (\nu-2 k)}+g i (\nu-2 k)} \operatorname{erfi}\left(\frac{d-2 i f k+i f \nu-4 i c k z+2 i c \nu z}{2 \sqrt{i c \nu-2 i c k}}\right)}{\sqrt{i c \nu-2 i c k}} - \frac{e^{\frac{1}{4}\left(-\frac{(d+2 i f k-i f \nu)^2}{2 i c k-i c \nu}+8 i g k-4 i g \nu+4 \pi i \nu\right)} \operatorname{erf}\left(\frac{d+2 i f k-i f \nu+4 i c k z-2 i c \nu z}{2 \sqrt{i c \nu-2 i c k}}\right)}{\sqrt{i c \nu-2 i c k}} \right) \;/;\; \nu \in \mathbb{N}^+$$

01.06.21.1332.01

$$\int e^{d z} \sin^{\nu}\left(\sqrt{z}\, c + f z + g\right) dz = (2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\sqrt{z}\,(i c \nu - 2 i c k) + \frac{1}{2}(-4 i g k + 2 i g \nu) + (d - 2 i f k + i f \nu) z}}{d - 2 i f k + i f \nu} - \frac{i c\, e^{\frac{c^2 (\nu - 2k)^2}{4 (d + f i (\nu - 2k))} - 2 i g k + i g \nu} \sqrt{\pi}\, (\nu - 2k) \operatorname{erfi}\left(\frac{c\, i (\nu - 2k) + 2 (d - 2 i f k + i f \nu) \sqrt{z}}{2 \sqrt{d + f i (\nu - 2k)}} \right)}{2 (d - 2 i f k + i f \nu)^{3/2}} + \frac{(-1)^{\nu} e^{\sqrt{z}\,(2 i c k - i c \nu) + \frac{1}{2}(4 i g k - 2 i g \nu) + (d + 2 i f k - i f \nu) z}}{d + 2 i f k - i f \nu} - \left((-1)^{\nu} e^{\frac{c^2 (2k - \nu)^2}{4 (d + f i (2k - \nu))} + 2 i g k - i g \nu} \sqrt{\pi}\, (2 i c k - i c \nu) \operatorname{erfi}\left(\frac{c\, i (2k - \nu) + 2 (d + 2 i f k - i f \nu) \sqrt{z}}{2 \sqrt{d + 2 i f k - i f \nu}} \right) \right) \Big/ \left(2 (d + 2 i f k - i f \nu)^{3/2} \right) \right) + \frac{2^{-\nu} e^{d z} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{d} /;\ \nu \in \mathbb{N}^+$$

Involving $e^{d z + e} \sin^{\nu}\left(c z^r + f z + g\right)$

01.06.21.1333.01

$$\int e^{d z + e} \sin^{\nu}\left(c z^2 + f z + g\right) dz = \frac{2^{-\nu} e^{e + d z} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)}{d} + i^{-\nu} 2^{-\nu - 1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\frac{i (d + f i (\nu - 2k))^2}{4 c (\nu - 2k)} + e + g i (\nu - 2k)} \operatorname{erfi}\left(\frac{d - 2 i f k + i f \nu - 4 i c k z + 2 i c \nu z}{2 \sqrt{i c \nu - 2 i c k}} \right)}{\sqrt{i c \nu - 2 i c k}} - \frac{e^{\frac{1}{4}\left(-\frac{(d + 2 i f k - i f \nu)^2}{2 i c k - i c \nu} + 4 e + 8 i g k - 4 i g \nu + 4 \pi i \nu \right)} \operatorname{erf}\left(\frac{d + 2 i f k - i f \nu + 4 i c k z - 2 i c \nu z}{2 \sqrt{i c \nu - 2 i c k}} \right)}{\sqrt{i c \nu - 2 i c k}} \right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1334.01

$$\int e^{d z+e} \sin^{\nu}\left(\sqrt{z}\, c+f z+g\right) dz = (2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\sqrt{z}\,(i c \nu-2 i c k)+\frac{1}{2}(2 e-4 i g k+2 i g \nu)+(d-2 i f k+i f \nu) z}}{d-2 i f k+i f \nu} - \left(i c\, e^{\frac{c^2 (\nu-2k)^2}{4 (d+f i (\nu-2k))}+e-2 i g k+i g \nu} \sqrt{\pi}\, (\nu-2k) \operatorname{erfi}\left(\frac{c\, i (\nu-2k)+2 (d-2 i f k+i f \nu) \sqrt{z}}{2 \sqrt{d+f i (\nu-2k)}} \right) \right) \Big/ \left(2 (d-2 i f k+i f \nu)^{3/2} \right) + \frac{(-1)^{\nu} e^{\sqrt{z}\,(2 i c k-i c \nu)+\frac{1}{2}(2 e+4 i g k-2 i g \nu)+(d+2 i f k-i f \nu) z}}{d+2 i f k-i f \nu} - \left((-1)^{\nu} e^{\frac{c^2 (2k-\nu)^2}{4 (d+f i (2k-\nu))}+e+2 i g k-i g \nu} \sqrt{\pi}\, (2 i c k-i c \nu) \operatorname{erfi}\left(\frac{c\, i (2k-\nu)+2 (d+2 i f k-i f \nu) \sqrt{z}}{2 \sqrt{d+2 i f k-i f \nu}} \right) \right) \Big/ \left(2 (d+2 i f k-i f \nu)^{3/2} \right) \right) + \frac{2^{-\nu} e^{e+d z} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{d} \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r} \sin^{\nu}\left(c z^r+f z+g\right)$

01.06.21.1335.01

$$\int e^{b z^2} \sin^{\nu}\left(c z^2+f z+g\right) dz = \frac{2^{-\nu-1} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{b}\, z\right) (1-\nu \bmod 2)}{\sqrt{b}} + i^{-\nu}\, 2^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\frac{f^2 (\nu-2k)^2}{4 (b+c i (\nu-2k))}+g i (\nu-2k)} \operatorname{erfi}\left(\frac{-2 f i k-4 i c z k+i f \nu+2 b z+2 i c \nu z}{2 \sqrt{b-2 i c k+i c \nu}} \right)}{\sqrt{b-2 i c k+i c \nu}} - \frac{e^{\frac{1}{4}\left(-\frac{(2 i f k-i f \nu)^2}{b+2 i c k-i c \nu}+8 i g k-4 i g \nu+4 \pi i \nu\right)} \operatorname{erf}\left(\frac{2 i f k+4 i c z k-i f \nu+2 b z-2 i c \nu z}{2 \sqrt{-b-2 i c k+i c \nu}} \right)}{\sqrt{-b-2 i c k+i c \nu}} \right) \;/;\; \nu \in \mathbb{N}^+$$

01.06.21.1336.01

$$\int e^{b\sqrt{z}}\sin^{\nu}\left(\sqrt{z}\,c+f\,z+g\right)dz = (2\,i)^{-\nu}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{e^{\sqrt{z}\,(b-2\,i\,c\,k+i\,c\,\nu)+\frac{1}{2}(2\,i\,g\,\nu-4\,i\,g\,k)+(i\,f\,\nu-2\,i\,f\,k)\,z}}{i\,f\,\nu-2\,i\,f\,k}-\left(e^{\frac{i\,(b+c\,i\,(\nu-2\,k))^2}{4\,f\,(\nu-2\,k)}-2\,i\,g\,k+i\,g\,\nu}\sqrt{\pi}\,(b+c\,i\,(\nu-2\,k))\operatorname{erfi}\left(\frac{b+c\,i\,(\nu-2\,k)+2\,(i\,f\,\nu-2\,i\,f\,k)\sqrt{z}}{2\sqrt{i\,f\,(\nu-2\,k)}}\right)\right)\Big/\left(2\,(i\,f\,\nu-2\,i\,f\,k)^{3/2}\right)+\frac{(-1)^{\nu}\,e^{\sqrt{z}\,(b+2\,i\,c\,k-i\,c\,\nu)+\frac{1}{2}(4\,i\,g\,k-2\,i\,g\,\nu)+(2\,i\,f\,k-i\,f\,\nu)\,z}}{2\,i\,f\,k-i\,f\,\nu}-\left((-1)^{\nu}\,e^{\frac{i\,(b+c\,i\,(2\,k-\nu))^2}{4\,f\,(2\,k-\nu)}+2\,i\,g\,k-i\,g\,\nu}\sqrt{\pi}\,(b+2\,i\,c\,k-i\,c\,\nu)\operatorname{erfi}\left(\frac{b+c\,i\,(2\,k-\nu)+2\,(2\,i\,f\,k-i\,f\,\nu)\sqrt{z}}{2\sqrt{2\,i\,f\,k-i\,f\,\nu}}\right)\right)\Big/\left(2\,(2\,i\,f\,k-i\,f\,\nu)^{3/2}\right)\right)+\frac{2^{1-\nu}\,e^{b\sqrt{z}}\left(b\sqrt{z}-1\right)\binom{\nu}{\frac{\nu}{2}}(1-\nu\bmod 2)}{b^2}\;/;\;\nu\in\mathbb{N}^+$$

Involving $e^{b\,z^r+e}\sin^{\nu}\left(c\,z^r+f\,z+g\right)$

01.06.21.1337.01

$$\int e^{b\,z^2+e}\sin^{\nu}\left(c\,z^2+f\,z+g\right)dz = \frac{2^{-\nu-1}\,e^{e}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}\operatorname{erfi}\left(\sqrt{b}\,z\right)(1-\nu\bmod 2)}{\sqrt{b}}+i^{-\nu}\,2^{-\nu-1}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{e^{\frac{f^2(\nu-2\,k)^2}{4\,(b+c\,i\,(\nu-2\,k))}+g\,i\,(\nu-2\,k)+e}\operatorname{erfi}\left(\frac{-2\,f\,i\,k-4\,i\,c\,z\,k+i\,f\,\nu+2\,b\,z+2\,i\,c\,\nu\,z}{2\sqrt{b-2\,i\,c\,k+i\,c\,\nu}}\right)}{\sqrt{b-2\,i\,c\,k+i\,c\,\nu}}-\frac{e^{\frac{1}{4}\left(-\frac{(2\,i\,f\,k-i\,f\,\nu)^2}{b+2\,i\,c\,k-i\,c\,\nu}+4\,e+8\,i\,g\,k-4\,i\,g\,\nu+4\,\pi\,i\,\nu\right)}\operatorname{erf}\left(\frac{2\,i\,f\,k+4\,i\,c\,z\,k-i\,f\,\nu+2\,b\,z-2\,i\,c\,\nu\,z}{2\sqrt{-b-2\,i\,c\,k+i\,c\,\nu}}\right)}{\sqrt{-b-2\,i\,c\,k+i\,c\,\nu}}\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.1338.01

$$\int e^{\sqrt{z}\, b+e} \sin^{\nu}\left(\sqrt{z}\, c+f\, z+g\right) dz == \left(\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\sqrt{z}\,(b-2 i c k+i c \nu)+\frac{1}{2}(2 e-4 i g k+2 i g \nu)+(i f \nu-2 i f k) z}}{i f \nu-2 i f k} - \left(e^{\frac{i (b+c i (\nu-2 k))^2}{4 f (\nu-2 k)}+e-2 i g k+i g \nu} \sqrt{\pi}\, (b+c\, i\, (\nu-2 k))\, \mathrm{erfi}\left(\frac{b+c\, i\, (\nu-2 k)+2\, (i f \nu-2 i f k) \sqrt{z}}{2 \sqrt{i f (\nu-2 k)}}\right)\right) \Big/ \left(2\, (i f \nu-2 i f k)^{3/2}\right) + \frac{(-1)^{\nu} e^{\sqrt{z}\,(b+2 i c k-i c \nu)+\frac{1}{2}(2 e+4 i g k-2 i g \nu)+(2 i f k-i f \nu) z}}{2 i f k-i f \nu} - \left((-1)^{\nu} e^{\frac{i (b+c i (2 k-\nu))^2}{4 f (2 k-\nu)}+e+2 i g k-i g \nu} \sqrt{\pi}\, (b+2 i c k-i c \nu)\, \mathrm{erfi}\left(\frac{b+c\, i\, (2 k-\nu)+2\, (2 i f k-i f \nu) \sqrt{z}}{2 \sqrt{2 i f k-i f \nu}}\right)\right) \Big/ \left(2\, (2 i f k-i f \nu)^{3/2}\right)\right)\right) (2 i)^{-\nu} + \frac{2^{1-\nu} e^{\sqrt{z}\, b+e} \left(b \sqrt{z}-1\right) \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)}{b^2} \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r+d z} \sin^{\nu}\left(c\, z^r+f\, z+g\right)$

01.06.21.1339.01

$$\int e^{b z^2+d z} \sin^{\nu}\left(c\, z^2+f\, z+g\right) dz == \frac{2^{-\nu-1} e^{-\frac{d^2}{4 b}} \sqrt{\pi}\, (1-\nu \bmod 2)}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} \mathrm{erfi}\left(\frac{d+2 b z}{2 \sqrt{b}}\right) + 2^{-\nu-1} i^{-\nu} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{-\frac{(d+f i (\nu-2 k))^2}{4 (b+c i (\nu-2 k))}+g i (\nu-2 k)}\, \mathrm{erfi}\left(\frac{d-2 i f k+i f \nu+2 b z-4 i c k z+2 i c \nu z}{2 \sqrt{b-2 i c k+i c \nu}}\right)}{\sqrt{b-2 i c k+i c \nu}} - \frac{e^{\frac{1}{4}\left(-\frac{(d+2 i f k-i f \nu)^2}{b+2 i c k-i c \nu}+8 i g k-4 i g \nu+4 \pi i \nu\right)}\, \mathrm{erf}\left(\frac{d+2 i f k-i f \nu+2 b z+4 i c k z-2 i c \nu z}{2 \sqrt{-b-2 i c k+i c \nu}}\right)}{\sqrt{-b-2 i c k+i c \nu}}\right) \;/;\; \nu \in \mathbb{N}^+$$

01.06.21.1340.01

$$\int e^{\sqrt{z}\, b+d\,z} \sin^{\nu}\left(\sqrt{z}\, c+f\,z+g\right) dz = (2\,i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\sqrt{z}\,(b-2\,i\,c\,k+i\,c\,\nu)+\frac{1}{2}(-4\,i\,g\,k+2\,i\,g\,\nu)+(d-2\,i\,f\,k+i\,f\,\nu)\,z}}{d-2\,i\,f\,k+i\,f\,\nu} - \left(e^{-\frac{(b+c\,i\,(\nu-2\,k))^2}{4\,(d+f\,i\,(\nu-2\,k))}-2\,i\,g\,k+i\,g\,\nu} \sqrt{\pi}\, (b+c\,i\,(\nu-2\,k))\, \operatorname{erfi}\left(\frac{b+c\,i\,(\nu-2\,k)+2\,(d-2\,i\,f\,k+i\,f\,\nu)\sqrt{z}}{2\sqrt{d+f\,i\,(\nu-2\,k)}} \right) \right) \Big/ \left(2\,(d-2\,i\,f\,k+i\,f\,\nu)^{3/2}\right) + \frac{(-1)^{\nu}\, e^{\sqrt{z}\,(b+2\,i\,c\,k-i\,c\,\nu)+\frac{1}{2}(4\,i\,g\,k-2\,i\,g\,\nu)+(d+2\,i\,f\,k-i\,f\,\nu)\,z}}{d+2\,i\,f\,k-i\,f\,\nu} - \frac{1}{2\,(d+2\,i\,f\,k-i\,f\,\nu)^{3/2}} \left((-1)^{\nu}\, e^{-\frac{(b+c\,i\,(2\,k-\nu))^2}{4\,(d+f\,i\,(2\,k-\nu))}+2\,i\,g\,k-i\,g\,\nu} \sqrt{\pi}\, (b+2\,i\,c\,k-i\,c\,\nu)\, \operatorname{erfi}\left(\frac{b+c\,i\,(2\,k-\nu)+2\,(d+2\,i\,f\,k-i\,f\,\nu)\sqrt{z}}{2\sqrt{d+2\,i\,f\,k-i\,f\,\nu}} \right) \right) \right) + 2^{-\nu} \left(\frac{e^{\sqrt{z}\, b+d\,z}}{d} - \frac{b\, e^{-\frac{b^2}{4\,d}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+2\,d\sqrt{z}}{2\sqrt{d}}\right)}{2\,d^{3/2}} \right) \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{b\,z^r+d\,z+e} \sin^{\nu}\left(c\,z^r+f\,z+g\right)$

01.06.21.1341.01

$$\int e^{b\,z^2+d\,z+e} \sin^{\nu}\left(c\,z^2+f\,z+g\right) dz = \frac{2^{-\nu-1}\, e^{e-\frac{d^2}{4\,b}} \sqrt{\pi}\, (1-\nu \bmod 2)}{\sqrt{b}} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\frac{d+2\,b\,z}{2\sqrt{b}}\right) + 2^{-\nu-1}\, i^{-\nu} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{-\frac{(d+f\,i\,(\nu-2\,k))^2}{4\,(b+c\,i\,(\nu-2\,k))}+e+g\,i\,(\nu-2\,k)} \operatorname{erfi}\left(\frac{d-2\,i\,f\,k+i\,f\,\nu+2\,b\,z-4\,i\,c\,k\,z+2\,i\,c\,\nu\,z}{2\sqrt{b-2\,i\,c\,k+i\,c\,\nu}}\right)}{\sqrt{b-2\,i\,c\,k+i\,c\,\nu}} - \left(e^{\frac{1}{4}\left(-\frac{(d+2\,i\,f\,k-i\,f\,\nu)^2}{b+2\,i\,c\,k-i\,c\,\nu}+4\,e+8\,i\,g\,k-4\,i\,g\,\nu+4\,\pi\,i\,\nu\right)} \operatorname{erf}\left(\frac{d+2\,i\,f\,k-i\,f\,\nu+2\,b\,z+4\,i\,c\,k\,z-2\,i\,c\,\nu\,z}{2\sqrt{-b-2\,i\,c\,k+i\,c\,\nu}}\right) \right) \Big/ \left(\sqrt{-b-2\,i\,c\,k+i\,c\,\nu}\right) \right) \;/;\; \nu \in \mathbb{N}^+$$

01.06.21.1342.01

$$\int e^{\sqrt{z}\, b+d z+e} \sin^{\nu}\left(\sqrt{z}\, c+f z+g\right) dz = (2 i)^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\sqrt{z}\,(b-2 i c k+i c \nu)+\frac{1}{2}(2 e-4 i g k+2 i g \nu)+(d-2 i f k+i f \nu) z}}{d-2 i f k+i f \nu} - \left(e^{-\frac{(b+c i (\nu-2k))^2}{4 (d+f i (\nu-2k))}+e-2 i g k+i g \nu} \sqrt{\pi}\, (b+c i (\nu-2k)) \operatorname{erfi}\left(\frac{b+c i (\nu-2k)+2 (d-2 i f k+i f \nu) \sqrt{z}}{2 \sqrt{d+f i (\nu-2k)}} \right) \right) \Big/ \left(2 (d-2 i f k+i f \nu)^{3/2}\right) + \frac{(-1)^{\nu} e^{\sqrt{z}\,(b+2 i c k-i c \nu)+\frac{1}{2}(2 e+4 i g k-2 i g \nu)+(d+2 i f k-i f \nu) z}}{d+2 i f k-i f \nu} - \frac{1}{2 (d+2 i f k-i f \nu)^{3/2}} \left((-1)^{\nu} e^{-\frac{(b+c i (2k-\nu))^2}{4 (d+f i (2k-\nu))}+e+2 i g k-i g \nu} \sqrt{\pi}\, (b+2 i c k-i c \nu) \operatorname{erfi}\left(\frac{b+c i (2k-\nu)+2 (d+2 i f k-i f \nu) \sqrt{z}}{2 \sqrt{d+2 i f k-i f \nu}} \right) \right) \right) + 2^{-\nu} \left(\frac{e^{\sqrt{z}\, b+e+d z}}{d} - \frac{b\, e^{e-\frac{b^2}{4 d}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+2 d \sqrt{z}}{2 \sqrt{d}} \right)}{2 d^{3/2}} \right) \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \,/;\, \nu \in \mathbb{N}^+$$

Involving powers of sin and rational functions of exp

Involving $\left(a+b\, e^{d z}\right)^{\beta} \sin^{\nu}(c z)$

01.06.21.1343.01

$$\int \frac{\sin^{\nu}(c z)}{\left(a+b\, e^{d z}\right)^n} dz = -\frac{2^{-\nu} b^{-n} e^{-d n z} (1-\nu \bmod 2)}{d n} \binom{\nu}{\frac{\nu}{2}} {}_2F_1\left(n, n; n+1; -\frac{a\, e^{-d z}}{b}\right) - \frac{2^{-\nu} i^{1-\nu} a^{-n}}{c} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{(-1)^k e^{i c (\nu-2k) z}}{\nu-2k} \binom{\nu}{k} \left({}_2F_1\left(\frac{i c (\nu-2k)}{d}, n; \frac{d-2 i c k+i c \nu}{d}; -\frac{b\, e^{d z}}{a} \right) - e^{-2 i c z \nu+i \pi \nu+4 i c k z} {}_2F_1\left(\frac{i c (2k-\nu)}{d}, n; \frac{d+2 i c k-i c \nu}{d}; -\frac{b\, e^{d z}}{a} \right) \right) \,/;\, n \in \mathbb{N}^+ \bigwedge \nu \in \mathbb{N}^+$$

Involving $e^{p z} \sin^{\nu}(c z) \left(a+b\, e^{d z}\right)^{-n}$

01.06.21.1344.01

$$\int \frac{e^{p z} \sin^{\nu}(c z)}{\left(a+b e^{d z}\right)^{n}} \, dz = 2^{-\nu} i^{-\nu} a^{-n} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{k} \binom{\nu}{k} \left(\frac{e^{i \pi \nu + (2 i c k + p - i c \nu) z}}{2 i c k + p - i c \nu} \, {}_2F_1\left(\frac{2 i c k + p - i c \nu}{d}, n; \frac{d + 2 i c k + p - i c \nu}{d}; -\frac{b e^{d z}}{a} \right) + \frac{e^{(p + c i (\nu - 2k)) z}}{p + c i (\nu - 2k)} \, {}_2F_1\left(\frac{p + c i (\nu - 2k)}{d}, n; \frac{d - 2 i c k + p + i c \nu}{d}; -\frac{b e^{d z}}{a} \right) \right) + \frac{2^{-\nu} a^{-n} (1 - \nu \bmod 2)}{p} e^{p z} \binom{\nu}{\frac{\nu}{2}} {}_2F_1\left(\frac{p}{d}, n; \frac{p}{d} + 1; -\frac{b e^{d z}}{a} \right) /; n \in \mathbb{N}^{+} \bigwedge \nu \in \mathbb{N}^{+}$$

Involving powers of sin and algebraic functions of exp

Involving $\left(a + b e^{d z}\right)^{\beta} \sin^{\nu}(c z)$

01.06.21.1345.01

$$\int \left(a+b e^{d z}\right)^{\beta} \sin^{\nu}(c z) \, dz = \frac{2^{-\nu} \left(\frac{e^{-d z} a}{b} + 1\right)^{-\beta} \left(a + b e^{d z}\right)^{\beta} (1 - \nu \bmod 2)}{d \beta} \binom{\nu}{\frac{\nu}{2}} {}_2F_1\left(-\beta, -\beta; 1 - \beta; -\frac{a e^{-d z}}{b}\right) - \frac{2^{-\nu} i^{1-\nu} \left(a + b e^{d z}\right)^{\beta}}{c} \left(\frac{e^{d z} b}{a} + 1\right)^{-\beta} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{(-1)^{k} e^{i c (\nu - 2k) z}}{\nu - 2k} \binom{\nu}{k} \left({}_2F_1\left(\frac{i c (\nu - 2k)}{d}, -\beta; \frac{d - 2 i c k + i c \nu}{d}; -\frac{b e^{d z}}{a} \right) - e^{-2 i c z \nu + i \pi \nu + 4 i c k z} \, {}_2F_1\left(\frac{i c (2k - \nu)}{d}, -\beta; \frac{d + 2 i c k - i c \nu}{d}; -\frac{b e^{d z}}{a} \right) \right) /; \nu \in \mathbb{N}^{+}$$

Involving $e^{p z}\left(a + b e^{d z}\right)^{\beta} \sin^{\nu}(c z)$

01.06.21.1346.01

$$\int e^{p z} \left(a+b e^{d z}\right)^{\beta} \sin^{\nu}(c z) \, dz = (2 i)^{-\nu} \left(\frac{e^{d z} b}{a} + 1\right)^{-\beta} \left(a + b e^{d z}\right)^{\beta} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{k} \binom{\nu}{k} \left(\frac{e^{i \pi \nu + (2 i c k + p - i c \nu) z}}{2 i c k + p - i c \nu} \, {}_2F_1\left(\frac{2 i c k + p - i c \nu}{d}, -\beta; \frac{d + 2 i c k + p - i c \nu}{d}; -\frac{b e^{d z}}{a} \right) + \frac{e^{(p + c i (\nu - 2k)) z}}{p + c i (\nu - 2k)} \, {}_2F_1\left(\frac{p + c i (\nu - 2k)}{d}, -\beta; \frac{d - 2 i c k + p + i c \nu}{d}; -\frac{b e^{d z}}{a} \right) \right) + \frac{2^{-\nu} (1 - \nu \bmod 2)}{p} e^{p z} \left(a + b e^{d z}\right)^{\beta} \left(\frac{e^{d z} b}{a} + 1\right)^{-\beta} \binom{\nu}{\frac{\nu}{2}} {}_2F_1\left(\frac{p}{d}, -\beta; \frac{p}{d} + 1; -\frac{b e^{d z}}{a} \right) /; \nu \in \mathbb{N}^{+}$$

Involving products of the direct function and exponential function

Involving products of two direct functions and exponential function

Involving $e^{b z} \sin(c z) \sin(a z)$

01.06.21.1347.01

$$\int e^{b z} \sin(c z) \sin(a z)\, dz = \left(e^{b z} \left(\sin(a z) \left(b \left(a^2 + b^2 + c^2\right) \sin(c z) - c \left(-a^2 + b^2 + c^2\right) \cos(c z)\right) - a \cos(a z) \left(\left(a^2 + b^2 - c^2\right) \sin(c z) - 2 b c \cos(c z)\right)\right)\right) \Big/ \left(a^4 + 2 \left(b^2 - c^2\right) a^2 + \left(b^2 + c^2\right)^2\right)$$

Involving $e^{p z} \sin(c z) \sin(a z + b)$

01.06.21.1348.01

$$\int e^{p z} \sin(c z) \sin(b + a z)\, dz = \frac{1}{2} e^{p z} \left(\frac{\cos((a - c) z) (p \cos(b) + (a - c) \sin(b))}{a^2 - 2 c a + c^2 + p^2} + \frac{((a - c) \cos(b) - p \sin(b)) \sin((a - c) z)}{a^2 - 2 c a + c^2 + p^2} - \frac{\cos((a + c) z) (p \cos(b) + (a + c) \sin(b))}{a^2 + 2 c a + c^2 + p^2} - \frac{((a + c) \cos(b) - p \sin(b)) \sin((a + c) z)}{a^2 + 2 c a + c^2 + p^2}\right)$$

Involving $e^{p z} \sin(c z + d) \sin(a z + b)$

01.06.21.1349.01

$$\int e^{p z} \sin(d + c z) \sin(b + a z)\, dz = \frac{1}{2} e^{p z} \left(\frac{\cos((a - c) z) (p \cos(b - d) + (a - c) \sin(b - d))}{a^2 - 2 c a + c^2 + p^2} + \frac{((a - c) \cos(b - d) - p \sin(b - d)) \sin((a - c) z)}{a^2 - 2 c a + c^2 + p^2} - \frac{\cos((a + c) z) (p \cos(b + d) + (a + c) \sin(b + d))}{a^2 + 2 c a + c^2 + p^2} - \frac{((a + c) \cos(b + d) - p \sin(b + d)) \sin((a + c) z)}{a^2 + 2 c a + c^2 + p^2}\right)$$

Involving $e^{p z^r} \sin(b z) \sin(c z)$

01.06.21.1350.01

$$\int e^{p z^2} \sin(b z) \sin(c z)\, dz = \frac{\sqrt{\pi}}{8 \sqrt{p}} e^{\frac{(b-c)^2}{4 p}} \left(e^{\frac{b c}{p}} i \operatorname{erf}\left(\frac{b + c + 2 i p z}{2 \sqrt{p}}\right) - i e^{\frac{b c}{p}} \operatorname{erf}\left(\frac{b + c - 2 i p z}{2 \sqrt{p}}\right) + \operatorname{erfi}\left(\frac{i b - i c + 2 p z}{2 \sqrt{p}}\right) - \operatorname{erfi}\left(\frac{i b - i c - 2 p z}{2 \sqrt{p}}\right)\right)$$

01.06.21.1351.01

$$\int e^{p\sqrt{z}}\sin(b\,z)\sin(c\,z)\,dz = \frac{1}{8}\left(\frac{e^{\frac{i p^2}{4c-4b}}\,p\sqrt{\pi}\,\operatorname{erf}\left(\frac{-p+2\,i\,(b-c)\sqrt{z}}{2\sqrt{i\,(b-c)}}\right)}{(i\,(b-c))^{3/2}} + \frac{e^{\frac{i p^2}{4(b+c)}}\,p\sqrt{\pi}\,\operatorname{erfi}\left(\frac{p+2\,i\,(b+c)\sqrt{z}}{2\sqrt{i\,(b+c)}}\right)}{(i\,(b+c))^{3/2}} + \frac{4\,e^{p\sqrt{z}}\sin((b-c)\,z)}{b-c} - \frac{e^{\frac{i p^2}{4b-4c}}\,p\sqrt{\pi}\,\operatorname{erfi}\left(\frac{p+2\,i\,(b-c)\sqrt{z}}{2\sqrt{i\,(b-c)}}\right)}{(i\,(b-c))^{3/2}} - \frac{4\,e^{p\sqrt{z}}\sin((b+c)\,z)}{b+c} - \frac{e^{-\frac{i p^2}{4(b+c)}}\,p\sqrt{\pi}\,\operatorname{erf}\left(\frac{-p+2\,i\,(b+c)\sqrt{z}}{2\sqrt{i\,(b+c)}}\right)}{(i\,(b+c))^{3/2}}\right)$$

Involving $e^{p z}\sin(b\,z^r)\sin(c\,z)$

01.06.21.1352.01

$$\int e^{p z}\sin(b\,z^2)\sin(c\,z)\,dz = -\frac{\sqrt{\pi}}{8\sqrt{i\,b}}\,e^{\frac{i\,(i\,c+p)^2}{4b}}\left(e^{-\frac{i\,(p^2-c^2)}{2b}}\operatorname{erf}\left(\frac{i\,c-p+2\,i\,b\,z}{2\sqrt{i\,b}}\right) + e^{-\frac{i\,(i\,c+p)^2}{2b}}\operatorname{erf}\left(\frac{i\,c+p-2\,i\,b\,z}{2\sqrt{i\,b}}\right) + \operatorname{erfi}\left(\frac{i\,c+p+2\,i\,b\,z}{2\sqrt{i\,b}}\right) + e^{\frac{c\,p}{b}}\operatorname{erfi}\left(\frac{i\,c-p-2\,i\,b\,z}{2\sqrt{i\,b}}\right)\right)$$

01.06.21.1353.01

$$\int e^{p z}\sin\left(b\sqrt{z}\right)\sin(c\,z)\,dz = \frac{1}{8}\left(-\frac{b\,e^{\frac{i b^2}{4c+4 i p}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{b+2\,(c+i\,p)\sqrt{z}}{2\sqrt{i\,c-p}}\right)}{(i\,c-p)^{3/2}} + \frac{b\,e^{\frac{i b^2}{4c+4 i p}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{b-2\,(c+i\,p)\sqrt{z}}{2\sqrt{i\,c-p}}\right)}{(i\,c-p)^{3/2}} + \frac{b\,e^{\frac{b^2}{4(i\,c+p)}}\,i\sqrt{\pi}\,\operatorname{erfi}\left(\frac{i\,b+2\,(i\,c+p)\sqrt{z}}{2\sqrt{i\,c+p}}\right)}{(i\,c+p)^{3/2}} - \frac{i\,b\,e^{\frac{b^2}{4(i\,c+p)}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{i\,b-2\,(i\,c+p)\sqrt{z}}{2\sqrt{i\,c+p}}\right)}{(i\,c+p)^{3/2}} - \frac{4\,e^{(-i\,c+p)\,z}\sin\left(b\sqrt{z}\right)}{c+i\,p} - \frac{4\,e^{(i\,c+p)\,z}\sin\left(b\sqrt{z}\right)}{c-i\,p}\right)$$

Involving $e^{p z^r}\sin(b\,z^r)\sin(c\,z)$

01.06.21.1354.01

$$\int e^{p z^2}\sin(b\,z^2)\sin(c\,z)\,dz = -\frac{\sqrt[4]{-1}\;e^{\frac{i c^2}{4(b+i\,p)}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{(-1)^{3/4}\,(-c+2\,b\,z+2\,i\,p\,z)}{2\sqrt{b+i\,p}}\right)}{8\sqrt{b+i\,p}} + \frac{\sqrt[4]{-1}\;e^{\frac{i c^2}{4(b+i\,p)}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{(-1)^{3/4}\,(c+2\,b\,z+2\,i\,p\,z)}{2\sqrt{b+i\,p}}\right)}{8\sqrt{b+i\,p}} + \frac{(-1)^{3/4}\,e^{-\frac{i c^2}{4(b-i\,p)}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{\sqrt[4]{-1}\,(c+2\,b\,z-2\,i\,p\,z)}{2\sqrt{b-i\,p}}\right)}{8\sqrt{b-i\,p}} - \frac{(-1)^{3/4}\,e^{-\frac{i c^2}{4(b-i\,p)}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{\sqrt[4]{-1}\,(-c+2\,b\,z-2\,i\,p\,z)}{2\sqrt{b-i\,p}}\right)}{8\sqrt{b-i\,p}}$$

01.06.21.1355.01

$$\int e^{p\sqrt{z}} \sin\left(b\sqrt{z}\right)\sin(c\,z)\,dz = \frac{1}{8\,c^{3/2}}\left(-2\,i\sqrt{c}\;e^{(-i\,b+p)\sqrt{z}-i\,c\,z} + 2\,i\sqrt{c}\;e^{(i\,b+p)\sqrt{z}-i\,c\,z} - 2\,i\sqrt{c}\;e^{\sqrt{z}\,(-i\,b+p)+i\,c\,z} + 2\,i\sqrt{c}\;e^{\sqrt{z}\,(i\,b+p)+i\,c\,z} + (-1)^{3/4}\,b\,e^{-\frac{i\,(b+i\,p)^2}{4\,c}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{\sqrt[4]{-1}\left(b+i\,p-2\,c\sqrt{z}\right)}{2\sqrt{c}}\right) + (-1)^{3/4}\,e^{\frac{i\,(b+i\,p)^2}{4\,c}}\,p\sqrt{\pi}\,\operatorname{erfi}\left(\frac{\sqrt[4]{-1}\left(-i\,b+p-2\,i\,c\sqrt{z}\right)}{2\sqrt{c}}\right) - (-1)^{3/4}\,e^{\frac{i\,(b-i\,p)^2}{4\,c}}\,p\sqrt{\pi}\,\operatorname{erfi}\left(\frac{\sqrt[4]{-1}\left(i\,b+p-2\,i\,c\sqrt{z}\right)}{2\sqrt{c}}\right) - \sqrt[4]{-1}\;e^{-\frac{i\,(b+i\,p)^2}{4\,c}}\,p\sqrt{\pi}\,\operatorname{erfi}\left(\frac{(-1)^{3/4}\left(-i\,b+p+2\,i\,c\sqrt{z}\right)}{2\sqrt{c}}\right) + \sqrt[4]{-1}\;e^{-\frac{i\,(b-i\,p)^2}{4\,c}}\,p\sqrt{\pi}\,\operatorname{erfi}\left(\frac{(-1)^{3/4}\left(i\,b+p+2\,i\,c\sqrt{z}\right)}{2\sqrt{c}}\right) - (-1)^{3/4}\,b\,e^{-\frac{i\,(b-i\,p)^2}{4\,c}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{\sqrt[4]{-1}\left(b-i\,p+2\,c\sqrt{z}\right)}{2\sqrt{c}}\right) - \sqrt[4]{-1}\;b\,e^{\frac{i\,(b-i\,p)^2}{4\,c}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{(-1)^{3/4}\left(-b+i\,p+2\,c\sqrt{z}\right)}{2\sqrt{c}}\right) - \sqrt[4]{-1}\;b\,e^{\frac{i\,(b+i\,p)^2}{4\,c}}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{(-1)^{3/4}\left(b+i\,p+2\,c\sqrt{z}\right)}{2\sqrt{c}}\right)\right)$$

Involving $e^{p\,z}\sin\left(b\,z^r\right)\sin\left(c\,z^r\right)$

01.06.21.1356.01

$$\int e^{p\,z}\sin\left(b\,z^2\right)\sin\left(c\,z^2\right)dz = \frac{1}{8}\sqrt{\pi}\left(\frac{e^{\frac{i\,p^2}{4\,c-4\,b}}\operatorname{erf}\left(\frac{2\,i\,(b-c)\,z-p}{2\sqrt{i\,(b-c)}}\right)}{\sqrt{i\,(b-c)}} + \frac{e^{\frac{i\,p^2}{4\,b-4\,c}}\operatorname{erfi}\left(\frac{p+2\,(b-c)\,i\,z}{2\sqrt{i\,(b-c)}}\right)}{\sqrt{i\,(b-c)}} - \frac{e^{-\frac{i\,p^2}{4\,(b+c)}}\operatorname{erf}\left(\frac{2\,i\,(b+c)\,z-p}{2\sqrt{i\,(b+c)}}\right)}{\sqrt{i\,(b+c)}} - \frac{e^{\frac{i\,p^2}{4\,(b+c)}}\operatorname{erfi}\left(\frac{p+2\,(b+c)\,i\,z}{2\sqrt{i\,(b+c)}}\right)}{\sqrt{i\,(b+c)}}\right)$$

01.06.21.1357.01

$$\int e^{p\,z}\sin\left(b\sqrt{z}\right)\sin\left(c\sqrt{z}\right)dz = \frac{1}{8}\left(\frac{(b-c)\,e^{\frac{(b-c)^2}{4\,p}}\sqrt{\pi}\,\operatorname{erf}\left(\frac{b-c+2\,i\,p\sqrt{z}}{2\sqrt{p}}\right)}{p^{3/2}} + \frac{(b+c)\,e^{\frac{(b+c)^2}{4\,p}}\sqrt{\pi}\,\operatorname{erf}\left(\frac{-b-c-2\,i\,p\sqrt{z}}{2\sqrt{p}}\right)}{p^{3/2}} + \frac{(b-c)\,e^{\frac{(c-b)^2}{4\,p}}\sqrt{\pi}\,\operatorname{erf}\left(\frac{b-c-2\,i\,p\sqrt{z}}{2\sqrt{p}}\right)}{p^{3/2}} + \frac{(b+c)\,e^{\frac{(b+c)^2}{4\,p}-2\,\pi\,i}\,i\sqrt{\pi}\,\operatorname{erfi}\left(\frac{i\,b+i\,c+2\,p\sqrt{z}}{2\sqrt{p}}\right)}{p^{3/2}} + \frac{8\,e^{p\,z}\sin\left(b\sqrt{z}\right)\sin\left(c\sqrt{z}\right)}{p}\right)$$

Involving $e^{p\,z^r}\sin\left(b\,z^r\right)\sin\left(c\,z^r\right)$

01.06.21.1358.01

$$\int e^{p z^r} \sin(b z^r) \sin(c z^r) \, dz = -\frac{z}{4 r} \left(\Gamma\left(\frac{1}{r}, i (b - c + i p) z^r\right) (i (b - c + i p) z^r)^{-1/r} - (i (b + c + i p) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i (b + c + i p) z^r\right) + (-i (b - c - i p) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -i (b - c - i p) z^r\right) - (-i (b + c - i p) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -i (b + c - i p) z^r\right) \right)$$

01.06.21.1359.01

$$\int e^{p z^2} \sin(b z^2) \sin(c z^2) \, dz = -\left(\sqrt{\pi} \left(\sqrt{-i (b + c + i p)} \sqrt{i b - i c + p} (-i b + i c + p) \sqrt{i b + i c + p} \operatorname{erfi}\left(\sqrt{-i (b + c + i p)} \, z\right) - i (b + c + i p) \left(\sqrt{i b - i c + p} \left((-i b + i c + p) \operatorname{erfi}\left(\sqrt{i b + i c + p} \, z\right) - \sqrt{-i b + i c + p} \sqrt{i b + i c + p} \operatorname{erfi}\left(\sqrt{-i b + i c + p} \, z\right)\right) + i \sqrt{i b + i c + p} (b - c + i p) \operatorname{erfi}\left(\sqrt{i b - i c + p} \, z\right)\right)\right)\right) \Big/ \left(8 \sqrt{i b - i c + p} \sqrt{i b + i c + p} \left(-b^2 - 2 i p b + c^2 + p^2\right)\right)$$

01.06.21.1360.01

$$\int e^{p \sqrt{z}} \sin\left(b \sqrt{z}\right) \sin\left(c \sqrt{z}\right) dz = -\frac{1}{2} e^{-i (b+c+i p) \sqrt{z}} \left(\frac{1}{(b + c + i p)^2} + e^{2 i c \sqrt{z}} \left(\frac{1}{(-i b + i c + p)^2} - \frac{e^{2 i b \sqrt{z}} \left((i b + i c + p) \sqrt{z} - 1\right)}{(b + c - i p)^2} + \frac{i \sqrt{z}}{-b + c - i p} \right) + \frac{e^{2 i b \sqrt{z}} \left(1 - (i b - i c + p) \sqrt{z}\right)}{(i b - i c + p)^2} + \frac{i \sqrt{z}}{b + c + i p} \right)$$

Involving $e^{b z^r + e} \sin(a z^r + q) \sin(c z^r + g)$

01.06.21.1361.01

$$\int e^{b z^r + e} \sin(a z^r + q) \sin(c z^r + g) \, dz = -\frac{1}{4 r} e^{e - i (g+q)} z \left(e^{2 i g} \Gamma\left(\frac{1}{r}, i (a - c + i b) z^r\right) (i (a - c + i b) z^r)^{-1/r} + e^{2 i q} (-i (a - i b - c) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -i (a - i b - c) z^r\right) - (i (a + c + i b) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i (a + c + i b) z^r\right) - e^{2 i (g+q)} (-i (a - i b + c) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -i (a - i b + c) z^r\right) \right)$$

01.06.21.1362.01

$$\int e^{b z^2 + e} \sin\left(a z^2 + q\right) \sin\left(c z^2 + g\right) dz = \frac{1}{8} e^{e - i (g+q)} \sqrt{\pi} \left(-\frac{\operatorname{erfi}\left(\sqrt{-i (a + c + i b)} \, z\right)}{\sqrt{-i (a + c + i b)}} + \frac{e^{2 i g} \operatorname{erfi}\left(\sqrt{b - i a + i c} \, z\right)}{\sqrt{b - i a + i c}} + \frac{e^{2 i q} \operatorname{erfi}\left(\sqrt{b - i c + i a} \, z\right)}{\sqrt{b - i c + i a}} - \frac{e^{2 i (g+q)} \operatorname{erfi}\left(\sqrt{b + i a + i c} \, z\right)}{\sqrt{b + i a + i c}} \right)$$

01.06.21.1363.01

$$\int e^{\sqrt{z}\, b+e} \sin\left(\sqrt{z}\, a+q\right) \sin\left(\sqrt{z}\, c+g\right) dz = \frac{1}{2}\left(\frac{e^{\sqrt{z}\,(b-i c-i a)+e-i g-i q+i\pi}\left(\sqrt{z}\, b+(-i a-i c)\sqrt{z}-1\right)}{(b-i c-i a)^2}+\frac{e^{\sqrt{z}\,(b-i c+i a)+e-i g+i q}\left(\sqrt{z}\, b+(i a-i c)\sqrt{z}-1\right)}{(b-i c+i a)^2}+\frac{e^{\sqrt{z}\,(b+i a+i c)+e+i g+i q-i\pi}\left(\sqrt{z}\, b-(-i a-i c)\sqrt{z}-1\right)}{(-b-i c-i a)^2}+\frac{e^{\sqrt{z}\,(b-i a+i c)+e+i g-i q}\left(\sqrt{z}\, b-(i a-i c)\sqrt{z}-1\right)}{(-b-i c+i a)^2}\right)$$

Involving $e^{b z^r+d z+e} \sin(a z^r+p z+q) \sin(c z^r+f z+g)$

01.06.21.1364.01

$$\int e^{b z^2+d z+e} \sin\left(a z^2+p z+q\right) \sin\left(c z^2+f z+g\right) dz = -\frac{1}{8}\sqrt{\pi} \left(\frac{e^{e-i g-i q-\frac{-d^2+2 i f d+2 i p d+f^2+p^2+2 f p}{4(-b+i a+i c)}} \operatorname{erf}\left(\frac{-d+i f+i p-2 b z+2 i a z+2 i c z}{2\sqrt{-b+i a+i c}}\right)}{\sqrt{-b+i a+i c}}+\frac{e^{e+i g+i q-\frac{d^2+2 i f d+2 i p d-f^2-p^2-2 f p}{4(b+i a+i c)}} \operatorname{erfi}\left(\frac{d+i f+i p+2 b z+2 i a z+2 i c z}{2\sqrt{b+i a+i c}}\right)}{\sqrt{b+i a+i c}}-\frac{e^{e+i g-i q-\frac{-d^2-2 i f d+2 i p d+f^2+p^2-2 f p}{4(-b-i c+i a)}} \operatorname{erf}\left(\frac{-d-i f+i p-2 b z-2 i c z+2 i a z}{2\sqrt{-b-i c+i a}}\right)}{\sqrt{-b-i c+i a}}-\frac{e^{e-i g+i q-\frac{d^2-2 i f d+2 i p d-f^2-p^2+2 f p}{4(b-i c+i a)}} \operatorname{erfi}\left(\frac{d-i f+i p+2 b z-2 i c z+2 i a z}{2\sqrt{b-i c+i a}}\right)}{\sqrt{b-i c+i a}}\right)$$

01.06.21.1365.01

$$\int e^{\sqrt{z}\, b+d z+e} \sin\left(\sqrt{z}\, a+p z+q\right) \sin\left(\sqrt{z}\, c+f z+g\right) dz = -\frac{1}{4} e^{e-i g-i q} \left(-\frac{e^{\sqrt{z}\,(b-i c+i a)+2 i q+(d-i f+i p) z}}{d-i f+i p} - \frac{e^{\sqrt{z}\,(b-i a+i c)+2 i g+(d+i f-i p) z}}{d+i f-i p} + \frac{e^{\sqrt{z}\,(b-i c-i a)+(d-i f-i p) z}}{d-i f-i p} + \frac{e^{\sqrt{z}\,(b+i a+i c)+2 i g+2 i q+(d+i f+i p) z}}{d+i f+i p}\right) +$$

$$\frac{1}{8 (d+i f+i p)^{3/2}} \left((b+i a+i c)\, e^{-\frac{-a^2+2 (b+i c) i a+b^2-c^2-4 d e-4 i e f-4 i d g+4 f g+2 i b c-4 i e p+4 g p-4 i d q+4 f q+4 p q}{4 (d+i f+i p)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+i a+i c+2 d \sqrt{z}+2 i f \sqrt{z}+2 i p \sqrt{z}}{2 \sqrt{d+i f+i p}}\right)\right) -$$

$$\frac{1}{8 (d-i f+i p)^{3/2}} \left((b-i c+i a)\, e^{-\frac{-a^2+2 (b-i c) i a+b^2-c^2-2 i b c-4 d e+4 f g+4 i e f+4 i d g-4 i e p-4 g p-4 i d q-4 f q+4 p q}{4 (d-i f+i p)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b-i c+i a+2 d \sqrt{z}-2 i f \sqrt{z}+2 i p \sqrt{z}}{2 \sqrt{d-i f+i p}}\right)\right) -$$

$$\frac{1}{8 (d+i f-i p)^{3/2}} \left((-b-i c+i a)\, e^{-\frac{-a^2-2 i (b+i c) a+b^2-c^2-4 d e-4 i e f-4 i d g+4 f g+2 i b c-4 g p+4 i e p-4 f q+4 i d q+4 p q}{4 (d+i f-i p)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{-b-i c+i a-2 d \sqrt{z}-2 i f \sqrt{z}+2 i p \sqrt{z}}{2 \sqrt{d+i f-i p}}\right)\right) +$$

$$\frac{1}{8 (d-i f-i p)^{3/2}} \left((-b+i a+i c)\, e^{\frac{-a^2-2 i b a-2 c a+b^2-c^2-2 i b c-4 d e+4 f g+4 i e f+4 i d g+4 g p+4 i e p+4 f q+4 i d q+4 p q}{4 (-d+i f+i p)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{-b+i a+i c-2 d \sqrt{z}+2 i f \sqrt{z}+2 i p \sqrt{z}}{2 \sqrt{d-i f-i p}}\right)\right)$$

Involving products of two direct functions and rational functions of exp

Involving $\sin(e z) \sin(c z) \left(a+b e^{d z}\right)^{-n}$

01.06.21.1366.01

$$\int \frac{\sin(e z)\sin(c z)}{\left(a+b\, e^{d z}\right)^n}\, dz = -\frac{1}{4} i\, a^{-n} \left(\frac{e^{-i (c-e) z}}{c-e} \left(e^{2 i (c-e) z}\, {}_2F_1\!\left(\frac{i (c-e)}{d}, n; \frac{d - i e + i c}{d}; -\frac{b\, e^{d z}}{a} \right) - {}_2F_1\!\left(-\frac{i (c-e)}{d}, n; \frac{d - i c + i e}{d}; -\frac{b\, e^{d z}}{a} \right) \right) + \frac{e^{-i (c+e) z}}{c+e} \left({}_2F_1\!\left(-\frac{i (c+e)}{d}, n; -\frac{i (c+e+i d)}{d}; -\frac{b\, e^{d z}}{a} \right) - e^{2 i (c+e) z}\, {}_2F_1\!\left(\frac{i (c+e)}{d}, n; \frac{d + i c + i e}{d}; -\frac{b\, e^{d z}}{a} \right) \right) \right) /; n \in \mathbb{N}^+$$

Involving $e^{p z} \sin(e z) \sin(c z) \left(a + b\, e^{d z}\right)^{-n}$

01.06.21.1367.01

$$\int \frac{e^{p z} \sin(e z)\sin(c z)}{\left(a+b\, e^{d z}\right)^n}\, dz = \frac{1}{4} a^{-n} \left(\frac{1}{c^2 - 2 e c + e^2 + p^2} \left(e^{(-i c + i e + p) z} (i c - i e + p)\, {}_2F_1\!\left(\frac{-i c + i e + p}{d}, n; \frac{d - i c + i e + p}{d}; -\frac{b\, e^{d z}}{a} \right) + e^{(i c - i e + p) z} (-i c + i e + p)\, {}_2F_1\!\left(\frac{i c - i e + p}{d}, n; \frac{d - i e + i c + p}{d}; -\frac{b\, e^{d z}}{a} \right) \right) + \frac{i}{c^2 + 2 e c + e^2 + p^2} \left(e^{(i c + i e + p) z} (c + e + i p)\, {}_2F_1\!\left(\frac{i c + i e + p}{d}, n; \frac{d + i c + i e + p}{d}; -\frac{b\, e^{d z}}{a} \right) - e^{-i (c + e + i p) z} (c + e - i p)\, {}_2F_1\!\left(-\frac{i (c + e + i p)}{d}, n; \frac{d - i e - i c + p}{d}; -\frac{b\, e^{d z}}{a} \right) \right) \right) /; n \in \mathbb{N}^+$$

Involving products of two direct functions and algebraic functions of exp

Involving $\left(a + b\, e^{d z}\right)^{\beta} \sin(e z) \sin(c z)$

01.06.21.1368.01

$$\int \left(a+b\, e^{d z}\right)^{\beta} \sin(e z)\sin(c z)\, dz = \frac{i}{4 (c-e)(c+e)} e^{-2 i (c+e) z} \left(a + b\, e^{d z}\right)^{\beta} \left(\frac{e^{d z} b}{a} + 1 \right)^{-\beta} \left(-(c+e)\, e^{i (3 c + e) z}\, {}_2F_1\!\left(\frac{i (c-e)}{d}, -\beta; \frac{d - i e + i c}{d}; -\frac{b\, e^{d z}}{a} \right) + (c-e)\, e^{i (c+e) z} \left(e^{2 i (c+e) z}\, {}_2F_1\!\left(\frac{i (c+e)}{d}, -\beta; \frac{d + i c + i e}{d}; -\frac{b\, e^{d z}}{a} \right) - {}_2F_1\!\left(-\frac{i (c+e)}{d}, -\beta; -\frac{i (c + e + i d)}{d}; -\frac{b\, e^{d z}}{a} \right) \right) + (c+e)\, e^{i (c + 3 e) z}\, {}_2F_1\!\left(-\frac{i (c-e)}{d}, -\beta; \frac{d - i c + i e}{d}; -\frac{b\, e^{d z}}{a} \right) \right)$$

Involving $e^{p z} \left(a + b\, e^{d z}\right)^{\beta} \sin(e z) \sin(c z)$

01.06.21.1369.01

$$\int e^{p z}\left(a+b e^{d z}\right)^{\beta} \sin(e z) \sin(c z) \, dz = \frac{1}{4}\left(a+b e^{d z}\right)^{\beta}\left(\frac{e^{d z} b}{a}+1\right)^{-\beta} \left(-\frac{1}{c^2-2 e c+e^2+p^2}\left(i e^{(i c-i e+p) z}(c-e+i p)\, {}_2F_1\left(\frac{i c-i e+p}{d}, -\beta; \frac{d-i e+i c+p}{d}; -\frac{b e^{d z}}{a}\right)- e^{(-i c+i e+p) z}(i c-i e+p)\, {}_2F_1\left(\frac{-i c+i e+p}{d}, -\beta; \frac{d-i c+i e+p}{d}; -\frac{b e^{d z}}{a}\right)\right)+ \frac{1}{c^2+2 e c+e^2+p^2}\left(i\left(e^{(i c+i e+p) z}(c+e+i p)\, {}_2F_1\left(\frac{i c+i e+p}{d}, -\beta; \frac{d+i c+i e+p}{d}; -\frac{b e^{d z}}{a}\right)- e^{-i(c+e+i p) z}(c+e-i p)\, {}_2F_1\left(-\frac{i(c+e+i p)}{d}, -\beta; \frac{d-i e-i c+p}{d}; -\frac{b e^{d z}}{a}\right)\right)\right)\right)$$

Involving products of several direct functions and exponential function

Involving $e^{p z} \sin(a z) \sin(b z) \sin(c z)$

01.06.21.1370.01

$$\int e^{p z} \sin(a z) \sin(b z) \sin(c z) \, dz = \frac{1}{4} e^{p z}\left(\frac{(a-b-c) \cos((a-b-c) z)-p \sin((a-b-c) z)}{a^2-2(b+c) a+b^2+c^2+p^2+2 b c}+\frac{(a+b+c) \cos((a+b+c) z)-p \sin((a+b+c) z)}{(a+b+c-i p)(a+b+c+i p)}- \frac{(a+b-c) \cos((a+b-c) z)-p \sin((a+b-c) z)}{(a+b-c-i p)(a+b-c+i p)}-\frac{(a-b+c) \cos((a-b+c) z)-p \sin((a-b+c) z)}{(a-b+c-i p)(a-b+c+i p)}\right)$$

Involving $e^{p z} \prod_{k=1}^{n} \sin(a_k z)$

01.06.21.1371.01

$$\int e^{p z} \prod_{k=1}^{n} \sin(a_k z) \, dz = (-2)^{-n} e^{p z} \sum_{\substack{k_1=-1 \\ \Delta k_1=2}}^{1} \sum_{\substack{k_2=-1 \\ \Delta k_2=2}}^{1} \cdots \sum_{\substack{k_n=-1 \\ \Delta k_n=2}}^{1}\left(\frac{p \cos\left(\sum_{j=1}^{n} k_j\left(z a_j+\frac{\pi}{2}\right)\right)+\sum_{j=1}^{n} k_j a_j \sin\left(\sum_{j=1}^{n} k_j\left(z a_j+\frac{\pi}{2}\right)\right)}{p^2+\left(\sum_{j=1}^{n} k_j a_j\right)^2}\right)$$

Involving products of powers of two direct functions and exponential function

Involving product of power of the direct function, the direct function and exponential function

Involving $e^{b z} \sin(c z) \sin^{\nu}(a z)$

01.06.21.1372.01

$$\int e^{b z} \sin(c z) \sin^{\nu}(a z) \, dz = -\frac{1}{2}\left(1-e^{-2 i a z}\right)^{-\nu} \sin^{\nu}(a z)\left(\frac{e^{(-i c+b) z}}{c+i b-a \nu}\, {}_2F_1\left(\frac{c+i b-a \nu}{2 a}, -\nu; \frac{-\nu a+2 a+c+i b}{2 a}; e^{-2 i a z}\right)+ \frac{e^{(i c+b) z}}{c-i b+a \nu}\, {}_2F_1\left(-\frac{c-i b+a \nu}{2 a}, -\nu; -\frac{c-i b+a(\nu-2)}{2 a}; e^{-2 i a z}\right)\right)$$

01.06.21.1373.01

$$\int e^{bz}\sin(cz)\sin^{\nu}(az)\,dz = (2i)^{-\nu-1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{e^{(b+ic-2iak+iav)z}}{b+ic-2iak+iav}+\frac{e^{(b-ic-2iak+iav)z}}{-b+ic+2iak-iav}+\frac{e^{i\pi\nu+(b+ic+2iak-iav)z}}{b+ic+2iak-iav}+\frac{e^{i\pi\nu+(b-ic+2iak-iav)z}}{-b+ic-2iak+iav}\right)+ 2^{-\nu-1}\left(\frac{e^{(b-ic)z}}{b-ic}-\frac{e^{(b+ic)z}}{b+ic}\right)i\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\;/;\;\nu\in\mathbb{N}^+$$

Involving $e^{bz}\sin(cz+d)\sin^{\nu}(az)$

01.06.21.1374.01

$$\int e^{bz}\sin(d+cz)\sin^{\nu}(az)\,dz = -\frac{1}{2}e^{-id}\left(1-e^{-2iaz}\right)^{-\nu}\sin^{\nu}(az)\left(\frac{e^{(-ic+b)z}}{c+ib-av}\,{}_2F_1\left(\frac{c+ib-av}{2a},-\nu;\frac{-\nu a+2a+c+ib}{2a};e^{-2iaz}\right)+ \frac{e^{2id+(ic+b)z}}{c-ib+av}\,{}_2F_1\left(-\frac{c-ib+av}{2a},-\nu;-\frac{c-ib+a(\nu-2)}{2a};e^{-2iaz}\right)\right)$$

01.06.21.1375.01

$$\int e^{bz}\sin(d+cz)\sin^{\nu}(az)\,dz = i\,2^{-\nu-1}\left(\frac{e^{-id+(-ic+b)z}}{-ic+b}-\frac{e^{id+(ic+b)z}}{ic+b}\right)\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)+2^{-\nu-1}\,i^{-\nu-1}\,e^{id}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k} \left(\frac{e^{(ic-2iak+b+iav)z}}{ic-2iak+b+iav}+\frac{e^{-2id+(-ic-2iak+b+iav)z}}{ic+2iak-b-iav}+\frac{e^{i\pi\nu+(ic+2iak+b-iav)z}}{ic+2iak+b-iav}+\frac{e^{-2id+i\pi\nu+(-ic+2iak+b-iav)z}}{ic-2iak-b+iav}\right)\;/;\;\nu\in\mathbb{N}^+$$

Involving $e^{pz}\sin(cz)\sin^{\nu}(az+b)$

01.06.21.1376.01

$$\int e^{pz}\sin(cz)\sin^{\nu}(b+az)\,dz = -\frac{1}{2}\left(1-e^{-2i(b+az)}\right)^{-\nu}\sin^{\nu}(b+az)\left(\frac{e^{(-ic+p)z}}{c+ip-av}\,{}_2F_1\left(\frac{c+ip-av}{2a},-\nu;\frac{-\nu a+2a+c+ip}{2a};e^{-2i(b+az)}\right)+ \frac{e^{(ic+p)z}}{c-ip+av}\,{}_2F_1\left(-\frac{c-ip+av}{2a},-\nu;-\frac{c-ip+a(\nu-2)}{2a};e^{-2i(b+az)}\right)\right)$$

01.06.21.1377.01

$$\int e^{pz}\sin(cz)\sin^{\nu}(b+az)\,dz = i\,2^{-\nu-1}\left(\frac{e^{(-ic+p)z}}{-ic+p}-\frac{e^{(ic+p)z}}{ic+p}\right)\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)+2^{-\nu-1}\,i^{-\nu-1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}e^{-2ibk-ib\nu}\left(\frac{e^{2ib\nu+(ic-2iak+p+iav)z}}{ic-2iak+p+iav}+ \frac{e^{2ib\nu+(-ic-2iak+p+iav)z}}{ic+2iak-p-iav}+\frac{e^{4ibk+i\pi\nu+(ic+2iak+p-iav)z}}{ic+2iak+p-iav}+\frac{e^{4ibk+i\pi\nu+(-ic+2iak+p-iav)z}}{ic-2iak-p+iav}\right)\;/;\;\nu\in\mathbb{N}^+$$

Involving $e^{pz}\sin(cz+d)\sin^{\nu}(az+b)$

01.06.21.1378.01

$$\int e^{pz}\sin(d+cz)\sin^{\nu}(b+az)\,dz = -\frac{1}{2}e^{-id}\left(1-e^{-2i(b+az)}\right)^{-\nu}\sin^{\nu}(b+az)\left(\frac{e^{(-ic+p)z}}{c+ip-a\nu}\,{}_2F_1\left(\frac{c+ip-a\nu}{2a},-\nu;\frac{-\nu a+2a+c+ip}{2a};e^{-2i(b+az)}\right)+\frac{e^{2id+(ic+p)z}}{c-ip+a\nu}\,{}_2F_1\left(-\frac{c-ip+a\nu}{2a},-\nu;-\frac{c-ip+a(\nu-2)}{2a};e^{-2i(b+az)}\right)\right)$$

01.06.21.1379.01

$$\int e^{pz}\sin(d+cz)\sin^{\nu}(b+az)\,dz = i\,2^{-\nu-1}\left(\frac{e^{-id+(-ic+p)z}}{-ic+p}-\frac{e^{id+(ic+p)z}}{ic+p}\right)\binom{\nu}{\frac{\nu}{2}}(1-\nu\bmod 2)+2^{-\nu-1}\,i^{-\nu-1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}e^{id-2ibk-ib\nu}\left(\frac{e^{2ib\nu+(ic-2iak+p+ia\nu)z}}{ic-2iak+p+ia\nu}+\frac{e^{-2id+2ib\nu+(-ic-2iak+p+ia\nu)z}}{ic+2iak-p-ia\nu}+\frac{e^{4ibk+i\pi\nu+(ic+2iak+p-ia\nu)z}}{ic+2iak+p-ia\nu}+\frac{e^{-2id+4ibk+i\pi\nu+(-ic+2iak+p-ia\nu)z}}{ic-2iak-p+ia\nu}\right)\;/;\;\nu\in\mathbb{N}^+$$

Involving $e^{pz^r}\sin(bz)\sin^{\nu}(cz)$

01.06.21.1380.01

$$\int e^{pz^2}\sin(bz)\sin^{\nu}(cz)\,dz = -\frac{i\,2^{-\nu-2}\,e^{\frac{b^2}{4p}}\sqrt{\pi}\,(1-\nu\bmod 2)}{\sqrt{p}}\binom{\nu}{\frac{\nu}{2}}\left(\operatorname{erfi}\left(\frac{ib+2pz}{2\sqrt{p}}\right)+\operatorname{erfi}\left(\frac{ib-2pz}{2\sqrt{p}}\right)\right)+\frac{i^{-\nu-1}\,2^{-\nu-2}\sqrt{\pi}}{\sqrt{p}}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k e^{-\frac{-b^2-2c(2k+\nu)b-c^2(\nu-2k)^2}{4p}}\binom{\nu}{k}\left(e^{-\frac{2bck}{p}}\operatorname{erfi}\left(\frac{ib-2ick+ic\nu+2pz}{2\sqrt{p}}\right)+e^{i\pi\nu-\frac{bc\nu}{p}}\operatorname{erfi}\left(\frac{ib+2ick-ic\nu+2pz}{2\sqrt{p}}\right)+e^{i\pi\nu-\frac{2bck}{p}}\operatorname{erfi}\left(\frac{ib-2ick+ic\nu-2pz}{2\sqrt{p}}\right)+e^{-\frac{bc\nu}{p}}\operatorname{erfi}\left(\frac{ib+2ick-ic\nu-2pz}{2\sqrt{p}}\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.1381.01

$$\int e^{p\sqrt{z}} \sin(b z)\sin^{\nu}(c z)\, dz = 2^{-\nu}\binom{\nu}{\frac{\nu}{2}}\left(-\frac{e^{p\sqrt{z}}\cos(b z)}{b} + \frac{e^{-\frac{i p^2}{4 b}}\, i\, p\sqrt{\pi}\,\mathrm{erf}\left(\frac{-p+2 i b\sqrt{z}}{2\sqrt{i b}}\right)}{4(i b)^{3/2}} + \frac{e^{\frac{i p^2}{4 b}}\, i\, p\sqrt{\pi}\,\mathrm{erfi}\left(\frac{p+2 i b\sqrt{z}}{2\sqrt{i b}}\right)}{4(i b)^{3/2}}\right)(1-\nu \bmod 2) + 2^{-\nu-2}\, i^{-\nu-1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(-\frac{2 i e^{p\sqrt{z}-i(b+2 c k-c \nu) z}}{b+2 c k-c \nu} - \frac{2 i(-1)^{\nu} e^{\sqrt{z}\, p+i(b+2 c k-c \nu) z}}{b+2 c k-c \nu} - \frac{2 i(-1)^{\nu} e^{p\sqrt{z}-i(b+c(\nu-2 k)) z}}{b+c(\nu-2 k)} - \frac{2 i e^{\sqrt{z}\, p+i(b+c(\nu-2 k)) z}}{b+c(\nu-2 k)} - \frac{(-1)^{\nu} e^{\frac{i p^2}{4 b+8 c k-4 c \nu}}\, p\sqrt{\pi}\,\mathrm{erfi}\left(\frac{p+2 i(b+2 c k-c \nu)\sqrt{z}}{2\sqrt{i(b+2 c k-c \nu)}}\right)}{(i(b+2 c k-c \nu))^{3/2}} - \frac{i\, e^{\frac{i p^2}{-4 b-8 c k+4 c \nu}}\, p\sqrt{\pi}\,\mathrm{erfi}\left(\frac{i p+2(b+2 c k-c \nu)\sqrt{z}}{2\sqrt{i(b+2 c k-c \nu)}}\right)}{(i(b+2 c k-c \nu))^{3/2}} - \frac{e^{\frac{i p^2}{4(b+c(\nu-2 k))}}\, p\sqrt{\pi}\,\mathrm{erfi}\left(\frac{p+2 i(b+c(\nu-2 k))\sqrt{z}}{2\sqrt{i(b+c(\nu-2 k))}}\right)}{(i(b+c(\nu-2 k)))^{3/2}} - \frac{i(-1)^{\nu} e^{-\frac{i p^2}{4(b+c(\nu-2 k))}}\, p\sqrt{\pi}\,\mathrm{erfi}\left(\frac{i p+2(b+c(\nu-2 k))\sqrt{z}}{2\sqrt{i(b+c(\nu-2 k))}}\right)}{(i(b+c(\nu-2 k)))^{3/2}}\right) /;\ \nu\in\mathbb{N}^+$$

Involving $e^{p z}\sin(b z^r)\sin^{\nu}(c z)$

01.06.21.1382.01

$$\int e^{p z}\sin(b z^2)\sin^{\nu}(c z)\, dz = -\frac{i\, 2^{-\nu-2}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}} e^{\frac{i p^2}{4 b}}\left(e^{-\frac{i p^2}{2 b}}\,\mathrm{erf}\left(\frac{p-2 i b z}{2\sqrt{i b}}\right) + \mathrm{erfi}\left(\frac{p+2 i b z}{2\sqrt{i b}}\right)\right)(1-\nu \bmod 2)}{\sqrt{i b}} + \frac{1}{\sqrt{i b}}\left(\left(i^{-\nu-1}\, 2^{-\nu-2}\sqrt{\pi}\right)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k e^{\frac{i\left(p^2+2 c i(2 k+\nu) p-c^2(2 k+\nu)^2\right)}{4 b}}\binom{\nu}{k}\left(-e^{-\frac{i\left(-\left(4 k^2+\nu^2\right) c^2+2 i p \nu c+p^2\right)}{2 b}}\,\mathrm{erf}\left(\frac{2 i c k-p-i c \nu+2 i b z}{2\sqrt{i b}}\right) - e^{-\frac{i\left(-\left(4 k^2+\nu^2\right) c^2+4 i k p c+p^2-2 b \pi \nu\right)}{2 b}}\,\mathrm{erf}\left(\frac{-p+c i(\nu-2 k)+2 i b z}{2\sqrt{i b}}\right) + e^{-\frac{i\left(-2 k c^2+i p c-b \pi\right)\nu}{b}}\,\mathrm{erfi}\left(\frac{2 i c k+p-i c \nu+2 i b z}{2\sqrt{i b}}\right) + e^{\frac{2 c k(p+i c \nu)}{b}}\,\mathrm{erfi}\left(\frac{p+c i(\nu-2 k)+2 i b z}{2\sqrt{i b}}\right)\right)\right) /;\ \nu\in\mathbb{N}^+$$

01.06.21.1383.01

$$\int e^{p z} \sin\left(b \sqrt{z}\right) \sin^{\nu}(c z)\, dz = 2^{-\nu} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(\frac{b\, e^{\frac{b^2}{4 p}} \sqrt{\pi} \left(\operatorname{erfi}\left(\frac{i b - 2 p \sqrt{z}}{2 \sqrt{p}}\right) - \operatorname{erfi}\left(\frac{i b + 2 p \sqrt{z}}{2 \sqrt{p}}\right)\right)}{4 p^{3/2}} + \frac{e^{p z} \sin\left(b \sqrt{z}\right)}{p} \right) + 2^{-\nu-1}$$

$$i^{-\nu-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{-i b \sqrt{z} + (-2 c i k + p + i c \nu) z} \left(-1 + e^{2 i b \sqrt{z}}\right)}{p + c i (\nu - 2 k)} + \frac{i b\, e^{\frac{b^2}{4(-2 c i k + p + i c \nu)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{i b + 4 i c k \sqrt{z} - 2 p \sqrt{z} - 2 i c \nu \sqrt{z}}{2 \sqrt{-2 c i k + p + i c \nu}}\right)}{2 (-2 c i k + p + i c \nu)^{3/2}} + \right.$$

$$\frac{i (-1)^{\nu} b\, e^{\frac{b^2}{4(2 i c k + p - i c \nu)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{i b - 4 i c k \sqrt{z} - 2 p \sqrt{z} + 2 i c \nu \sqrt{z}}{2 \sqrt{2 i c k + p - i c \nu}}\right)}{2 (2 i c k + p - i c \nu)^{3/2}} -$$

$$\frac{i b\, e^{\frac{b^2}{4(-2 c i k + p + i c \nu)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{i b - 4 i c k \sqrt{z} + 2 p \sqrt{z} + 2 i c \nu \sqrt{z}}{2 \sqrt{-2 c i k + p + i c \nu}}\right)}{2 (-2 c i k + p + i c \nu)^{3/2}} + \frac{(-1)^{\nu} e^{-i b \sqrt{z} + (2 i c k + p - i c \nu) z} \left(-1 + e^{2 i b \sqrt{z}}\right)}{2 i c k + p - i c \nu} -$$

$$\left. \frac{i (-1)^{\nu} b\, e^{\frac{b^2}{4(2 i c k + p - i c \nu)}} \sqrt{\pi} \operatorname{erfi}\left(\frac{i b + 4 i c k \sqrt{z} + 2 p \sqrt{z} - 2 i c \nu \sqrt{z}}{2 \sqrt{2 i c k + p - i c \nu}}\right)}{2 (2 i c k + p - i c \nu)^{3/2}} \right) /; \nu \in \mathbb{N}^+$$

Involving $e^{p z} \sin(b z) \sin^{\nu}(c z^r)$

01.06.21.1384.01

$$\int e^{p z} \sin(b z) \sin^{\nu}\left(c z^2\right) dz = -i\, 2^{-\nu-1} \left(\frac{e^{(i b + p) z}}{i b + p} + \frac{e^{(-i b + p) z}}{i b - p} \right) \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + \frac{2^{-\nu-2} i^{-\nu-1} \sqrt{\pi}}{\sqrt{i c}}$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{(-1)^k}{\sqrt{\nu - 2 k}} e^{\frac{-b^2 + 2 i p b + p^2}{4(i c \nu - 2 i c k)}} \binom{\nu}{k} \left(e^{i \pi \nu} \operatorname{erf}\left(\frac{-i b - p - 4 i c k z + 2 i c \nu z}{2 \sqrt{i c} \sqrt{\nu - 2 k}}\right) - e^{\frac{i b p}{2 i c k - i c \nu} + i \pi \nu} \operatorname{erf}\left(\frac{i b - p + 2 i c (\nu - 2 k) z}{2 \sqrt{i c} \sqrt{\nu - 2 k}}\right) + \right.$$

$$\left. e^{\frac{(i b + p)^2}{4 i c k - 2 i c \nu}} \operatorname{erfi}\left(\frac{i b + p + 2 i c (\nu - 2 k) z}{2 \sqrt{i c} \sqrt{\nu - 2 k}}\right) + e^{\frac{p^2 - b^2}{4 i c k - 2 i c \nu}} \operatorname{erfi}\left(\frac{i b - p + 4 i c k z - 2 i c \nu z}{2 \sqrt{i c} \sqrt{\nu - 2 k}}\right) \right) /; \nu \in \mathbb{N}^+$$

01.06.21.1385.01

$$\int e^{p z} \sin(b z) \sin^{\nu}\left(c \sqrt{z}\right) dz == 2^{-\nu-1} i \left(\frac{e^{(-i b+p) z}}{-i b+p} - \frac{e^{(i b+p) z}}{i b+p}\right) \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) +$$

$$2^{-\nu-2} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{-\frac{1}{2} i \pi (\nu-1)} \left(-\frac{i e^{\frac{(2 c k-c \nu)^2}{4(-i b+p)}} \sqrt{\pi}\, (2 c k - c \nu) \operatorname{erf}\left(\frac{2 \sqrt{z}\, (b+i p)+c (2 k-\nu)}{2 \sqrt{-i b+p}}\right)}{(-b - i p) \sqrt{-i b + p}} + \right.\right.$$

$$\frac{i e^{\frac{(c \nu-2 c k)^2}{4(i b+p)}+i \pi (\nu-1)} \sqrt{\pi}\, (2 c k - c \nu) \operatorname{erf}\left(\frac{2 \sqrt{z}\, (b-i p)+c (2 k-\nu)}{2 \sqrt{i b+p}}\right)}{(i p - b) \sqrt{i b + p}} + \frac{2 e^{(-i b+p) z-i (2 c k-c \nu) \sqrt{z}}}{-i b + p} +$$

$$\left.\frac{2 e^{i \pi (\nu-1)+(i b+p) z+i (2 c k-c \nu) \sqrt{z}}}{i b + p}\right) + e^{\frac{1}{2} i \pi (\nu+1)} \left(\frac{c e^{\frac{c^2 (\nu-2 k)^2}{4 (i b+p)}-i \pi (\nu+1)} \sqrt{\pi}\, (\nu - 2 k) \operatorname{erfi}\left(\frac{2 \sqrt{z}\, (i b+p)+c i (\nu-2 k)}{2 \sqrt{i b+p}}\right)}{(i p - b) \sqrt{i b + p}} - \right.$$

$$\frac{i c e^{\frac{i c^2 (\nu-2 k)^2}{4 (b+i p)}} \sqrt{\pi}\, (\nu - 2 k) \operatorname{erf}\left(\frac{2 \sqrt{z}\, (-b-i p)+c (2 k-\nu)}{2 \sqrt{-i b+p}}\right)}{(b + i p) \sqrt{-i b + p}} +$$

$$\left.\left.\frac{2 e^{(-i b+p) z-i (c \nu-2 c k) \sqrt{z}}}{-i b + p} + \frac{2 e^{-i \pi (\nu+1)+(i b+p) z+i (c \nu-2 c k) \sqrt{z}}}{i b + p}\right)\right) /; \nu \in \mathbb{N}^+$$

Involving $e^{p z} \sin\left(b z^r\right) \sin^{\nu}\left(c z^r\right)$

01.06.21.1386.01

$$\int e^{p z} \sin\left(b z^2\right) \sin^{\nu}\left(c z^2\right) dz ==$$

$$2^{-\nu-2} \sqrt{\pi} \left(\frac{i \left(e^{-\frac{i p^2}{4 b}} \binom{\nu}{\frac{\nu}{2}} \left(\operatorname{erf}\left(\frac{p-2 i b z}{2 \sqrt{i b}}\right) + e^{\frac{i p^2}{2 b}} \operatorname{erfi}\left(\frac{p+2 i b z}{2 \sqrt{i b}}\right)\right) (\nu \bmod 2 - 1)\right)}{\sqrt{i b}} + i^{-\nu-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{1}{\sqrt{i (b - 2 c k + c \nu)}}\right.\right.$$

$$\left(e^{-\frac{i p^2}{4 (b-2 c k+c \nu)}} \left(e^{\frac{i p^2}{2 (b-2 c k+c \nu)}} \operatorname{erfi}\left(\frac{p + 2 i (b - 2 c k + c \nu) z}{2 \sqrt{i (b - 2 c k + c \nu)}}\right) - i e^{i \pi \nu} \operatorname{erfi}\left(\frac{i p + 2 (b - 2 c k + c \nu) z}{2 \sqrt{i (b - 2 c k + c \nu)}}\right)\right)\right) -$$

$$\left.\left.\frac{e^{i \left(\frac{p^2}{4 b+8 c k-4 c \nu}+\pi \nu\right)} \operatorname{erf}\left(\frac{p+2 i (b+2 c k-c \nu) z}{2 \sqrt{-i (b+2 c k-c \nu)}}\right)}{\sqrt{-i (b + 2 c k - c \nu)}} - \frac{i e^{\frac{i p^2}{-4 b-8 c k+4 c \nu}} \operatorname{erfi}\left(\frac{i p+2 (b+2 c k-c \nu) z}{2 \sqrt{i (b+2 c k-c \nu)}}\right)}{\sqrt{i (b + 2 c k - c \nu)}}\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1387.01

$$\int e^{p z} \sin\left(b \sqrt{z}\right) \sin^{\nu}\left(c \sqrt{z}\right) dz = 2^{-\nu-2} i \left(\frac{b e^{\frac{b^2}{4p}} i \sqrt{\pi} \operatorname{erfi}\left(\frac{-i b + 2 p \sqrt{z}}{2\sqrt{p}}\right)}{p^{3/2}} + \frac{4 e^{-\frac{1}{2}(i \pi) + p z} \sin\left(b \sqrt{z}\right)}{p} - \frac{i b e^{\frac{b^2}{4p} - i \pi} \sqrt{\pi} \operatorname{erfi}\left(\frac{i b + 2 p \sqrt{z}}{2\sqrt{p}}\right)}{p^{3/2}} \right) \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) +$$

$$2^{-\nu-2} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{-\frac{1}{2} i \pi (\nu-1)} \left(\frac{4 e^{p z - \frac{1}{2} i \pi (1-\nu)} \cos\left(\frac{1}{2} \pi (\nu - 1) + (b + 2 c k - c \nu) \sqrt{z}\right)}{p} + \right.\right.$$

$$\frac{e^{\frac{(b+2ck-c\nu)^2}{4p}} \sqrt{\pi} (b + 2 c k - c \nu) \operatorname{erf}\left(\frac{b + c(2k-\nu) + 2 i p \sqrt{z}}{2\sqrt{p}}\right)}{p^{3/2}} +$$

$$\left. \frac{e^{\frac{(-b-2ck+c\nu)^2}{4p} + i \pi (\nu-1)} \sqrt{\pi} (b + 2 c k - c \nu) \operatorname{erf}\left(\frac{b + c(2k-\nu) - 2 i p \sqrt{z}}{2\sqrt{p}}\right)}{p^{3/2}} \right) +$$

$$e^{\frac{1}{2} i \pi (\nu+1)} \left(\frac{4 e^{p z - \frac{1}{2} i \pi (\nu+1)} \cos\left(\frac{1}{2} \pi (\nu + 1) + (-b + 2 c k - c \nu) \sqrt{z}\right)}{p} - \right.$$

$$\frac{e^{\frac{(b+c(\nu-2k))^2}{4p}} \sqrt{\pi} (b + c(\nu - 2k)) \operatorname{erf}\left(\frac{-b + c(2k-\nu) - 2 i p \sqrt{z}}{2\sqrt{p}}\right)}{p^{3/2}} -$$

$$\left.\left. \frac{i e^{\frac{(b+c(\nu-2k))^2}{4p} - i \pi (\nu+1)} \sqrt{\pi} (b + c(\nu - 2k)) \operatorname{erfi}\left(\frac{i b + i c(\nu-2k) + 2 p \sqrt{z}}{2\sqrt{p}}\right)}{p^{3/2}} \right)\right) /; \nu \in \mathbb{N}^+$$

Involving $e^{p z^r} \sin(b z) \sin^{\nu}(c z^r)$

01.06.21.1388.01

$$\int e^{p z^2} \sin(b z) \sin^{\nu}(c z^2)\, dz = -\frac{i\, 2^{-\nu-2}\, e^{\frac{b^2}{4p}} \sqrt{\pi}\, (1 - \nu \bmod 2)}{\sqrt{p}} \binom{\nu}{\frac{\nu}{2}} \left(\operatorname{erfi}\left(\frac{i b + 2 p z}{2\sqrt{p}}\right) + \operatorname{erfi}\left(\frac{i b - 2 p z}{2\sqrt{p}}\right)\right) - 2^{-\nu-2}\, i^{-\nu-1} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k\, e^{-\frac{b^2}{8 i c k - 4 p - 4 i c \nu}} \binom{\nu}{k} \left(e^{i \pi \nu - \frac{1}{4} b^2 \left(\frac{1}{-2 c i k + p + i c \nu} + \frac{1}{-2 c i k - p + i c \nu}\right)} \sqrt{i c (\nu - 2k) - p}\, \sqrt{p + c i (\nu - 2k)} \left(\operatorname{erf}\left(\frac{i b + 2 (2 i c k + p - i c \nu) z}{2\sqrt{i c (\nu - 2k) - p}}\right) + \operatorname{erf}\left(\frac{i b - 2 (2 i c k + p - i c \nu) z}{2\sqrt{i c (\nu - 2k) - p}}\right)\right) + (2 i c k + p - i c \nu) \left(\operatorname{erfi}\left(\frac{i b + 2 (-2 c i k + p + i c \nu) z}{2\sqrt{-2 c i k + p + i c \nu}}\right) + \operatorname{erfi}\left(\frac{i b + 4 i c k z - 2 p z - 2 i c \nu z}{2\sqrt{-2 c i k + p + i c \nu}}\right)\right)\right) \Big/ \left((-2 c i k - p + i c \nu) \sqrt{p + c i (\nu - 2k)}\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1389.01

$$\int e^{p\sqrt{z}} \sin(b\,z) \sin^{\nu}\left(c\sqrt{z}\right) dz = 2^{-\nu-2} \left(\frac{4\, e^{p\sqrt{z}}\, i \cos(b\,z)}{b} - \frac{e^{-\frac{i p^2}{4b}}\, p \sqrt{\pi}\, \operatorname{erfi}\left(\frac{p - 2 i b\sqrt{z}}{2\sqrt{-i b}}\right)}{(-i b)^{3/2}} - \frac{e^{\frac{i p^2}{4b} - i\pi}\, p\sqrt{\pi}\, \operatorname{erfi}\left(\frac{p + 2 i b \sqrt{z}}{2\sqrt{i b}}\right)}{(i b)^{3/2}} \right) i \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) +$$

$$\frac{2^{-\nu-2}}{b} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \Bigg(e^{-\frac{1}{2} i \pi (\nu-1)} \Bigg(2\, i\, e^{(p - i(2ck - c\nu))\sqrt{z} - i b z} - 2\, i\, e^{i\pi(\nu-1) + i b z + (p + i(2ck - c\nu))\sqrt{z}} -$$

$$\frac{e^{\frac{i(2ck + ip - c\nu)^2}{4b}} \sqrt{\pi}\, (2ck + ip - c\nu) \operatorname{erfi}\left(\frac{p - i\left(2\sqrt{z}\, b + c(2k-\nu)\right)}{2\sqrt{-i b}}\right)}{\sqrt{-i b}} - \frac{1}{\sqrt{i b}} \Bigg(e^{i\pi(\nu-1) - \frac{i(-2ck + ip + c\nu)^2}{4b}} \sqrt{\pi}$$

$$(2ck - ip - c\nu) \operatorname{erfi}\left(\frac{p + i\left(2\sqrt{z}\, b + c(2k - \nu)\right)}{2\sqrt{i b}}\right) \Bigg) \Bigg) + e^{\frac{1}{2} i\pi(\nu+1)} \Bigg(2\, i\, e^{(p - i(c\nu - 2ck))\sqrt{z} - i b z} -$$

$$2\, i\, e^{-i\pi(\nu+1) + i b z + (p + i(c\nu - 2ck))\sqrt{z}} - \frac{e^{\frac{i(ip + c(\nu - 2k))^2}{4b}} \sqrt{\pi}\, (ip + c(\nu - 2k)) \operatorname{erfi}\left(\frac{p + i\left(c(2k - \nu) - 2b\sqrt{z}\right)}{2\sqrt{-i b}}\right)}{\sqrt{-i b}} -$$

$$\frac{1}{\sqrt{i b}} \left(e^{\frac{i(p + c i(\nu - 2k))^2}{4b} - i\pi(\nu+1)} \sqrt{\pi}\, (c(\nu - 2k) - ip) \operatorname{erfi}\left(\frac{p + i c(\nu - 2k) + 2 i b\sqrt{z}}{2\sqrt{i b}}\right) \right) \Bigg) \Bigg) \;/;\; \nu \in \mathbb{N}^+$$

Involving $z^n e^{p z^r} \sin\left(b z^r\right) \sin^{\nu}(c\, z)$

01.06.21.1390.01

$$\int z^n e^{p z^2} \sin(b z^2) \sin^\nu(c z)\, dz = i\, 2^{-\nu-2} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \left(\left((-i b - p) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (-i b - p) z^2\right) - \left((i b - p) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (i b - p) z^2\right)\right) (1 - \nu \bmod 2) + \frac{2^{-\nu-2} i^{-\nu-1}}{\sqrt{-i b + p}\, \sqrt{i b + p}} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{\frac{c^2 p (\nu - 2 s)^2}{2(-i b + p)(i b + p)}} \binom{\nu}{s} \left((-1)^\nu e^{-\frac{c^2 (\nu-2 s)^2}{4(i b + p)}} \sqrt{i b + p} \sum_{q=0}^n 2^{q-n} (-i b + p)^{-n-\frac{1}{2}} (i c (\nu - 2 s))^{n-q} (c i (2 s - \nu) + 2(-i b + p) z)^{q+1} \left(-\frac{(c i (2 s - \nu) + 2(-i b + p) z)^2}{-i b + p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(c i (2 s - \nu) + 2(-i b + p) z)^2}{4(-i b + p)}\right) + e^{-\frac{c^2 (\nu-2 s)^2}{4(i b + p)}} \sqrt{i b + p} \sum_{q=0}^n (-i b + p)^{-n-\frac{1}{2}} \left(i c \left(s - \frac{\nu}{2}\right)\right)^{n-q} (c i (\nu - 2 s) + 2(-i b + p) z)^{q+1} \left(-\frac{(c i (\nu - 2 s) + 2(-i b + p) z)^2}{-i b + p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(c i (\nu - 2 s) + 2(-i b + p) z)^2}{4(-i b + p)}\right) - e^{-\frac{c^2 (\nu-2 s)^2}{4(-i b + p)}} \sqrt{-i b + p} \left((-1)^\nu \sum_{q=0}^n 2^{q-n} (i b + p)^{-n-\frac{1}{2}} (i c (\nu - 2 s))^{n-q} (c i (2 s - \nu) + 2(i b + p) z)^{q+1} \left(-\frac{(c i (2 s - \nu) + 2(i b + p) z)^2}{i b + p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(c i (2 s - \nu) + 2(i b + p) z)^2}{4(i b + p)}\right) + \sum_{q=0}^n (i b + p)^{-n-\frac{1}{2}} \left(i c \left(s - \frac{\nu}{2}\right)\right)^{n-q} (c i (\nu - 2 s) + 2(i b + p) z)^{q+1} \left(-\frac{(c i (\nu - 2 s) + 2(i b + p) z)^2}{i b + p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(c i (\nu - 2 s) + 2(i b + p) z)^2}{4(i b + p)}\right) \right) \right) /; \nu \in \mathbb{N}^+ \land n \in \mathbb{N}$$

01.06.21.1391.01

$$\int z^n e^{p \sqrt{z}} \sin(b \sqrt{z}) \sin^\nu(c z)\, dz = 2^{-\nu} i z^{n+1} \binom{\nu}{\frac{\nu}{2}} \left(\left((-i b - p)\sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (-i b - p)\sqrt{z}\right) - \left((i b - p)\sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (i b - p)\sqrt{z}\right)\right) (1 - \nu \bmod 2) - i^{1-\nu} 2^{-2n-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu-1} e^{-\frac{i(-i b + p)^2}{4 c (\nu - 2 s)}} (-i c (\nu - 2 s))^{-2n-2} \sum_{j=0}^n \sum_{h=0}^j (-1)^{j-h} 4^j (-i b + p)^{-h-j+2n} \right.$$

$$\left(-i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^{h+j}\left(-\frac{i\left(-i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{c\,(v-2\, s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((-i\, b+p)$$

$$\left(-i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(-i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, c\,(v-2\, s)}\right)-2\, i\, c\,(v-2\, s)$$

$$\sqrt{-\frac{i\left(-i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{c\,(v-2\, s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(-i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, c\,(v-2\, s)}\right)\Bigg)+$$

$$(-1)^v\, e^{-\frac{i\,(i\, b+p)^2}{4\, c\,(v-2\, s)}}\,(-i\, c\,(v-2\, s))^{-2\, n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(i\, b+p)^{-h-j+2\, n}\left(i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{c\,(v-2\, s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((i\, b+p)\left(i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, c\,(v-2\, s)}\right)-2\, i\, c\,(v-2\, s)$$

$$\sqrt{-\frac{i\left(i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{c\,(v-2\, s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,-\frac{i\left(i\, b+p-2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, c\,(v-2\, s)}\right)\Bigg)-$$

$$e^{\frac{i\,(-i\, b+p)^2}{4\, c\,(v-2\, s)}}\,(i\, c\,(v-2\, s))^{-2\, n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(-i\, b+p)^{-h-j+2\, n}\left(-i\, b+p+2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(-i\, b+p+2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{c\,(v-2\, s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((-i\, b+p)\left(-i\, b+p+2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,\frac{i\left(-i\, b+p+2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, c\,(v-2\, s)}\right)+2\, c\, i$$

$$(v-2\, s)\sqrt{\frac{i\left(-i\, b+p+2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{c\,(v-2\, s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(-i\, b+p+2\, i\, c\,(v-2\, s)\,\sqrt{z}\right)^2}{4\, c\,(v-2\, s)}\right)\Bigg)+$$

$$e^{\frac{i(i b+p)^2}{4 c (v-2 s)}} (i c (v-2 s))^{-2 n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (i b+p)^{-h-j+2 n} \left(i b+p+2 i c (v-2 s) \sqrt{z}\right)^{h+j} \left(\frac{i \left(i b+p+2 i c (v-2 s) \sqrt{z}\right)^2}{c (v-2 s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left((i b+p) \left(i b+p+2 i c (v-2 s) \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i \left(i b+p+2 i c (v-2 s) \sqrt{z}\right)^2}{4 c (v-2 s)}\right) + 2 c i (v-2 s) \sqrt{\frac{i \left(i b+p+2 i c (v-2 s) \sqrt{z}\right)^2}{c (v-2 s)}} \Gamma\left(\frac{1}{2}(h+j+2), \frac{i \left(i b+p+2 i c (v-2 s) \sqrt{z}\right)^2}{4 c (v-2 s)}\right)\right)\right) /; n \in \mathbb{N} \land v \in \mathbb{N}^+$$

Involving $e^{p z^r} \sin(b z^r) \sin^v(c z^r)$

01.06.21.1392.01

$$\int e^{p z^r} \sin(b z^r) \sin^v(c z^r) \, dz = \frac{2^{-v-1} z}{r} \left(i \binom{v}{\frac{v}{2}} \left(((-i b-p) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-i b-p) z^r\right) - (i (b+i p) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i (b+i p) z^r\right)\right) (1-v \bmod 2) + i^{-v-1} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left((-1)^v \Gamma\left(\frac{1}{r}, i (b+i p-2 c s+c v) z^r\right) (i (b+i p-2 c s+c v) z^r)^{-1/r} - (-i (b-i p-2 c s+c v) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -i (b-i p-2 c s+c v) z^r\right) + (i (b+i p+2 c s-c v) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, i (b+i p+2 c s-c v) z^r\right) - (-1)^v (-i (b-i p+2 c s-c v) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, -i (b-i p+2 c s-c v) z^r\right)\right)\right) /; v \in \mathbb{N}^+$$

01.06.21.1393.01

$$\int e^{p z^2} \sin(b z^2) \sin^\nu(c z^2)\, dz = 2^{-\nu-2} \sqrt{\pi} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\left(e^{\frac{1}{2} i \pi (\nu-1)} \sqrt{i b + p + i c (2k-\nu)}\, (-i b + p - i c (2k-\nu)) \operatorname{erfi}\left(\sqrt{i b + p + i c (2k-\nu)}\, z\right) + e^{-\frac{1}{2} i \pi (\nu-1)} (i b + p + i c (2k-\nu)) \sqrt{-i b + p - i c (2k-\nu)} \operatorname{erfi}\left(\sqrt{-i b + p - i c (2k-\nu)}\, z\right) \right) \Big/ ((-i b + p - i c (2k-\nu))(i b + p + i c (2k-\nu))) + \left(e^{-\frac{1}{2} i \pi (\nu+1)} \sqrt{i b + p + i c (\nu-2k)}\, (-i b + p - i c (\nu-2k)) \operatorname{erfi}\left(\sqrt{i b + p + i c (\nu-2k)}\, z\right) + e^{\frac{1}{2} i \pi (\nu+1)} (i b + p + i c (\nu-2k)) \sqrt{-i b + p - i c (\nu-2k)} \operatorname{erfi}\left(\sqrt{-i b + p - i c (\nu-2k)}\, z\right) \right) \Big/ ((-i b + p - i c (\nu-2k))(i b + p + i c (\nu-2k))) \right) - \frac{i\, 2^{-\nu-2} \sqrt{\pi}}{(-i b + p)(i b + p)} \binom{\nu}{\frac{\nu}{2}} \left((-i b + p) \sqrt{i b + p} \operatorname{erfi}\left(\sqrt{i b + p}\, z\right) - \sqrt{-i b + p}\, (i b + p) \operatorname{erfi}\left(\sqrt{-i b + p}\, z\right) \right) (1 - \nu \bmod 2) \;/;\; \nu \in \mathbb{N}^+$$

01.06.21.1394.01

$$\int e^{p \sqrt{z}} \sin(b \sqrt{z}) \sin^\nu(c \sqrt{z})\, dz = 2^{-\nu} e^{\frac{i \pi}{2} + (-i b + p)\sqrt{z}} \left(\frac{e^{2\left(-\frac{1}{2}(i \pi) + i b \sqrt{z}\right)} \left(-1 + i b \sqrt{z} + p \sqrt{z}\right)}{(i b + p)^2} + \frac{\sqrt{z}}{-i b + p} - \frac{1}{(i b - p)^2} \right) \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + 2^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{(-i b + p - i c (2k-\nu))\sqrt{z} - \frac{1}{2} i \pi (\nu-1)} \left(\frac{e^{2\left(\sqrt{z}\,(i b + i c (2k-\nu)) + \frac{1}{2} i \pi (\nu-1)\right)} \left(\sqrt{z}\, p + (i b + i c (2k-\nu))\sqrt{z} - 1\right)}{(i b + p + i c (2k-\nu))^2} + \frac{\sqrt{z}}{-i b + p - i c (2k-\nu)} - \frac{1}{(i b - p + i c (2k-\nu))^2} \right) + e^{\frac{1}{2} i \pi (\nu+1) + (-i b + p - i c (\nu-2k))\sqrt{z}} \left(\frac{e^{2\left((i b + i c (\nu-2k))\sqrt{z} - \frac{1}{2} i \pi (\nu+1)\right)} \left(\sqrt{z}\, p + (i b + i c (\nu-2k))\sqrt{z} - 1\right)}{(i b + p + i c (\nu-2k))^2} + \frac{\sqrt{z}}{-i b + p - i c (\nu-2k)} - \frac{1}{(i b - p + i c (\nu-2k))^2} \right) \right) \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + e} \sin(a z^r + q) \sin^\nu(c z^r + g)$

01.06.21.1395.01

$$\int e^{b z^r+e} \sin(a z^r + q) \sin^\nu(c z^r + g)\, dz = \frac{i\, 2^{-\nu-1} z}{r} \binom{\nu}{\frac{\nu}{2}} \left(e^{e+i q} ((-b - i a) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b - i a) z^r\right) - e^{e-i q} ((i a - b) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (i a - b) z^r\right)\right) (1 - \nu \bmod 2) + \frac{i^{-\nu-1} 2^{-\nu-1} z}{r} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu+1} e^{e+i q+2 i g s-i g \nu} \Gamma\left(\frac{1}{r}, (-b - i a - 2 i c s + i c \nu) z^r\right) ((-b - i a - 2 i c s + i c \nu) z^r)^{-1/r} + (-1)^\nu e^{e-i q+2 i g s-i g \nu} ((-b + i a - 2 i c s + i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b + i a - 2 i c s + i c \nu) z^r\right) - e^{e+i q-2 i g s+i g \nu} ((-b - i a + 2 i c s - i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b - i a + 2 i c s - i c \nu) z^r\right) + e^{e-i q-2 i g s+i g \nu} ((-b + i a + 2 i c s - i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b + i a + 2 i c s - i c \nu) z^r\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1396.01

$$\int e^{b z^2+e} \sin\left(a z^2 + q\right) \sin^\nu\left(c z^2 + g\right) dz = 2^{-\nu-2} \left(\frac{e^{2\left(\frac{i\pi}{2} - i q\right)} \operatorname{erfi}\left(\sqrt{b - i a}\, z\right)}{\sqrt{b - i a}} + \frac{\operatorname{erfi}\left(\sqrt{b + i a}\, z\right)}{\sqrt{b + i a}}\right) e^{e+i q-\frac{i\pi}{2}} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) + 2^{-\nu-2} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{e-i q-\frac{1}{2} i \pi (\nu-1)+g i (\nu-2 s)} \left(\frac{\operatorname{erfi}\left(\sqrt{b - i a + c i (\nu - 2 s)}\, z\right)}{\sqrt{b - i a + c i (\nu - 2 s)}} + \frac{e^{2\left(i q+\frac{1}{2} i \pi (\nu-1)-i g (\nu-2 s)\right)} \operatorname{erfi}\left(\sqrt{b + i a - i c (\nu - 2 s)}\, z\right)}{\sqrt{b + i a - i c (\nu - 2 s)}}\right) + e^{e+i q-\frac{1}{2} i \pi (\nu+1)+g i (\nu-2 s)} \left(\frac{\operatorname{erfi}\left(\sqrt{b + i a + c i (\nu - 2 s)}\, z\right)}{\sqrt{b + i a + c i (\nu - 2 s)}} + \frac{e^{2\left(-i q+\frac{1}{2} i \pi (\nu+1)-i g (\nu-2 s)\right)} \operatorname{erfi}\left(\sqrt{b - i a - i c (\nu - 2 s)}\, z\right)}{\sqrt{b - i a - i c (\nu - 2 s)}}\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1397.01

$$\int e^{\sqrt{z}\, b+e} \sin\left(\sqrt{z}\, a+q\right) \sin^{v}\left(\sqrt{z}\, c+g\right) dz = 2^{-v} \left(\frac{e^{\sqrt{z}\,(b+i a)+e+i q-\frac{i\pi}{2}} \left(\sqrt{z}\, b+i a \sqrt{z}-1\right)}{(-b-i a)^2} + \frac{e^{\sqrt{z}\,(b-i a)+e-i q+\frac{i\pi}{2}} \left(\sqrt{z}\, b-i a \sqrt{z}-1\right)}{(b-i a)^2} \right) \binom{v}{\frac{v}{2}} (1-v \bmod 2) + 2^{-v} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \left(\left(e^{e-i q+\frac{1}{2} i \pi (v+1)-i g (v-2 s)+(b-i a-i c (v-2 s)) \sqrt{z}} \left(\sqrt{z}\, b+(-i a-i c (v-2 s)) \sqrt{z}-1\right)\right) \Big/ (b-i a-i c (v-2 s))^2 + \left(e^{e+i q+\frac{1}{2} i \pi (v-1)-i g (v-2 s)+(b+i a-i c (v-2 s)) \sqrt{z}} \left(\sqrt{z}\, b+(i a-i c (v-2 s)) \sqrt{z}-1\right)\right) \Big/ (b+i a-i c (v-2 s))^2 + \left(e^{e+i q-\frac{1}{2} i \pi (v+1)+g i (v-2 s)+(b+i a+c i (v-2 s)) \sqrt{z}} \left(\sqrt{z}\, b-(-i a-i c (v-2 s)) \sqrt{z}-1\right)\right) \Big/ (-b-i a-i c (v-2 s))^2 + \left(e^{e-i q-\frac{1}{2} i \pi (v-1)+g i (v-2 s)+(b-i a+c i (v-2 s)) \sqrt{z}} \left(\sqrt{z}\, b-(i a-i c (v-2 s)) \sqrt{z}-1\right)\right) \Big/ (-b+i a-i c (v-2 s))^2 \right) \binom{v}{s} \;/;\; v \in \mathbb{N}^+$$

Involving $e^{b z^r+d z+e} \sin\left(a z^r+p z+q\right) \sin^{v}\left(c z^r+f z+g\right)$

01.06.21.1398.01

$$\int e^{b z^2+d z+e} \sin\left(a z^2+p z+q\right) \sin^{v}\left(c z^2+f z+g\right) dz = \frac{2^{-v-2} \sqrt{\pi}}{a^2+b^2} \binom{v}{\frac{v}{2}} (1-v \bmod 2) \left(\sqrt{b-i a}\, (b+i a)\, e^{\frac{-(d-i p)^2-2 (-a-i b) (-2 i e+\pi-2 q)}{4 (b-i a)}} \operatorname{erfi}\left(\frac{d-i p+2 (b-i a) z}{2 \sqrt{b-i a}}\right) + (b-i a) \sqrt{b+i a}\, e^{\frac{-(d+i p)^2-2 (i b-a) (2 i e+\pi-2 q)}{4 (b+i a)}} \operatorname{erfi}\left(\frac{d+i p+2 b z+2 i a z}{2 \sqrt{b+i a}}\right)\right) + 2^{-v-2} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(\left(e^{\frac{-(d+i (-p+2 f s-f v))^2-2 (-2 i e+\pi-2 q+4 g s-2 g v+\pi v) (-a-i b+2 c s-c v)}{4 (b+i (-a+2 c s-c v))}} \operatorname{erfi}\left(\frac{d-i p+f i (2 s-v)+2 (b-i a+c i (2 s-v)) z}{2 \sqrt{b-i a+c i (2 s-v)}}\right)\right) \Big/ \left(\sqrt{b-i a+c i (2 s-v)}\right) + \frac{1}{\sqrt{b+i a+c i (2 s-v)}} \left(e^{\frac{-(d+i (p+2 f s-f v))^2-2 (-a+i b-2 c s+c v) (2 i e+\pi-2 q-4 g s+2 g v-\pi v)}{4 (b-i (-a-2 c s+c v))}} \operatorname{erfi}\left(\frac{d+i p+f i (2 s-v)+2 (b+i a+c i (2 s-v)) z}{2 \sqrt{b+i a+c i (2 s-v)}}\right)\right) + \left(e^{\frac{-(d+i (-p-2 f s+f v))^2-2 (-a-i b-2 c s+c v) (-2 i e+\pi-2 q-4 g s+2 g v-\pi v)}{4 (b+i (-a-2 c s+c v))}} \operatorname{erfi}\left(\frac{d-i p+f i (v-2 s)+2 (b-i a+c i (v-2 s)) z}{2 \sqrt{b-i a+c i (v-2 s)}}\right)\right) \Big/ \left(\sqrt{b-i a+c i (v-2 s)}\right) + \frac{1}{\sqrt{b+i a+c i (v-2 s)}} \left(e^{\frac{-(d+i p+f i (v-2 s))^2-2 (2 i e+\pi-2 q+4 g s-2 g v+\pi v) (-a+i b+2 c s-c v)}{4 (b+i a+c i (v-2 s))}} \operatorname{erfi}\left(\frac{d+i p+f i (v-2 s)+2 (b+i a+c i (v-2 s)) z}{2 \sqrt{b+i a+c i (v-2 s)}}\right)\right)\right) \;/;\; v \in \mathbb{N}^+$$

01.06.21.1399.01

$$\int e^{\sqrt{z}\, b+d z+e} \sin\left(\sqrt{z}\, a+p z+q\right) \sin^{\nu}\left(\sqrt{z}\, c+f z+g\right) dz =$$

$$2^{-\nu-2}\, e^{e-i q+\frac{i\pi}{2}} \binom{\nu}{\frac{\nu}{2}} \left(-\frac{(b+i a)\, e^{-\frac{(b+i a)^2}{4(d+i p)}+2 i q-i\pi} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+i a+2(d+i p)\sqrt{z}}{2\sqrt{d+i p}}\right)}{(d+i p)^{3/2}}+\right.$$

$$\left.\frac{(i a-b)\, e^{-\frac{(b-i a)^2}{4(d-i p)}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b-i a+2(d-i p)\sqrt{z}}{2\sqrt{d-i p}}\right)}{(d-i p)^{3/2}}+\frac{2\, e^{\sqrt{z}\,(b+i a)+2 i q+(d+i p) z-i\pi}}{d+i p}+\frac{2\, e^{\sqrt{z}\,(b-i a)+(d-i p) z}}{d-i p}\right)(1-\nu \bmod 2)+$$

$$2^{-\nu-2} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{e-i q+\frac{1}{2} i\pi(\nu+1)-i g(\nu-2k)} \left(\left(\left(e^{-\frac{(b+i(a+c(\nu-2k)))^2}{4(d+i p+f i(\nu-2k))}+2 i q-i\pi(\nu+1)+2 g i(\nu-2k)} \sqrt{\pi}\, (a-i b+c(\nu-2k))\right.\right.\right.\right.$$

$$\left.\left.\operatorname{erfi}\left(\frac{b+i a+c i(\nu-2k)+2(d+i p+f i(\nu-2k))\sqrt{z}}{2\sqrt{d+i p+f i(\nu-2k)}}\right)\right)\Big/\left((i d+2 f k-p-f\nu)\right.\right.$$

$$\left.\left.\sqrt{d+i p+f i(\nu-2k)}\right)+\frac{2\, e^{2 i q-i\pi(\nu+1)+2 g i(\nu-2k)+(d+i p+f i(\nu-2k)) z+(b+i(a-2 c k+c\nu))\sqrt{z}}}{d+i p+f i(\nu-2k)}-\right.$$

$$\left(e^{\frac{i(a+i b+c(\nu-2k))^2}{4(i d+p+f(\nu-2k))}} \sqrt{\pi}\, (a+i b+c(\nu-2k)) \operatorname{erfi}\left(\frac{b+i\left(-a+c(2k-\nu)+2(-i d+2 f k-p-f\nu)\sqrt{z}\right)}{2\sqrt{d+i(2 f k-p-f\nu)}}\right)\right)\Big/$$

$$\left.\left((i d+p+f(\nu-2k))\sqrt{d+i(2 f k-p-f\nu)}\right)+\frac{2\, e^{\sqrt{z}\,(b-i(a-2 c k+c\nu))+(d+i(2 f k-p-f\nu)) z}}{d+i(2 f k-p-f\nu)}\right)+$$

$$e^{e-i q-i g(2k-\nu)-\frac{1}{2} i\pi(\nu-1)} \left(\left(\left(e^{\frac{(-a+i b-2 c k+c\nu)^2}{4(d+i(2 f k+p-f\nu))}+2 i q+2 g i(2k-\nu)+i\pi(\nu-1)} \sqrt{\pi}\, (a-i b+2 c k-c\nu)\right.\right.\right.$$

$$\left.\left.\operatorname{erfi}\left(\frac{b+i\left(a+c(2k-\nu)+2(-i d+2 f k+p-f\nu)\sqrt{z}\right)}{2\sqrt{d+i(2 f k+p-f\nu)}}\right)\right)\Big/\right.$$

$$\left.\left((i d-2 f k-p+f\nu)\sqrt{d+i(2 f k+p-f\nu)}\right)+\left(e^{\frac{(a+i b+2 c k-c\nu)^2}{4(d-i(2 f k+p-f\nu))}} \sqrt{\pi}\, (a+i b+2 c k-c\nu)\right.\right.$$

$$\left.\left.\operatorname{erfi}\left(\frac{b-i\left(a+c(2k-\nu)+2(i d+2 f k+p-f\nu)\sqrt{z}\right)}{2\sqrt{d-i(2 f k+p-f\nu)}}\right)\right)\Big/\left((-i d-2 f k-p+f\nu)\right.$$

$$\left.\sqrt{d-i(2 f k+p-f\nu)}\right)+\frac{2\, e^{2 i q+2 g i(2k-\nu)+i\pi(\nu-1)+(d+i(2 f k+p-f\nu)) z+(b+i(a+2 c k-c\nu))\sqrt{z}}}{d+i(2 f k+p-f\nu)}+$$

$$\left.\left.2\, e^{\sqrt{z}\,(b-i(a+2 c k-c\nu))+(d-i(2 f k+p-f\nu)) z}\right)\right) /;\ \nu \in \mathbb{N}^{+}$$

Involving product of power of the direct function, the direct function and rational functions of exp

Involving $\sin(e\, z)\sin^{\nu}(c\, z)\left(a+b\, e^{d\, z}\right)^{-n}$

01.06.21.1400.01

$$\int \frac{\sin(e\, z)\sin^{\nu}(c\, z)}{\left(a+b\, e^{d\, z}\right)^{n}}\, dz = 2^{-\nu-1} a^{-n} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s} \binom{\nu}{s} \left(\frac{1}{-i\, e-2\, i\, c\, s+i\, c\, \nu}\, i \cos\left(\frac{\pi \nu}{2}\right) \left(e^{(-i\, e-2\, i\, c\, s+i\, c\, \nu)\, z}\, {}_2F_1\left(\frac{-i\, e-2\, i\, c\, s+i\, c\, \nu}{d}, n; \frac{d-i\, e-2\, i\, c\, s+i\, c\, \nu}{d}; -\frac{b\, e^{d\, z}}{a}\right) + e^{(i\, e+2\, i\, c\, s-i\, c\, \nu)\, z}\, {}_2F_1\left(\frac{i\, e+2\, i\, c\, s-i\, c\, \nu}{d}, n; \frac{d+i\, e+2\, i\, c\, s-i\, c\, \nu}{d}; -\frac{b\, e^{d\, z}}{a}\right)\right) + \frac{1}{-i\, e+2\, i\, c\, s-i\, c\, \nu}\, i \cos\left(\frac{\pi \nu}{2}\right) \left(e^{(i\, e-2\, i\, c\, s+i\, c\, \nu)\, z}\, {}_2F_1\left(\frac{i\, e-2\, i\, c\, s+i\, c\, \nu}{d}, n; \frac{d+i\, e-2\, i\, c\, s+i\, c\, \nu}{d}; -\frac{b\, e^{d\, z}}{a}\right) + e^{(-i\, e+2\, i\, c\, s-i\, c\, \nu)\, z}\, {}_2F_1\left(\frac{-i\, e+2\, i\, c\, s-i\, c\, \nu}{d}, n; \frac{d-i\, e+2\, i\, c\, s-i\, c\, \nu}{d}; -\frac{b\, e^{d\, z}}{a}\right)\right) - \frac{1}{-i\, e+2\, i\, c\, s-i\, c\, \nu} \sin\left(\frac{\pi \nu}{2}\right) \left(e^{(-i\, e+2\, i\, c\, s-i\, c\, \nu)\, z}\, {}_2F_1\left(\frac{-i\, e+2\, i\, c\, s-i\, c\, \nu}{d}, n; \frac{d-i\, e+2\, i\, c\, s-i\, c\, \nu}{d}; -\frac{b\, e^{d\, z}}{a}\right) - e^{(i\, e-2\, i\, c\, s+i\, c\, \nu)\, z}\, {}_2F_1\left(\frac{i\, e-2\, i\, c\, s+i\, c\, \nu}{d}, n; \frac{d+i\, e-2\, i\, c\, s+i\, c\, \nu}{d}; -\frac{b\, e^{d\, z}}{a}\right)\right) + \frac{1}{-i\, e-2\, i\, c\, s+i\, c\, \nu} \sin\left(\frac{\pi \nu}{2}\right) \left(e^{(-i\, e-2\, i\, c\, s+i\, c\, \nu)\, z}\, {}_2F_1\left(\frac{-i\, e-2\, i\, c\, s+i\, c\, \nu}{d}, n; \frac{d-i\, e-2\, i\, c\, s+i\, c\, \nu}{d}; -\frac{b\, e^{d\, z}}{a}\right) - e^{(i\, e+2\, i\, c\, s-i\, c\, \nu)\, z}\, {}_2F_1\left(\frac{i\, e+2\, i\, c\, s-i\, c\, \nu}{d}, n; \frac{d+i\, e+2\, i\, c\, s-i\, c\, \nu}{d}; -\frac{b\, e^{d\, z}}{a}\right)\right)\right) - \frac{2^{-\nu-1} a^{-n}}{e} \binom{\nu}{\frac{\nu}{2}} \left(e^{+i\, e\, z}\, {}_2F_1\left(\frac{i\, e}{d}, n; \frac{d+i\, e}{d}; -\frac{b\, e^{d\, z}}{a}\right) + e^{-i\, e\, z}\, {}_2F_1\left(-\frac{i\, e}{d}, n; \frac{d-i\, e}{d}; -\frac{b\, e^{d\, z}}{a}\right)\right) (1-\nu \bmod 2) \;/;\; n \in \mathbb{N}^{+} \wedge \nu \in \mathbb{N}^{+}$$

Involving $e^{p\, z}\sin(e\, z)\sin^{\nu}(c\, z)\left(a+b\, e^{d\, z}\right)^{-n}$

01.06.21.1401.01

$$\int \frac{e^{p z} \sin(e z) \sin^{\nu}(c z)}{\left(a + b e^{d z}\right)^{n}} \, dz = 2^{-\nu-1} a^{-n} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s} \binom{\nu}{s} \left(i \cos\left(\frac{\pi \nu}{2}\right) \left(e^{(-i e+p-2 i c s+i c \nu) z} (-i e - p - 2 i c s + i c \nu) \, {}_2F_1\left(\frac{-i e + p - 2 i c s + i c \nu}{d}, n; \frac{d - i e + p - 2 i c s + i c \nu}{d}; -\frac{b e^{d z}}{a}\right) + e^{(i e+p+2 i c s-i c \nu) z} (-i e + p - 2 i c s + i c \nu) \, {}_2F_1\left(\frac{i e + p + 2 i c s - i c \nu}{d}, n; \frac{d + i e + p + 2 i c s - i c \nu}{d}; -\frac{b e^{d z}}{a}\right) \right) \Big/ ((-i e - p - 2 i c s + i c \nu)(-i e + p - 2 i c s + i c \nu)) + i \cos\left(\frac{\pi \nu}{2}\right) \left(e^{(i e+p-2 i c s+i c \nu) z} (-i e + p + 2 i c s - i c \nu) \, {}_2F_1\left(\frac{i e + p - 2 i c s + i c \nu}{d}, n; \frac{d + i e + p - 2 i c s + i c \nu}{d}; -\frac{b e^{d z}}{a}\right) + e^{(-i e+p+2 i c s-i c \nu) z} (-i e - p + 2 i c s - i c \nu) \, {}_2F_1\left(\frac{-i e + p + 2 i c s - i c \nu}{d}, n; \frac{d - i e + p + 2 i c s - i c \nu}{d}; -\frac{b e^{d z}}{a}\right) \right) \Big/ ((-i e - p + 2 i c s - i c \nu)(-i e + p + 2 i c s - i c \nu)) - \sin\left(\frac{\pi \nu}{2}\right) \left(e^{(-i e+p+2 i c s-i c \nu) z} (-i e - p + 2 i c s - i c \nu) \, {}_2F_1\left(\frac{-i e + p + 2 i c s - i c \nu}{d}, n; \frac{d - i e + p + 2 i c s - i c \nu}{d}; -\frac{b e^{d z}}{a}\right) - e^{(i e+p-2 i c s+i c \nu) z} (-i e + p + 2 i c s - i c \nu) \, {}_2F_1\left(\frac{i e + p - 2 i c s + i c \nu}{d}, n; \frac{d + i e + p - 2 i c s + i c \nu}{d}; -\frac{b e^{d z}}{a}\right) \right) \Big/ ((-i e - p + 2 i c s - i c \nu)(-i e + p + 2 i c s - i c \nu)) + \sin\left(\frac{\pi \nu}{2}\right) \left(e^{(-i e+p-2 i c s+i c \nu) z} (-i e - p - 2 i c s + i c \nu) \, {}_2F_1\left(\frac{-i e + p - 2 i c s + i c \nu}{d}, n; \frac{d - i e + p - 2 i c s + i c \nu}{d}; -\frac{b e^{d z}}{a}\right) - e^{(i e+p+2 i c s-i c \nu) z} (-i e + p - 2 i c s + i c \nu) \, {}_2F_1\left(\frac{i e + p + 2 i c s - i c \nu}{d}, n; \frac{d + i e + p + 2 i c s - i c \nu}{d}; -\frac{b e^{d z}}{a}\right) \right) \Big/ ((-i e - p - 2 i c s + i c \nu)(-i e + p - 2 i c s + i c \nu)) \right) - \frac{i \, 2^{-\nu-1} a^{-n}}{(i e - p)(i e + p)} \binom{\nu}{\frac{\nu}{2}} \left(e^{(-i e+p) z} (i e + p) \, {}_2F_1\left(\frac{-i e + p}{d}, n; \frac{d - i e + p}{d}; -\frac{b e^{d z}}{a}\right) + e^{(i e+p) z} (i e - p) \, {}_2F_1\left(\frac{i e + p}{d}, n; \frac{d + i e + p}{d}; -\frac{b e^{d z}}{a}\right) \right) (1 - \nu \bmod 2) \; /; \; n \in \mathbb{N}^{+} \land \nu \in \mathbb{N}^{+}$$

Involving product of power of the direct function, the direct function and algebraic functions of exp

Involving $\left(a+b\,e^{d z}\right)^{\beta} \sin(e z) \sin^{\nu}(c z)$

01.06.21.1402.01

$$\int \left(a+b\,e^{d z}\right)^{\beta} \sin(e z) \sin^{\nu}(c z)\, dz = 2^{-\nu-1} \left(a+b\,e^{d z}\right)^{\beta} \left(\frac{e^{d z} b}{a}+1\right)^{-\beta}$$

$$\sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(\frac{1}{-e-2 c s+c \nu} \left(\left(e^{(-i e-2 i c s+i c \nu) z}\, {}_2F_1\left(\frac{-i e-2 i c s+i c \nu}{d}, -\beta; \frac{d-i e-2 i c s+i c \nu}{d}; -\frac{b\,e^{d z}}{a}\right)+\right.\right.\right.$$

$$\left.\left. e^{(i e+2 i c s-i c \nu) z}\, {}_2F_1\left(\frac{i e+2 i c s-i c \nu}{d}, -\beta; \frac{d+i e+2 i c s-i c \nu}{d}; -\frac{b\,e^{d z}}{a}\right)\right) \cos\left(\frac{\pi \nu}{2}\right)\right)+$$

$$\frac{1}{-e+2 c s-c \nu} \left(\left(e^{(i e-2 i c s+i c \nu) z}\, {}_2F_1\left(\frac{i e-2 i c s+i c \nu}{d}, -\beta; \frac{d+i e-2 i c s+i c \nu}{d}; -\frac{b\,e^{d z}}{a}\right)+\right.\right.$$

$$\left.\left. e^{(-i e+2 i c s-i c \nu) z}\, {}_2F_1\left(\frac{-i e+2 i c s-i c \nu}{d}, -\beta; \frac{d-i e+2 i c s-i c \nu}{d}; -\frac{b\,e^{d z}}{a}\right)\right) \cos\left(\frac{\pi \nu}{2}\right)\right)-$$

$$\frac{1}{-i e+2 i c s-i c \nu} \left(\sin\left(\frac{\nu \pi}{2}\right) \left(e^{(-i e+2 i c s-i c \nu) z}\, {}_2F_1\left(\frac{-i e+2 i c s-i c \nu}{d}, -\beta; \frac{d-i e+2 i c s-i c \nu}{d}; -\frac{b\,e^{d z}}{a}\right)-\right.\right.$$

$$\left.\left. e^{(i e-2 i c s+i c \nu) z}\, {}_2F_1\left(\frac{i e-2 i c s+i c \nu}{d}, -\beta; \frac{d+i e-2 i c s+i c \nu}{d}; -\frac{b\,e^{d z}}{a}\right)\right)\right)+$$

$$\frac{1}{-i e-2 i c s+i c \nu} \left(\left(e^{(-i e-2 i c s+i c \nu) z}\, {}_2F_1\left(\frac{-i e-2 i c s+i c \nu}{d}, -\beta; \frac{d-i e-2 i c s+i c \nu}{d}; -\frac{b\,e^{d z}}{a}\right)-\right.\right.$$

$$\left.\left.\left. e^{(i e+2 i c s-i c \nu) z}\, {}_2F_1\left(\frac{i e+2 i c s-i c \nu}{d}, -\beta; \frac{d+i e+2 i c s-i c \nu}{d}; -\frac{b\,e^{d z}}{a}\right)\right) \sin\left(\frac{\nu \pi}{2}\right)\right)\right)-$$

$$\frac{2^{-\nu-1} \left(a+b\,e^{d z}\right)^{\beta}}{e} \left(\frac{e^{d z} b}{a}+1\right)^{-\beta} \binom{\nu}{\frac{\nu}{2}} \left(e^{i e z}\, {}_2F_1\left(\frac{i e}{d}, -\beta; \frac{d+i e}{d}; -\frac{b\,e^{d z}}{a}\right)+e^{-i e z}\, {}_2F_1\left(-\frac{i e}{d}, -\beta; \frac{d-i e}{d}; -\frac{b\,e^{d z}}{a}\right)\right)$$

$$(1-\nu \bmod 2) \;/;\; \nu \in \mathbb{N}^+$$

Involving $e^{p z} \left(a+b\,e^{d z}\right)^{\beta} \sin(e z) \sin^{\nu}(c z)$

01.06.21.1403.01

$$\int e^{p z} \left(a + b\, e^{d z}\right)^{\beta} \sin(e\, z) \sin^{\nu}(c\, z)\, dz ==$$

$$2^{-\nu-1} \left(a + b\, e^{d z}\right)^{\beta} \left(\frac{e^{d z} b}{a} + 1\right)^{-\beta} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(i \cos\left(\frac{\pi \nu}{2}\right) \left(e^{(-i e + p - 2 i c s + i c \nu) z} (-i e - p - 2 i c s + i c \nu)\right.\right.$$
$$ {}_2F_1\left(\frac{-i e + p - 2 i c s + i c \nu}{d}, -\beta; \frac{d - i e + p - 2 i c s + i c \nu}{d}; -\frac{b\, e^{d z}}{a}\right) + e^{(i e + p + 2 i c s - i c \nu) z}$$
$$(-i e + p - 2 i c s + i c \nu)\, {}_2F_1\left(\frac{i e + p + 2 i c s - i c \nu}{d}, -\beta; \frac{d + i e + p + 2 i c s - i c \nu}{d}; -\frac{b\, e^{d z}}{a}\right)\Bigg) \Bigg/$$
$$((-i e - p - 2 i c s + i c \nu)(-i e + p - 2 i c s + i c \nu)) + i \cos\left(\frac{\pi \nu}{2}\right) \left(e^{(i e + p - 2 i c s + i c \nu) z} (-i e + p + 2 i c s - i c \nu)\right.$$
$$ {}_2F_1\left(\frac{i e + p - 2 i c s + i c \nu}{d}, -\beta; \frac{d + i e + p - 2 i c s + i c \nu}{d}; -\frac{b\, e^{d z}}{a}\right) + e^{(-i e + p + 2 i c s - i c \nu) z}$$
$$(-i e - p + 2 i c s - i c \nu)\, {}_2F_1\left(\frac{-i e + p + 2 i c s - i c \nu}{d}, -\beta; \frac{d - i e + p + 2 i c s - i c \nu}{d}; -\frac{b\, e^{d z}}{a}\right)\Bigg) \Bigg/$$
$$((-i e - p + 2 i c s - i c \nu)(-i e + p + 2 i c s - i c \nu)) - \sin\left(\frac{\pi \nu}{2}\right) \left(e^{(-i e + p + 2 i c s - i c \nu) z} (-i e - p + 2 i c s - i c \nu)\right.$$
$$ {}_2F_1\left(\frac{-i e + p + 2 i c s - i c \nu}{d}, -\beta; \frac{d - i e + p + 2 i c s - i c \nu}{d}; -\frac{b\, e^{d z}}{a}\right) - e^{(i e + p - 2 i c s + i c \nu) z}$$
$$(-i e + p + 2 i c s - i c \nu)\, {}_2F_1\left(\frac{i e + p - 2 i c s + i c \nu}{d}, -\beta; \frac{d + i e + p - 2 i c s + i c \nu}{d}; -\frac{b\, e^{d z}}{a}\right)\Bigg) \Bigg/$$
$$((-i e - p + 2 i c s - i c \nu)(-i e + p + 2 i c s - i c \nu)) + \sin\left(\frac{\pi \nu}{2}\right) \left(e^{(-i e + p - 2 i c s + i c \nu) z} (-i e - p - 2 i c s + i c \nu)\right.$$
$$ {}_2F_1\left(\frac{-i e + p - 2 i c s + i c \nu}{d}, -\beta; \frac{d - i e + p - 2 i c s + i c \nu}{d}; -\frac{b\, e^{d z}}{a}\right) - e^{(i e + p + 2 i c s - i c \nu) z}$$
$$(-i e + p - 2 i c s + i c \nu)\, {}_2F_1\left(\frac{i e + p + 2 i c s - i c \nu}{d}, -\beta; \frac{d + i e + p + 2 i c s - i c \nu}{d}; -\frac{b\, e^{d z}}{a}\right)\Bigg) \Bigg/$$
$$\left.((-i e - p - 2 i c s + i c \nu)(-i e + p - 2 i c s + i c \nu))\right) - \frac{1}{(i e - p)(i e + p)}$$
$$\left(i \left(2^{-\nu-1} \left(a + b\, e^{d z}\right)^{\beta} \left(\frac{e^{d z} b}{a} + 1\right)^{-\beta} \binom{\nu}{\frac{\nu}{2}} \left(e^{(-i e + p) z} (i e + p)\, {}_2F_1\left(\frac{-i e + p}{d}, -\beta; \frac{d - i e + p}{d}; -\frac{b\, e^{d z}}{a}\right) + \right.\right.\right.$$
$$\left.\left.\left. e^{(i e + p) z} (i e - p)\, {}_2F_1\left(\frac{i e + p}{d}, -\beta; \frac{d + i e + p}{d}; -\frac{b\, e^{d z}}{a}\right)\right) (1 - \nu \bmod 2)\right)\right) /; \nu \in \mathbb{N}^+$$

Involving products of powers of two direct functions and exponential function

Involving $e^{b z} \sin^{\mu}(c\, z) \sin^{\nu}(a\, z)$

01.06.21.1404.01

$$\int e^{b z} \sin^{\mu}(c z) \sin^{\nu}(a z)\, dz = -\frac{2^{-\nu} e^{b z} \left(1-e^{2 i c z}\right)^{-\mu} (\nu \bmod 2-1) \sin^{\mu}(c z)}{b-i c \mu} \binom{\nu}{\frac{\nu}{2}} {}_2F_1\left(-\frac{i b+c \mu}{2 c}, -\mu; \frac{1}{2}\left(2-\frac{i b}{c}-\mu\right); e^{2 i c z}\right) + 2^{-\nu} i^{-\nu} \left(1-e^{2 i c z}\right)^{-\mu} \sin^{\mu}(c z) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{i \pi \nu+(b-i a (\nu-2 k)) z}}{b+i (2 a k-a \nu-c \mu)} {}_2F_1\left(-\frac{i b-2 a k+a \nu+c \mu}{2 c}, -\mu; -\frac{i b+a (\nu-2 k)+c (\mu-2)}{2 c}; e^{2 i c z}\right) + \frac{e^{(b+a i (\nu-2 k)) z}}{b-i (2 a k-a \nu+c \mu)} {}_2F_1\left(-\frac{i b+2 a k-a \nu+c \mu}{2 c}, -\mu; -\frac{\mu c-2 c+i b+2 a k-a \nu}{2 c}; e^{2 i c z}\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1405.01

$$\int e^{b z} \sin^{m}(c z) \sin^{\nu}(a z)\, dz = \frac{2^{-m-\nu} e^{b z} (1-m \bmod 2) (1-\nu \bmod 2)}{b} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} + 2^{-m-\nu} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left(\frac{e^{\frac{i \pi m}{2}+(b+2 i c k-i c m) z}}{b+2 i c k-i c m} + \frac{e^{(b-2 i c k+i c m) z-\frac{i m \pi}{2}}}{b-2 i c k+i c m}\right) + 2^{-m-\nu} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{\frac{i \pi \nu}{2}+(b+2 i a k-i a \nu) z}}{b+2 i a k-i a \nu} + \frac{e^{(b-2 i a k+i a \nu) z-\frac{i \pi \nu}{2}}}{b-2 i a k+i a \nu}\right) + 2^{-m-\nu} i^{-m-\nu} e^{b z} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{(2 i c k-i c m+2 i a s-i a \nu) z} \binom{\nu}{s} \left(-\frac{e^{i \pi (m+\nu)}}{-b+c i (m-2 k)-2 i a s+i a \nu} + \frac{e^{2 i (c (m-2 k)+a (\nu-2 s)) z}}{b+c i (m-2 k)-2 i a s+i a \nu} + \frac{e^{i \pi \nu+2 c i (m-2 k) z}}{b+c i (m-2 k)+2 i a s-i a \nu} + \frac{e^{i m \pi-2 i a (2 s-\nu) z}}{b+2 i c k-i c m-2 i a s+i a \nu}\right) /; m \in \mathbb{N}^+ \bigwedge \nu \in \mathbb{N}^+$$

Involving $e^{p z} \sin^{m}(c z) \sin^{\nu}(a z+b)$

01.06.21.1406.01

$$\int e^{p z} \sin^{\mu}(c z) \sin^{\nu}(a z+b)\, dz = \frac{2^{-\nu} e^{p z} (1-\nu \bmod 2) \sin^{\mu}(c z)}{p-i c \mu} \left(1-e^{2 i c z}\right)^{-\mu} \binom{\nu}{\frac{\nu}{2}} {}_2F_1\left(-\frac{i p+c \mu}{2 c}, -\mu; \frac{1}{2}\left(-\frac{i p}{c}-\mu+2\right); e^{2 i c z}\right) + i^{1-\nu} 2^{-\nu} \left(1-e^{2 i c z}\right)^{-\mu} \sin^{\mu}(c z) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{i b (\nu-2 k)} \binom{\nu}{k} \left(\frac{e^{(p+a i (\nu-2 k)) z}}{2 a k+i p-a \nu+c \mu} {}_2F_1\left(-\frac{2 a k+i p-a \nu+c \mu}{2 c}, -\mu; -\frac{2 a k+i p-a \nu+c (\mu-2)}{2 c}; e^{2 i c z}\right) + \frac{e^{i \pi \nu-2 i b (\nu-2 k)+(p-i a (\nu-2 k)) z}}{i p+a (\nu-2 k)+c \mu} {}_2F_1\left(-\frac{i p+a (\nu-2 k)+c \mu}{2 c}, -\mu; -\frac{-2 a k+i p+a \nu+c (\mu-2)}{2 c}; e^{2 i c z}\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1407.01

$$\int e^{pz}\sin^m(cz)\sin^\nu(b+az)\,dz = \frac{2^{-m}e^{pz}}{p-ia\nu}\left(1-e^{2i(b+az)}\right)^{-\nu}\binom{m}{\frac{m}{2}}\,{}_2F_1\left(-\frac{ip+a\nu}{2a},-\nu;\frac{1}{2}\left(-\frac{ip}{a}-\nu+2\right);e^{2i(b+az)}\right)(1-m\bmod 2)\sin^\nu(b+az)+ i^{1-m}2^{-m}\left(1-e^{2i(b+az)}\right)^{-\nu}\sin^\nu(b+az)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(\frac{e^{(ci(m-2k)+p)z}}{2ck-cm+ip+a\nu}\,{}_2F_1\left(-\frac{2ck-cm+ip+a\nu}{2a},-\nu;-\frac{2ck-cm+ip+a(\nu-2)}{2a};e^{2i(b+az)}\right)+\frac{e^{i\pi m+(p-ic(m-2k))z}}{c(m-2k)+ip+a\nu}\,{}_2F_1\left(-\frac{c(m-2k)+ip+a\nu}{2a},-\nu;-\frac{-2ck+cm+ip+a(\nu-2)}{2a};e^{2i(b+az)}\right)\right)/;\nu\in\mathbb{N}^+$$

01.06.21.1408.01

$$\int e^{pz}\sin^m(cz)\sin^\nu(b+az)\,dz = e^{pz}\left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s e^{i(c(2k-m)z+(2s-\nu)(b+az))}\left(\frac{i\,e^{i(m\pi-2(2s-\nu)(b+az))}}{c(m-2k)+ip+2as-a\nu}+\frac{e^{-2i(2bs+2azs-b\nu+2ckz-cmz-a\nu z)}}{ci(m-2k)+p-2ias+ia\nu}+\frac{i\,e^{i(\pi\nu+2c(m-2k)z)}}{2ck-cm+ip-2as+a\nu}+\frac{i\,e^{i\pi(m+\nu)}}{c(m-2k)+ip+a(\nu-2s)}\right)\binom{\nu}{s}\right)$$

$$(2i)^{-m-\nu}+\frac{2^{-m-\nu}e^{pz}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m\bmod 2)(1-\nu\bmod 2)}{p}+2^{-m-\nu}\binom{\nu}{\frac{\nu}{2}}(1-\nu\bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\left(\frac{e^{-\frac{1}{2}i(-2czm+\pi m+4ckz+2ipz)}}{-2cik+icm+p}+\frac{e^{\frac{1}{2}i(-2czm+\pi m+4ckz-2ipz)}}{ci(2k-m)+p}\right)\binom{m}{k}+ 2^{-m-\nu}\binom{m}{\frac{m}{2}}(1-m\bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\left(\frac{e^{-\frac{1}{2}i(4bk+4azk-2b\nu+\pi\nu+2ipz-2a\nu z)}}{-2aik+p+ia\nu}+\frac{e^{\frac{1}{2}i(4bk+4azk-2b\nu+\pi\nu-2ipz-2a\nu z)}}{p+ai(2k-\nu)}\right)\binom{\nu}{k}/;m\in\mathbb{N}^+\land\nu\in\mathbb{N}^+$$

Involving $e^{pz}\sin^\mu(cz+d)\sin^\nu(az+b)$

01.06.21.1409.01

$$\int e^{p z} \sin^{\mu}(d+c z) \sin^{v}(b+a z)\, dz = \frac{1}{p-i c \mu}\left(2^{-v} e^{p z}\left(1-e^{2 i (d+c z)}\right)^{-\mu}\binom{v}{\frac{v}{2}}\, {}_2F_1\left(-\frac{i p+c \mu}{2 c}, -\mu; \frac{1}{2}\left(-\frac{i p}{c}-\mu+2\right); e^{2 i (d+c z)}\right)(1-v \bmod 2) \sin^{\mu}(d+c z)+\right.$$
$$2^{-v} i^{1-v}\left(1-e^{2 i (d+c z)}\right)^{-\mu} \sin^{\mu}(d+c z) \sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k e^{i b (v-2 k)}\binom{v}{k}\left(\frac{e^{(p+a i (v-2 k)) z}}{2 a k+i p-a v+c \mu}\right.$$
$${}_2F_1\left(-\frac{2 a k+i p-a v+c \mu}{2 c}, -\mu; -\frac{2 a k+i p-a v+c(\mu-2)}{2 c}; e^{2 i (d+c z)}\right)+\frac{e^{i \pi v-2 i b (v-2 k)+(p-i a (v-2 k)) z}}{i p+a(v-2 k)+c \mu}$$
$$\left.\left.{}_2F_1\left(-\frac{i p+a(v-2 k)+c \mu}{2 c}, -\mu; -\frac{-2 a k+i p+a v+c(\mu-2)}{2 c}; e^{2 i (d+c z)}\right)\right)\right) /; v \in \mathbb{N}^+$$

01.06.21.1410.01

$$\int e^{p z} \sin^{m}(d+c z) \sin^{v}(b+a z)\, dz = \frac{2^{-m-v} e^{p z}(1-m \bmod 2)(1-v \bmod 2)}{p}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}+$$
$$2^{-m-v}\binom{v}{\frac{v}{2}}(1-v \bmod 2) \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(\frac{e^{-\frac{1}{2} i (4 d k+4 c z k-2 d m-2 c m z+2 i p z+m \pi)}}{-2 c i k+i c m+p}+\frac{e^{\frac{1}{2} i (4 d k+4 c z k-2 d m-2 c m z-2 i p z+m \pi)}}{c i(2 k-m)+p}\right)+$$
$$2^{-m-v}\binom{m}{\frac{m}{2}}(1-m \bmod 2) \sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\left(\frac{e^{-\frac{1}{2} i (4 b k+4 a z k-2 b v+\pi v+2 i p z-2 a v z)}}{-2 a i k+p+i a v}+\frac{e^{\frac{1}{2} i (4 b k+4 a z k-2 b v+\pi v-2 i p z-2 a v z)}}{p+a i(2 k-v)}\right)+$$
$$2^{-m-v} i^{-m-v} e^{p z} \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}$$
$$\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s} e^{i((2 s-v)(b+a z)+(2 k-m)(d+c z))}\left(\frac{i e^{i(m \pi-2(2 s-v)(b+a z))}}{c(m-2 k)+i p+2 a s-a v}+\frac{e^{-2 i(2 d k+2 c z k-d m+2 b s-b v-c m z+2 a s z-a v z)}}{c i(m-2 k)+p-2 i a s+i a v}+\right.$$
$$\left.\frac{i e^{i(2 d(m-2 k)+2 c z(m-2 k)+\pi v)}}{2 c k-c m+i p-2 a s+a v}+\frac{i e^{i \pi(m+v)}}{c(m-2 k)+i p+a(v-2 s)}\right) /; m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

Involving $e^{p z^r} \sin^m(b z) \sin^v(c z)$

01.06.21.1411.01

$$\int e^{p z^2} \sin^m(b z) \sin^\nu(c z)\, dz = \frac{2^{-m-\nu-1}\sqrt{\pi}\,(1 - m \bmod 2)(1-\nu \bmod 2)}{\sqrt{p}} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{p}\, z\right) + \frac{2^{-m-\nu-1}\sqrt{\pi}}{\sqrt{p}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^s \binom{m}{s} \left(e^{-\frac{-b^2 (m-2s)^2 - 2\pi i m p}{4p}} \operatorname{erfi}\left(\frac{2pz - i b(m-2s)}{2\sqrt{p}}\right) + e^{-\frac{2\pi i m p - b^2 (m-2s)^2}{4p}} \operatorname{erfi}\left(\frac{b i (m-2s) + 2pz}{2\sqrt{p}}\right)\right) + \frac{2^{-m-\nu-1}\sqrt{\pi}}{\sqrt{p}} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{-\frac{-c^2 (\nu-2k)^2 - 2\pi i p \nu}{4p}} \operatorname{erfi}\left(\frac{2pz - i c(\nu-2k)}{2\sqrt{p}}\right) + e^{-\frac{2\pi i p \nu - c^2 (\nu-2k)^2}{4p}} \operatorname{erfi}\left(\frac{c i (\nu-2k) + 2pz}{2\sqrt{p}}\right)\right) + \frac{2^{-m-\nu-1}\sqrt{\pi}}{\sqrt{p}} \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \binom{m}{s} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{k+s} \binom{\nu}{k} \left(e^{-\frac{(b i (m-2s) + c i (2k-\nu))^2 - 2 i p \pi (\nu - m)}{4p}} \operatorname{erfi}\left(\frac{b i (m-2s) + c i (2k-\nu) + 2pz}{2\sqrt{p}}\right) + e^{-\frac{(-i b (m-2s) - i c (2k-\nu))^2 + 2 i p \pi (\nu-m)}{4p}} \operatorname{erfi}\left(\frac{-i b(m-2s) - i c(2k-\nu) + 2pz}{2\sqrt{p}}\right) + e^{-\frac{(b i (m-2s) + c i (\nu-2k))^2 + 2 i p \pi (m+\nu)}{4p}} \operatorname{erfi}\left(\frac{b i (m-2s) + c i (\nu-2k) + 2pz}{2\sqrt{p}}\right) + e^{-\frac{(-i b (m-2s) - i c (\nu-2k))^2 - 2 i p \pi (m+\nu)}{4p}} \operatorname{erfi}\left(\frac{-i b (m-2s) - i c(\nu-2k) + 2pz}{2\sqrt{p}}\right)\right) /; m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1412.01

$$\int e^{p\sqrt{z}} \sin^m(b z) \sin^\nu(c z)\, dz = 2^{-m-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^s e^{\frac{i m \pi}{2}} \binom{m}{s} \left(\frac{2 i e^{p\sqrt{z} - i b (m-2s) z}}{b(m-2s)} - \frac{2 i e^{-i \pi m + b i (m-2s) z + p\sqrt{z}}}{b(m-2s)} - \frac{e^{-\frac{i p^2}{4 b (m-2s)}} p \sqrt{\pi} \operatorname{erfi}\left(\frac{p - 2 i b (m-2s)\sqrt{z}}{2\sqrt{-i b (m-2s)}}\right)}{(-i b (m-2s))^{3/2}} - \frac{e^{\frac{i p^2}{4 b (m-2s)} - i m \pi} p \sqrt{\pi} \operatorname{erfi}\left(\frac{p + 2 b i (m-2s)\sqrt{z}}{2\sqrt{i b (m-2s)}}\right)}{(i b (m-2s))^{3/2}}\right) + \frac{2^{-m-\nu+1} e^{p\sqrt{z}} \left(p\sqrt{z} - 1\right)(1-m \bmod 2)(1-\nu \bmod 2)}{p^2} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} + 2^{-m-\nu-1} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{\frac{i \pi \nu}{2}} \binom{\nu}{k} \left(\frac{2 i e^{p\sqrt{z} - i c (\nu-2k) z}}{c(\nu-2k)} - \frac{2 i e^{\sqrt{z}\, p - i \pi \nu + c i (\nu - 2k) z}}{c(\nu-2k)} - \right.$$

$$\left.\frac{e^{-\frac{i p^2}{4 c (v-2 k)}} p \sqrt{\pi} \operatorname{erfi}\left(\frac{p-2 i c (v-2 k) \sqrt{z}}{2 \sqrt{-i c (v-2 k)}}\right)}{(-i c (v-2 k))^{3/2}}-\frac{e^{\frac{i p^2}{4 c (v-2 k)}-i \pi v} p \sqrt{\pi} \operatorname{erfi}\left(\frac{p+2 c i (v-2 k) \sqrt{z}}{2 \sqrt{i c (v-2 k)}}\right)}{(i c (v-2 k))^{3/2}}\right)+$$

$$2^{-m-v-1} \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \binom{m}{s} \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{k+s} \binom{v}{k} \Bigg(e^{-\frac{1}{2} i \pi (v-m)} \Bigg(\frac{2 e^{\sqrt{z}\, p+i \pi (v-m)+(b i (m-2 s)+c i (2 k-v)) z}}{b i (m-2 s)+c i (2 k-v)}-$$

$$\left(e^{i \pi (v-m)-\frac{p^2}{4 (b i (m-2 s)+c i (2 k-v))}} p \sqrt{\pi} \operatorname{erfi}\left(\frac{p+2 (b i (m-2 s)+c i (2 k-v)) \sqrt{z}}{2 \sqrt{b i (m-2 s)+c i (2 k-v)}}\right)\right) \Big/$$

$$(b i (m-2 s)+c i (2 k-v))^{3/2}+\frac{2 e^{\sqrt{z}\, p+(-i b (m-2 s)-i c (2 k-v)) z}}{-i b (m-2 s)-i c (2 k-v)}-\Bigg(e^{-\frac{p^2}{4 (-i b (m-2 s)-i c (2 k-v))}} p \sqrt{\pi}$$

$$\left.\operatorname{erfi}\left(\frac{p+2 (-i b (m-2 s)-i c (2 k-v)) \sqrt{z}}{2 \sqrt{-i b (m-2 s)-i c (2 k-v)}}\right)\right) \Big/ (-i b (m-2 s)-i c (2 k-v))^{3/2}\Bigg)+$$

$$e^{\frac{1}{2} i \pi (m+v)} \Bigg(\frac{2 e^{\sqrt{z}\, p-i \pi (m+v)+(b i (m-2 s)+c i (v-2 k)) z}}{b i (m-2 s)+c i (v-2 k)}-\Bigg(e^{-\frac{p^2}{4 (b i (m-2 s)+c i (v-2 k))}-i \pi (m+v)} p \sqrt{\pi}$$

$$\left.\operatorname{erfi}\left(\frac{p+2 (b i (m-2 s)+c i (v-2 k)) \sqrt{z}}{2 \sqrt{b i (m-2 s)+c i (v-2 k)}}\right)\right) \Big/$$

$$(b i (m-2 s)+c i (v-2 k))^{3/2}+\frac{2 e^{\sqrt{z}\, p+(-i b (m-2 s)-i c (v-2 k)) z}}{-i b (m-2 s)-i c (v-2 k)}-$$

$$\left(e^{-\frac{p^2}{4 (-i b (m-2 s)-i c (v-2 k))}} p \sqrt{\pi} \operatorname{erfi}\left(\frac{p+2 (-i b (m-2 s)-i c (v-2 k)) \sqrt{z}}{2 \sqrt{-i b (m-2 s)-i c (v-2 k)}}\right)\right) \Big/$$

$$\left.\left.(-i b (m-2 s)-i c (v-2 k))^{3/2}\right)\right) /;\ m \in \mathbb{N}^+ \wedge v \in \mathbb{N}^+$$

Involving $e^{p z} \sin^m(b z^r) \sin^v(c z)$

01.06.21.1413.01

$$\int e^{p z} \sin^m\left(b z^2\right) \sin^\nu(c z) \, dz = \frac{2^{-m-\nu} e^{p z} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - m \bmod 2)(1 - \nu \bmod 2)}{p} +$$

$$2^{-m-\nu+1} e^{p z} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \left((-1)^k \binom{\nu}{k} \left(\cos(c(\nu - 2k) z) \left(p \cos\left(\frac{\pi \nu}{2}\right) + c(2k - \nu) \sin\left(\frac{\pi \nu}{2}\right)\right) - \right.\right.$$

$$\left.\left.\left(c(2k - \nu) \cos\left(\frac{\pi \nu}{2}\right) - p \sin\left(\frac{\pi \nu}{2}\right)\right) \sin(c(\nu - 2k) z)\right)\right) \Big/ ((2 i c k + p - i c \nu)(p + c i(\nu - 2k))) + \frac{1}{b}$$

$$\left(i\, 2^{-m-\nu-1} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \frac{1}{m - 2s} \left((-1)^s \binom{m}{s} \left(e^{-\frac{i\left(p^2 - 2 b m \pi (m-2s)\right)}{4 b (m-2s)}} \sqrt{-i b (m - 2s)} \operatorname{erfi}\left(\frac{p - 2 i b (m - 2s) z}{2 \sqrt{-i b (m - 2s)}}\right) - \right.\right.\right.$$

$$\left.\left.\left. e^{\frac{i\left(p^2 - 2 b m \pi (m-2s)\right)}{4 b (m-2s)}} \sqrt{i b (m - 2s)} \operatorname{erfi}\left(\frac{p + 2 b i (m - 2s) z}{2 \sqrt{i b (m - 2s)}}\right)\right)\right)\right) + \frac{1}{b} \left(i\, 2^{-m-\nu-1} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \binom{m}{s} \right.$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \frac{1}{m - 2s} \left((-1)^{k+s} \binom{\nu}{k} \left(e^{-\frac{i\left((p - i c (2k-\nu))^2 + 2 b \pi (m-2s)(\nu-m)\right)}{4 b (m-2s)}} \sqrt{-i b (m - 2s)} \operatorname{erfi}\left(\frac{p - i c (2k - \nu) - 2 i b (m - 2s) z}{2 \sqrt{-i b (m - 2s)}}\right) + \right.\right.$$

$$e^{-\frac{i\left((p - i c (\nu-2k))^2 - 2 b \pi (m-2s)(m+\nu)\right)}{4 b (m-2s)}} \sqrt{-i b (m - 2s)} \operatorname{erfi}\left(\frac{p - i c (\nu - 2k) - 2 i b (m - 2s) z}{2 \sqrt{-i b (m - 2s)}}\right) -$$

$$e^{\frac{i\left((p + c i (2k-\nu))^2 + 2 b \pi (m-2s)(\nu-m)\right)}{4 b (m-2s)}} \sqrt{i b (m - 2s)} \operatorname{erfi}\left(\frac{p + c i (2k - \nu) + 2 b i (m - 2s) z}{2 \sqrt{i b (m - 2s)}}\right) -$$

$$\left.\left.\left. e^{\frac{i\left((p + c i (\nu-2k))^2 - 2 b \pi (m-2s)(m+\nu)\right)}{4 b (m-2s)}} \sqrt{i b (m - 2s)} \operatorname{erfi}\left(\frac{p + c i (\nu - 2k) + 2 b i (m - 2s) z}{2 \sqrt{i b (m - 2s)}}\right)\right)\right)\right) /;\ m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1414.01

$$\int e^{p z} \sin^m\left(b \sqrt{z}\right) \sin^\nu(c z)\, dz = \frac{(-1)^m 2^{-m-\nu} e^{p z} (1 - m \bmod 2)(1 - \nu \bmod 2)}{p} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} +$$

$$(-1)^m i^\nu 2^{-m-\nu} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{e^{(p - i c (\nu - 2k)) z}}{p - i c (\nu - 2k)} + \frac{e^{(p + c i (\nu - 2k)) z - i \pi \nu}}{p + c i (\nu - 2k)} \right) +$$

$$i^{-m} 2^{-m-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^s \binom{m}{s} \left(\frac{i b e^{\frac{b^2 (m-2s)^2}{4p} - i m \pi} \sqrt{\pi} (m - 2s) \operatorname{erfi}\left(\frac{2 p \sqrt{z} - i b (m - 2s)}{2 \sqrt{p}} \right)}{p^{3/2}} + \right.$$

$$\left. \frac{i b e^{\frac{b^2 (m-2s)^2}{4p}} \sqrt{\pi} (m - 2s) \operatorname{erfi}\left(\frac{-2 \sqrt{z}\, p - i b (m - 2s)}{2 \sqrt{p}} \right)}{p^{3/2}} + \frac{2 e^{b i \sqrt{z} (m - 2s) + p z}}{p} + \frac{2 e^{-i \pi m + p z - i b (m - 2s) \sqrt{z}}}{p} \right) +$$

$$(-1)^m 2^{-m-\nu-1} \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \binom{m}{s} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{k+s} \binom{\nu}{k} \left(e^{-\frac{1}{2} i \pi (\nu - m)} \left(\left(i b e^{\frac{b^2 (m-2s)^2}{4 (p + c i (2k - \nu))} + i \pi (\nu - m)} \sqrt{\pi} (m - 2s) \right.\right.\right.$$

$$\left. \operatorname{erfi}\left(\frac{2 (p + c i (2k - \nu)) \sqrt{z} - i b (m - 2s)}{2 \sqrt{p + c i (2k - \nu)}} \right) \right) \Big/ (p + c i (2k - \nu))^{3/2} +$$

$$\left(i b e^{\frac{b^2 (m-2s)^2}{4 (p - i c (2k - \nu))}} \sqrt{\pi} (m - 2s) \operatorname{erfi}\left(\frac{2 (i c (2k - \nu) - p) \sqrt{z} - i b (m - 2s)}{2 \sqrt{p - i c (2k - \nu)}} \right) \right) \Big/ (p - i c (2k - \nu))^{3/2} +$$

$$\left. \frac{2 e^{-i b \sqrt{z} (m - 2s) + i \pi (\nu - m) + (p + c i (2k - \nu)) z}}{p + c i (2k - \nu)} + \frac{2 e^{b i \sqrt{z} (m - 2s) + (p - i c (2k - \nu)) z}}{p - i c (2k - \nu)} \right) + e^{\frac{1}{2} i \pi (m + \nu)}$$

$$\left(\left(i b e^{\frac{b^2 (m-2s)^2}{4 (p + c i (\nu - 2k))} - i \pi (m + \nu)} \sqrt{\pi} (m - 2s) \operatorname{erfi}\left(\frac{2 (p + c i (\nu - 2k)) \sqrt{z} - i b (m - 2s)}{2 \sqrt{p + c i (\nu - 2k)}} \right) \right) \Big/ (p + c i (\nu - 2k))^{3/2} + \right.$$

$$\left(i b e^{\frac{b^2 (m-2s)^2}{4 (p - i c (\nu - 2k))}} \sqrt{\pi} (m - 2s) \operatorname{erfi}\left(\frac{2 (i c (\nu - 2k) - p) \sqrt{z} - i b (m - 2s)}{2 \sqrt{p - i c (\nu - 2k)}} \right) \right) \Big/ (p - i c (\nu - 2k))^{3/2} +$$

$$\left. \left. \frac{2 e^{-i b \sqrt{z} (m - 2s) - i \pi (m + \nu) + (p + c i (\nu - 2k)) z}}{p + c i (\nu - 2k)} + \frac{2 e^{b i \sqrt{z} (m - 2s) + (p - i c (\nu - 2k)) z}}{p - i c (\nu - 2k)} \right) \right) /;\ m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

Involving $e^{p z^r} \sin^m(b z^r) \sin^\nu(c z)$

01.06.21.1415.01

$$\int e^{p z^2} \sin^m\left(b z^2\right) \sin^\nu(c z)\, dz = 2^{-m-\nu-1} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \left((-1)^k \binom{m}{k} \left(\left(e^{\frac{i m \pi}{2}} \sqrt{p - i\, b\, (m - 2k)}\, (b\, i\, (m - 2k) + p) \operatorname{erfi}\left(\frac{2 p z - 2 i\, b\, (m - 2k)\, z}{2 \sqrt{p - i\, b\, (m - 2k)}} \right) + e^{-\frac{1}{2} i m \pi} (p - i\, b\, (m - 2k)) \right.\right.\right.$$

$$\left.\left.\left. \sqrt{b\, i\, (m - 2k) + p}\, \operatorname{erfi}\left(\sqrt{b\, i\, (m - 2k) + p}\; z \right) \right) \right) \Big/ \left((p - i\, b\, (m - 2k))\, (b\, i\, (m - 2k) + p) \right) +$$

$$\frac{2^{-m-\nu-1} \sqrt{\pi}\, (1 - m \bmod 2)\, (1 - \nu \bmod 2)}{\sqrt{p}} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{p}\; z \right) + \frac{2^{-m-\nu-1} \sqrt{\pi}}{\sqrt{p}} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)$$

$$\sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{-c^2 (\nu - 2s)^2 - 2 \pi i p \nu}{4p}} \operatorname{erfi}\left(\frac{2 p z - i\, c\, (\nu - 2s)}{2 \sqrt{p}} \right) + e^{-\frac{2 \pi i p \nu - c^2 (\nu - 2s)^2}{4p}} \operatorname{erfi}\left(\frac{c\, i\, (\nu - 2s) + 2 p z}{2 \sqrt{p}} \right) \right) +$$

$$2^{-m-\nu-1} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \binom{\nu}{s} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+s} \binom{m}{k} \left(\left(\left(e^{-\frac{2 i (p - i b (2k - m)) \pi (m - \nu) - c^2 (\nu - 2s)^2}{4 (p - i b (2k - m))}} \sqrt{p - i\, b\, (2k - m)}\, (b\, i\, (2k - m) + p) \right.\right.\right.$$

$$\operatorname{erfi}\left(\frac{-i\, c\, (\nu - 2s) - 2 i\, b\, (2k - m)\, z + 2 p z}{2 \sqrt{p - i\, b\, (2k - m)}} \right) + e^{-\frac{-c^2 (\nu - 2s)^2 - 2 i (b i (2k - m) + p) \pi (m - \nu)}{4 (b i (2k - m) + p)}}$$

$$\left.\left. (p - i\, b\, (2k - m)) \sqrt{b\, i\, (2k - m) + p}\, \operatorname{erfi}\left(\frac{c\, i\, (\nu - 2s) + 2\, (b\, i\, (2k - m) + p)\, z}{2 \sqrt{b\, i\, (2k - m) + p}} \right) \right) \right/$$

$$((p - i\, b\, (2k - m))\, (b\, i\, (2k - m) + p)) + \left(e^{-\frac{-c^2 (\nu - 2s)^2 - 2 i (p - i b (m - 2k)) \pi (m + \nu)}{4 (p - i b (m - 2k))}} \sqrt{p - i\, b\, (m - 2k)} \right.$$

$$(b\, i\, (m - 2k) + p) \operatorname{erfi}\left(\frac{-i\, c\, (\nu - 2s) - 2 i\, b\, (m - 2k)\, z + 2 p z}{2 \sqrt{p - i\, b\, (m - 2k)}} \right) + e^{-\frac{2 i (b i (m - 2k) + p) \pi (m + \nu) - c^2 (\nu - 2s)^2}{4 (b i (m - 2k) + p)}}$$

$$\left.\left. (p - i\, b\, (m - 2k)) \sqrt{b\, i\, (m - 2k) + p}\, \operatorname{erfi}\left(\frac{c\, i\, (\nu - 2s) + 2\, (b\, i\, (m - 2k) + p)\, z}{2 \sqrt{b\, i\, (m - 2k) + p}} \right) \right) \right/$$

$$\left. ((p - i\, b\, (m - 2k))\, (b\, i\, (m - 2k) + p)) \right) /;\ m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1416.01

$$\int e^{p \sqrt{z}} \sin^m\left(b \sqrt{z}\right) \sin^\nu(c z)\, dz =$$

$$\frac{2^{-m-\nu+1} e^{p \sqrt{z}} \left(p \sqrt{z} - 1\right) (1 - m \bmod 2)\, (1 - \nu \bmod 2)}{p^2} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} + i^m\, 2^{-m-\nu+1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^s \binom{m}{s}$$

$$e^{(p-i b (m-2 s)) \sqrt{z}} \left(\frac{e^{2\left(i b (m-2 s) \sqrt{z} - \frac{i m \pi}{2}\right)} \left(\sqrt{z}\, p + b\, i (m-2 s) \sqrt{z} - 1\right)}{(p + b\, i (m-2 s))^2} + \frac{\sqrt{z}}{p - i\, b (m-2 s)} - \frac{1}{(i\, b (m-2 s) - p)^2} \right) +$$

$$i^{v}\, 2^{-m-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \left(\frac{2\, i\, e^{p \sqrt{z} - i c (v-2k) z}}{c (v-2k)} - \frac{2\, i\, e^{\sqrt{z}\, p - i \pi v + c\, i (v-2k) z}}{c (v-2k)} - \right.$$

$$\left. \frac{e^{-\frac{i p^2}{4 c (v-2k)}}\, p \sqrt{\pi}\, \operatorname{erfi}\left(\frac{p - 2 i c (v-2k) \sqrt{z}}{2 \sqrt{-i c (v-2k)}} \right)}{(-i\, c (v-2k))^{3/2}} - \frac{e^{\frac{i p^2}{4 c (v-2k)} - i \pi v}\, p \sqrt{\pi}\, \operatorname{erfi}\left(\frac{p + 2 c\, i (v-2k) \sqrt{z}}{2 \sqrt{i\, c (v-2k)}} \right)}{(i\, c (v-2k))^{3/2}} \right) +$$

$$2^{-m-v-1} \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \binom{m}{s} \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{k+s} \binom{v}{k} \left(e^{-\frac{1}{2} i \pi (v-m)} \left(\frac{2\, i\, e^{(p - i b (m-2s)) \sqrt{z} - i c (2k-v) z}}{c (2k-v)} - \frac{2\, i\, e^{\sqrt{z}\, (p + b\, i (m-2s)) + i \pi (v-m) + c\, i (2k-v) z}}{c (2k-v)} - \right. \right.$$

$$\frac{e^{-\frac{i (p - i b (m-2s))^2}{4 c (2k-v)}}\, p \sqrt{\pi}\, \operatorname{erfi}\left(\frac{p - i b (m-2s) - 2 i c (2k-v) \sqrt{z}}{2 \sqrt{-i c (2k-v)}} \right)}{(-i\, c (2k-v))^{3/2}} -$$

$$\left(i\, b\, e^{-\frac{i (p - i b (m-2s))^2}{4 c (2k-v)}} \sqrt{\pi}\, (m-2s)\, \operatorname{erfi}\left(\frac{-p + b\, i (m-2s) + 2 c\, i (2k-v) \sqrt{z}}{2 \sqrt{-i\, c (2k-v)}} \right) \right) \Big/ (-i\, c (2k-v))^{3/2} -$$

$$\frac{e^{\frac{i (p + b i (m-2s))^2}{4 c (2k-v)} + i \pi (v-m)}\, p \sqrt{\pi}\, \operatorname{erfi}\left(\frac{p + b i (m-2s) + 2 c i (2k-v) \sqrt{z}}{2 \sqrt{i c (2k-v)}} \right)}{(i\, c (2k-v))^{3/2}} -$$

$$\left. \frac{1}{(i\, c (2k-v))^{3/2}} \left(i\, b\, e^{\frac{i (p + b i (m-2s))^2}{4 c (2k-v)} + i \pi (v-m)} \sqrt{\pi}\, (m-2s)\, \operatorname{erfi}\left(\frac{p + b\, i (m-2s) + 2 c\, i (2k-v) \sqrt{z}}{2 \sqrt{i\, c (2k-v)}} \right) \right) \right) +$$

$$e^{\frac{1}{2} i \pi (m+v)} \left(\frac{2\, i\, e^{(p - i b (m-2s)) \sqrt{z} - i c (v-2k) z}}{c (v-2k)} - \frac{2\, i\, e^{\sqrt{z}\, (p + b\, i (m-2s)) - i \pi (m+v) + c\, i (v-2k) z}}{c (v-2k)} - \right.$$

$$\frac{e^{-\frac{i (p - i b (m-2s))^2}{4 c (v-2k)}}\, p \sqrt{\pi}\, \operatorname{erfi}\left(\frac{p - i b (m-2s) - 2 i c (v-2k) \sqrt{z}}{2 \sqrt{-i c (v-2k)}} \right)}{(-i\, c (v-2k))^{3/2}} -$$

$$\left(i\, b\, e^{-\frac{i\,(p-i\,b\,(m-2\,s))^2}{4\,c\,(v-2\,k)}} \sqrt{\pi}\, (m-2\,s)\, \mathrm{erfi}\left(\frac{-p+b\,i\,(m-2\,s)+2\,c\,i\,(v-2\,k)\sqrt{z}}{2\sqrt{-i\,c\,(v-2\,k)}}\right)\right) \Big/ (-i\,c\,(v-2\,k))^{3/2} -$$

$$\frac{e^{\frac{i\,(p+b\,i\,(m-2\,s))^2}{4\,c\,(v-2\,k)}-i\,\pi\,(m+v)}\, p\sqrt{\pi}\, \mathrm{erfi}\left(\frac{p+b\,i\,(m-2\,s)+2\,c\,i\,(v-2\,k)\sqrt{z}}{2\sqrt{i\,c\,(v-2\,k)}}\right)}{(i\,c\,(v-2\,k))^{3/2}} - \frac{1}{(i\,c\,(v-2\,k))^{3/2}} \left(i\, b\, e^{\frac{i\,(p+b\,i\,(m-2\,s))^2}{4\,c\,(v-2\,k)}-i\,\pi\,(m+v)}\right.$$

$$\left.\left.\left.\sqrt{\pi}\, (m-2\,s)\, \mathrm{erfi}\left(\frac{p+b\,i\,(m-2\,s)+2\,c\,i\,(v-2\,k)\sqrt{z}}{2\sqrt{i\,c\,(v-2\,k)}}\right)\right)\right)\right) /;\, m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

Involving $e^{p\,z}\sin^m(b\,z^r)\sin^v(c\,z^r)$

01.06.21.1417.01

$$\int e^{pz}\sin^m(b z^2)\sin^\nu(c z^2)\,dz = \frac{2^{-m-\nu} e^{pz}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)}{p} + \frac{1}{b}\left(i\,2^{-m-\nu-1}\sqrt{\pi}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\sum_{s=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{m-2s}\left((-1)^s\binom{m}{s}\left(e^{-\frac{i(p^2-2bm\pi(m-2s))}{4b(m-2s)}}\sqrt{-i b(m-2s)}\,\operatorname{erfi}\left(\frac{p-2ib(m-2s)z}{2\sqrt{-ib(m-2s)}}\right) - e^{\frac{i(p^2-2bm\pi(m-2s))}{4b(m-2s)}}\sqrt{i b(m-2s)}\,\operatorname{erfi}\left(\frac{p+2bi(m-2s)z}{2\sqrt{ib(m-2s)}}\right)\right)\right)\right) + \frac{1}{c}\left(i\,2^{-m-\nu-1}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}\frac{1}{\nu-2k}\left((-1)^k\binom{\nu}{k}\left(e^{-\frac{i(p^2-2c\pi\nu(\nu-2k))}{4c(\nu-2k)}}\sqrt{-ic(\nu-2k)}\,\operatorname{erfi}\left(\frac{p-2ic(\nu-2k)z}{2\sqrt{-ic(\nu-2k)}}\right) - e^{\frac{i(p^2-2c\pi\nu(\nu-2k))}{4c(\nu-2k)}}\sqrt{ic(\nu-2k)}\,\operatorname{erfi}\left(\frac{p+2ci(\nu-2k)z}{2\sqrt{ic(\nu-2k)}}\right)\right)\right)\right) + 2^{-m-\nu-1}\sqrt{\pi}\sum_{s=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\binom{m}{s}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{k+s}\binom{\nu}{k}\left(\frac{1}{bi(m-2s)+ci(2k-\nu)}\left(e^{-\frac{p^2-2i\pi(bi(m-2s)+ci(2k-\nu))(\nu-m)}{4(bi(m-2s)+ci(2k-\nu))}}\sqrt{bi(m-2s)+ci(2k-\nu)}\,\operatorname{erfi}\left(\frac{p+2(bi(m-2s)+ci(2k-\nu))z}{2\sqrt{bi(m-2s)+ci(2k-\nu)}}\right) - e^{-\frac{p^2+2i\pi(-ib(m-2s)-ic(2k-\nu))(\nu-m)}{4(-ib(m-2s)-ic(2k-\nu))}}\sqrt{-ib(m-2s)-ic(2k-\nu)}\,\operatorname{erfi}\left(\frac{p-2(bi(m-2s)+ci(2k-\nu))z}{2\sqrt{-ib(m-2s)-ic(2k-\nu)}}\right)\right) + \frac{1}{bi(m-2s)+ci(\nu-2k)}\left(e^{-\frac{p^2+2i\pi(m+\nu)(bi(m-2s)+ci(\nu-2k))}{4(bi(m-2s)+ci(\nu-2k))}}\sqrt{bi(m-2s)+ci(\nu-2k)}\,\operatorname{erfi}\left(\frac{p+2(bi(m-2s)+ci(\nu-2k))z}{2\sqrt{bi(m-2s)+ci(\nu-2k)}}\right) - e^{-\frac{p^2-2i\pi(m+\nu)(-ib(m-2s)-ic(\nu-2k))}{4(-ib(m-2s)-ic(\nu-2k))}}\sqrt{-ib(m-2s)-ic(\nu-2k)}\,\operatorname{erfi}\left(\frac{p-2(bi(m-2s)+ci(\nu-2k))z}{2\sqrt{-ib(m-2s)-ic(\nu-2k)}}\right)\right)\right) /;\ m\in\mathbb{N}^+\land \nu\in\mathbb{N}^+$$

01.06.21.1418.01

$$\int e^{pz}\sin^m(b\sqrt{z})\sin^\nu(c\sqrt{z})\,dz = 2^{-m-\nu-1}\binom{\nu}{\frac{\nu}{2}}\left(\sum_{s=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^s e^{\frac{im\pi}{2}}\binom{m}{s}\left(\frac{4e^{pz-\frac{im\pi}{2}}\cos\left(\frac{m\pi}{2}-b(m-2s)\sqrt{z}\right)}{p} + \frac{b\,e^{-\frac{(2ibs-ibm)^2}{4p}}\,i\sqrt{\pi}\,(m-2s)\operatorname{erfi}\left(\frac{2p\sqrt{z}-ib(m-2s)}{2\sqrt{p}}\right)}{p^{3/2}} - \frac{i\,b\,e^{\frac{b^2(m-2s)^2}{4p}-im\pi}\sqrt{\pi}\,(m-2s)\operatorname{erfi}\left(\frac{2\sqrt{z}\,p+bi(m-2s)}{2\sqrt{p}}\right)}{p^{3/2}}\right)\right)(1-\nu \bmod 2) +$$

$$\frac{2^{-m-v} e^{p z} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)(1 - v \bmod 2)}{p} + 2^{-m-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k e^{\frac{i \pi v}{2}} \binom{v}{k} \left(\frac{4 e^{p z - \frac{i \pi v}{2}} \cos\left(c \sqrt{z} (2k - v) + \frac{\pi v}{2}\right)}{p} - \right.$$

$$\left. \frac{e^{-\frac{(2 i c k - i c v)^2}{4 p}} \sqrt{\pi} (2 i c k - i c v) \operatorname{erfi}\left(\frac{2 \sqrt{z} p + c i (2k - v)}{2 \sqrt{p}}\right)}{p^{3/2}} - \frac{i c e^{\frac{c^2 (v - 2k)^2}{4 p} - i \pi v} \sqrt{\pi} (v - 2k) \operatorname{erfi}\left(\frac{2 \sqrt{z} p + c i (v - 2k)}{2 \sqrt{p}}\right)}{p^{3/2}} \right) +$$

$$2^{-m-v-1} \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \binom{m}{s} \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{k+s} \binom{v}{k} \left(e^{-\frac{1}{2} i \pi (v-m)} \left(\frac{4 e^{p z - \frac{1}{2} i \pi (m-v)} \cos\left(\frac{1}{2} \pi (v - m) + (2 c k + b m - 2 b s - c v) \sqrt{z}\right)}{p} + \right.\right.$$

$$\frac{1}{p^{3/2}} \left(e^{\frac{(2 c k + b m - 2 b s - c v)^2}{4 p}} \sqrt{\pi} (2 c k + b m - 2 b s - c v) \operatorname{erf}\left(\frac{2 i \sqrt{z} p + b (m - 2s) + c (2k - v)}{2 \sqrt{p}}\right)\right) + \frac{1}{p^{3/2}}$$

$$\left.\left(e^{\frac{(-2 c k - b m + 2 b s + c v)^2}{4 p} + i \pi (v - m)} \sqrt{\pi} (2 c k + b m - 2 b s - c v) \operatorname{erf}\left(\frac{-2 i \sqrt{z} p + b (m - 2s) + c (2k - v)}{2 \sqrt{p}}\right)\right)\right) +$$

$$e^{\frac{1}{2} i \pi (m+v)} \left(\frac{4 e^{p z - \frac{1}{2} i \pi (m+v)} \cos\left(\frac{1}{2} \pi (m + v) + (2 c k - b m + 2 b s - c v) \sqrt{z}\right)}{p} - \right.$$

$$\frac{1}{p^{3/2}} \left(e^{\frac{(b (m - 2s) + c (v - 2k))^2}{4 p}} \sqrt{\pi} (b (m - 2s) + c (v - 2k)) \operatorname{erf}\left(\frac{-2 i \sqrt{z} p - b (m - 2s) + c (2k - v)}{2 \sqrt{p}}\right)\right) -$$

$$\frac{1}{p^{3/2}} \left(i e^{\frac{(b (m - 2s) + c (v - 2k))^2}{4 p} - i \pi (m+v)} \sqrt{\pi} (b (m - 2s) + c (v - 2k)) \right.$$

$$\left.\left.\left. \operatorname{erfi}\left(\frac{2 \sqrt{z} p + b i (m - 2s) + c i (v - 2k)}{2 \sqrt{p}}\right)\right)\right)\right) /; m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

Involving $e^{p z^r} \sin^m(b z^r) \sin^v(c z^r)$

01.06.21.1419.01

$$\int e^{p z^r} \sin^m(b z^r) \sin^\nu(c z^r)\, dz = -\frac{(-1)^m 2^{-m-\nu} z (-p z^r)^{-1/r} (1 - m \bmod 2)(1 - \nu \bmod 2)}{r} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{1}{r}, -p z^r\right) - \frac{2^{-m-\nu} i^{-m-\nu} z}{r} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left((-1)^m e^{\frac{i \pi \nu}{2}} \Gamma\left(\frac{1}{r}, (-2 b i k + i b m - p) z^r\right) ((-2 b i k + i b m - p) z^r)^{-1/r} + e^{\frac{i \pi \nu}{2}} ((2 i b k - i b m - p) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (2 i b k - i b m - p) z^r\right)\right) - \frac{(-1)^m i^{-\nu} 2^{-m-\nu} z}{r} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^\nu \Gamma\left(\frac{1}{r}, (-2 c i k - p + i c \nu) z^r\right) ((-2 c i k - p + i c \nu) z^r)^{-1/r} + ((2 i c k - p - i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (2 i c k - p - i c \nu) z^r\right)\right) - \frac{(-1)^m i^{-m-\nu} 2^{-m-\nu} z}{r} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu \Gamma\left(\frac{1}{r}, (-2 b i k + i b m - p - 2 i c s + i c \nu) z^r\right) ((-2 b i k + i b m - p - 2 i c s + i c \nu) z^r)^{-1/r} + (-1)^{m+\nu} ((2 i b k - i b m - p - 2 i c s + i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (2 i b k - i b m - p - 2 i c s + i c \nu) z^r\right) + ((-2 b i k + i b m - p + 2 i c s - i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-2 b i k + i b m - p + 2 i c s - i c \nu) z^r\right) + (-1)^m ((2 i b k - i b m - p + 2 i c s - i c \nu) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (2 i b k - i b m - p + 2 i c s - i c \nu) z^r\right)\right) /;\ m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1420.01

$$\int e^{p z^2} \sin^m(b z^2) \sin^\nu(c z^2)\, dz = 2^{-m-\nu-1} \sqrt{\pi} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \left((-1)^s \binom{m}{s} \left(e^{-\frac{1}{2} i m \pi} \sqrt{p + b i (m - 2 s)}\, (p - i b (m - 2 s)) \operatorname{erfi}\left(\sqrt{p + b i (m - 2 s)}\, z \right) + e^{\frac{i m \pi}{2}} (p + b i (m - 2 s)) \sqrt{p - i b (m - 2 s)} \operatorname{erfi}\left(\sqrt{p - i b (m - 2 s)}\, z \right) \right) \right) \Big/ ((p - i b (m - 2 s)) (p + b i (m - 2 s))) + \frac{2^{-m-\nu-1} \sqrt{\pi}\, (1 - m \bmod 2) (1 - \nu \bmod 2)}{\sqrt{p}} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{p}\, z \right) + 2^{-m-\nu-1} \sqrt{\pi} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} \left((-1)^k \binom{\nu}{k} \left(e^{-\frac{1}{2} i \pi \nu} \sqrt{p + c i (\nu - 2 k)}\, (p - i c (\nu - 2 k)) \operatorname{erfi}\left(\sqrt{p + c i (\nu - 2 k)}\, z \right) + e^{\frac{i \pi \nu}{2}} (p + c i (\nu - 2 k)) \sqrt{p - i c (\nu - 2 k)} \operatorname{erfi}\left(\sqrt{p - i c (\nu - 2 k)}\, z \right) \right) \right) \Big/ ((p - i c (\nu - 2 k)) (p + c i (\nu - 2 k))) + 2^{-m-\nu-1} \sqrt{\pi} \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \binom{m}{s} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{k+s} \binom{\nu}{k} \left(\left(e^{\frac{1}{2} i \pi (\nu - m)} \sqrt{p + b i (m - 2 s) + c i (2 k - \nu)}\, (p - i b (m - 2 s) - i c (2 k - \nu)) \operatorname{erfi}\left(\sqrt{p + b i (m - 2 s) + c i (2 k - \nu)}\, z \right) + e^{-\frac{1}{2} i \pi (\nu - m)} (p + b i (m - 2 s) + c i (2 k - \nu)) \sqrt{p - i b (m - 2 s) - i c (2 k - \nu)} \operatorname{erfi}\left(\sqrt{p - i b (m - 2 s) - i c (2 k - \nu)}\, z \right) \right) \Big/ ((p - i b (m - 2 s) - i c (2 k - \nu)) (p + b i (m - 2 s) + c i (2 k - \nu))) + \left(e^{-\frac{1}{2} i \pi (m + \nu)} \sqrt{p + b i (m - 2 s) + c i (\nu - 2 k)}\, (p - i b (m - 2 s) - i c (\nu - 2 k)) \operatorname{erfi}\left(\sqrt{p + b i (m - 2 s) + c i (\nu - 2 k)}\, z \right) + e^{\frac{1}{2} i \pi (m + \nu)} (p + b i (m - 2 s) + c i (\nu - 2 k)) \sqrt{p - i b (m - 2 s) - i c (\nu - 2 k)} \operatorname{erfi}\left(\sqrt{p - i b (m - 2 s) - i c (\nu - 2 k)}\, z \right) \right) \Big/ ((p - i b (m - 2 s) - i c (\nu - 2 k)) (p + b i (m - 2 s) + c i (\nu - 2 k))) \right) /;\ m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1421.01

$$\int e^{p\sqrt{z}} \sin^m(b\sqrt{z}) \sin^\nu(c\sqrt{z})\,dz = \frac{2^{-m-\nu+1} e^{p\sqrt{z}} (p\sqrt{z}-1)(1-m \bmod 2)(1-\nu \bmod 2)}{p^2} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} + 2^{-m-\nu+1} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^s \binom{m}{s} e^{\frac{i\pi m}{2}+(p-i b(m-2s))\sqrt{z}} \left(\frac{e^{2\left(i b(m-2s)\sqrt{z}-\frac{i m\pi}{2}\right)} (\sqrt{z}\, p + b\, i(m-2s)\sqrt{z}-1)}{(p+b\, i(m-2s))^2} + \frac{\sqrt{z}}{p-i b(m-2s)} - \frac{1}{(i b(m-2s)-p)^2} \right) + 2^{-m-\nu+1} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} e^{\frac{i\pi\nu}{2}+(p-i c(\nu-2k))\sqrt{z}} \left(\frac{e^{2\left(i c(\nu-2k)\sqrt{z}-\frac{i\pi\nu}{2}\right)} (\sqrt{z}\, p + c\, i(\nu-2k)\sqrt{z}-1)}{(p+c\, i(\nu-2k))^2} + \frac{\sqrt{z}}{p-i c(\nu-2k)} - \frac{1}{(i c(\nu-2k)-p)^2} \right) + 2^{-m-\nu+1} \sum_{s=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \binom{m}{s} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{k+s} \binom{\nu}{k} \left(e^{(p-i b(m-2s)-i c(2k-\nu))\sqrt{z}-\frac{1}{2} i\pi(\nu-m)} \left(\left(e^{2\left(\sqrt{z}\,(b\, i(m-2s)+c\, i(2k-\nu))+\frac{1}{2} i\pi(\nu-m)\right)} (\sqrt{z}\, p + (b\, i(m-2s)+c\, i(2k-\nu))\sqrt{z}-1) \right) \Big/ (p+b\, i(m-2s)+c\, i(2k-\nu))^2 + \frac{\sqrt{z}}{p-i b(m-2s)-i c(2k-\nu)} - \frac{1}{(-p+b\, i(m-2s)+c\, i(2k-\nu))^2} \right) + e^{\frac{1}{2} i\pi(m+\nu)+(p-i b(m-2s)-i c(\nu-2k))\sqrt{z}} \left(\left(e^{2\left((b\, i(m-2s)+c\, i(\nu-2k))\sqrt{z}-\frac{1}{2} i\pi(m+\nu)\right)} (\sqrt{z}\, p + (b\, i(m-2s)+c\, i(\nu-2k))\sqrt{z}-1) \right) \Big/ (p+b\, i(m-2s)+c\, i(\nu-2k))^2 + \frac{\sqrt{z}}{p-i b(m-2s)-i c(\nu-2k)} - \frac{1}{(-p+b\, i(m-2s)+c\, i(\nu-2k))^2} \right) \right) \;/;\; m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

Involving $e^{b z^r + e} \sin^m(a z^r + q) \sin^\nu(c z^r + g)$

01.06.21.1422.01

$$\int e^{b z^r+e} \sin^m(a z^r + q) \sin^v(c z^r + g) \, dz ==$$

$$-\frac{(-1)^m 2^{-m-v} e^e z (-b z^r)^{-1/r} (1 - m \bmod 2)(1 - v \bmod 2)}{r} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} \Gamma\left(\frac{1}{r}, -b z^r\right) - \frac{i^{-m} 2^{-m-v} z}{r} \binom{v}{\frac{v}{2}}$$

$$(1 - v \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left((-1)^m e^{e+2 i k q - i m q} \Gamma\left(\frac{1}{r}, (-b - 2 i a k + i a m) z^r\right) ((-b - 2 i a k + i a m) z^r)^{-1/r} + \right.$$

$$\left. e^{e-2 i k q + i m q} ((-b + 2 i a k - i a m) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b + 2 i a k - i a m) z^r\right)\right) - \frac{(-1)^m i^{-v} 2^{-m-v} z}{r} \binom{m}{\frac{m}{2}}$$

$$(1 - m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \left((-1)^v e^{e+2 i g k - i g v} \Gamma\left(\frac{1}{r}, (-b - 2 i c k + i c v) z^r\right) ((-b - 2 i c k + i c v) z^r)^{-1/r} + \right.$$

$$\left. e^{e-2 i g k + i g v} ((-b + 2 i c k - i c v) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b + 2 i c k - i c v) z^r\right)\right) -$$

$$\frac{i^{m-v} 2^{-m-v} z}{r} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left((-1)^v e^{e+2 i k q - i m q + 2 i g s - i g v} \Gamma\left(\frac{1}{r}, (-b - 2 i a k + i a m - 2 i c s + i c v) z^r\right)\right.$$

$$((-b - 2 i a k + i a m - 2 i c s + i c v) z^r)^{-1/r} + (-1)^{m+v} e^{e-2 i k q + i m q + 2 i g s - i g v}$$

$$((-b + 2 i a k - i a m - 2 i c s + i c v) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b + 2 i a k - i a m - 2 i c s + i c v) z^r\right) +$$

$$e^{e+2 i k q - i m q - 2 i g s + i g v} ((-b - 2 i a k + i a m + 2 i c s - i c v) z^r)^{-1/r} \Gamma\left(\frac{1}{r}, (-b - 2 i a k + i a m + 2 i c s - i c v)\right.$$

$$\left. z^r\right) + (-1)^m e^{e-2 i k q + i m q - 2 i g s + i g v} ((-b + 2 i a k - i a m + 2 i c s - i c v) z^r)^{-1/r}$$

$$\left.\Gamma\left(\frac{1}{r}, (-b + 2 i a k - i a m + 2 i c s - i c v) z^r\right)\right) /; m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

01.06.21.1423.01

$$\int e^{b z^2+e} \sin^m(a z^2+q) \sin^v(c z^2+g) \, dz = \frac{2^{-m-v-1} e^e \sqrt{\pi} (1-m \bmod 2)(1-v \bmod 2)}{\sqrt{b}} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} \operatorname{erfi}(\sqrt{b}\, z) + 2^{-m-v-1} \sqrt{\pi} \binom{v}{\frac{v}{2}} (1-v \bmod 2) \sum_{k=0}^{\lfloor \frac{m-1}{2} \rfloor} (-1)^k e^{e+i(m-2k)q-\frac{i m \pi}{2}} \binom{m}{k} \left(\frac{\operatorname{erfi}(\sqrt{b+a i (m-2k)}\, z)}{\sqrt{b+a i (m-2k)}} + \frac{e^{2\left(\frac{i m \pi}{2}-i(m-2k)q\right)} \operatorname{erfi}(\sqrt{b-i a (m-2k)}\, z)}{\sqrt{b-i a (m-2k)}} \right) + 2^{-m-v-1} \sqrt{\pi} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{k=0}^{\lfloor \frac{v-1}{2} \rfloor} (-1)^k e^{e+g i (v-2k)-\frac{i \pi v}{2}} \binom{v}{k} \left(\frac{\operatorname{erfi}(\sqrt{b+c i (v-2k)}\, z)}{\sqrt{b+c i (v-2k)}} + \frac{e^{2\left(\frac{i \pi v}{2}-i g (v-2k)\right)} \operatorname{erfi}(\sqrt{b-i c (v-2k)}\, z)}{\sqrt{b-i c (v-2k)}} \right) + 2^{-m-v-1} \sqrt{\pi} \sum_{k=0}^{\lfloor \frac{m-1}{2} \rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\lfloor \frac{v-1}{2} \rfloor} (-1)^s \binom{v}{s} \left(e^{e-\frac{1}{2} i \pi (v-m) - i(m-2k)q + g i (v-2s)} \left(\frac{\operatorname{erfi}(\sqrt{b-i a (m-2k)+c i (v-2s)}\, z)}{\sqrt{b-i a (m-2k)+c i (v-2s)}} + \left(e^{2\left(\frac{1}{2} i \pi (v-m) + i(m-2k)q - i g (v-2s)\right)} \operatorname{erfi}(\sqrt{b+a i (m-2k)-i c (v-2s)}\, z) \right) \Big/ \left(\sqrt{b+a i (m-2k)-i c (v-2s)} \right) \right) + e^{e+i(m-2k)q+g i (v-2s)-\frac{1}{2} i \pi (m+v)} \left(\frac{\operatorname{erfi}(\sqrt{b+a i (m-2k)+c i (v-2s)}\, z)}{\sqrt{b+a i (m-2k)+c i (v-2s)}} + \left(e^{2\left(-i(m-2k)q - i g (v-2s) + \frac{1}{2} i \pi (m+v)\right)} \operatorname{erfi}(\sqrt{b-i a (m-2k)-i c (v-2s)}\, z) \right) \Big/ \left(\sqrt{b-i a (m-2k)-i c (v-2s)} \right) \right) \right) /; m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

01.06.21.1424.01

$$\int e^{\sqrt{z}\, b+e} \sin^m\left(\sqrt{z}\, a+q\right) \sin^v\left(\sqrt{z}\, c+g\right) dz = \frac{2^{-m-v+1} e^{\sqrt{z}\, b+e} \left(b \sqrt{z}-1\right) \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1-m \bmod 2)(1-v \bmod 2)}{b^2} +$$

$$2^{-m-v+1} \binom{v}{\frac{v}{2}} (1-v \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \left(\frac{e^{e+i(m-2k)q+(b+a i(m-2k))\sqrt{z}-\frac{i m \pi}{2}} \left(\sqrt{z}\, b+a i (m-2k)\sqrt{z}-1\right)}{(-b-i a(m-2k))^2} + \right.$$

$$\left. \frac{e^{e-i(m-2k)q+(b-i a(m-2k))\sqrt{z}+\frac{i m \pi}{2}} \left(\sqrt{z}\, b-i a(m-2k)\sqrt{z}-1\right)}{(b-i a(m-2k))^2} \right) \binom{m}{k} +$$

$$2^{-m-v+1} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \left(\frac{e^{e+g i(v-2k)+(b+c i(v-2k))\sqrt{z}-\frac{i \pi v}{2}} \left(\sqrt{z}\, b+c i(v-2k)\sqrt{z}-1\right)}{(-b-i c(v-2k))^2} + \right.$$

$$\left. \frac{e^{e+\frac{i \pi v}{2}-i g(v-2k)+(b-i c(v-2k))\sqrt{z}} \left(\sqrt{z}\, b-i c(v-2k)\sqrt{z}-1\right)}{(b-i c(v-2k))^2} \right) \binom{v}{k} +$$

$$2^{-m-v+1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \left(\left(e^{e-i(m-2k)q+\frac{1}{2} i \pi (m+v)-i g(v-2s)+(b-i a(m-2k)-i c(v-2s))\sqrt{z}} \right. \right.$$
$$\left. \left(\sqrt{z}\, b+(-i a(m-2k)-i c(v-2s))\sqrt{z}-1\right)\right) \Big/ (b-i a(m-2k)-i c(v-2s))^2 +$$
$$\left(e^{e+i(m-2k)q+\frac{1}{2} i \pi (v-m)-i g(v-2s)+(b+a i(m-2k)-i c(v-2s))\sqrt{z}} \left(\sqrt{z}\, b+(i a(m-2k)-i c(v-2s))\sqrt{z}-1\right)\right) \Big/$$
$$(b+a i(m-2k)-i c(v-2s))^2 + \left(e^{e+i(m-2k)q-\frac{1}{2} i \pi (m+v)+g i(v-2s)+(b+a i(m-2k)+c i(v-2s))\sqrt{z}} \right.$$
$$\left. \left(\sqrt{z}\, b-(-i a(m-2k)-i c(v-2s))\sqrt{z}-1\right)\right) \Big/ (-b-i a(m-2k)-i c(v-2s))^2 +$$
$$\left(e^{e-i(m-2k)q-\frac{1}{2} i \pi (v-m)+g i(v-2s)+(b-i a(m-2k)+c i(v-2s))\sqrt{z}} \left(\sqrt{z}\, b-(i a(m-2k)-i c(v-2s))\sqrt{z}-1\right)\right) \Big/$$
$$\left.(-b+a i(m-2k)-i c(v-2s))^2\right) \binom{v}{s} /;\ m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

Involving $e^{b z^r+d z+e} \sin^m\left(a z^r+p z+q\right) \sin^v\left(c z^r+f z+g\right)$

01.06.21.1425.01

$$\int e^{b z^2+d z+e} \sin^m\left(a z^2+p z+q\right) \sin^v\left(c z^2+f z+g\right) dz =$$

$$\frac{2^{-m-v-1} e^{-\frac{d^2-4 b e}{4 b}} \sqrt{\pi} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} \operatorname{erfi}\left(\frac{d+2 b z}{2\sqrt{b}}\right) (1-m \bmod 2)(1-v \bmod 2)}{\sqrt{b}} +$$

$$2^{-m-v-1}\sqrt{\pi}\binom{v}{\frac{v}{2}}\Bigg(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{b^2+a^2(m-2k)^2}\Bigg((-1)^k\binom{m}{k}\Bigg(e^{-\frac{(d+i(m-2k)p)^2+2(ib+2ak-am)(2ie+m(\pi-2q)+4kq)}{4(b+ai(m-2k))}}\sqrt{b+ai(m-2k)}$$

$$(b-ia(m-2k))\operatorname{erfi}\left(\frac{d+i(m-2k)p+2bz+2ai(m-2k)z}{2\sqrt{b+ai(m-2k)}}\right)+e^{-\frac{(d-i(m-2k)p)^2+2(-ib+2ak-am)(-2ie+m(\pi-2q)+4kq)}{4(b-ia(m-2k))}}$$

$$(b+ai(m-2k))\sqrt{b-ia(m-2k)}\operatorname{erfi}\left(\frac{d-i(m-2k)p+2(b-ia(m-2k))z}{2\sqrt{b-ia(m-2k)}}\right)\Bigg)\Bigg)\Bigg)(1-v\bmod 2)+$$

$$2^{-m-v-1}\sqrt{\pi}\binom{m}{\frac{m}{2}}(1-m\bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}\frac{1}{b^2+c^2(v-2k)^2}\Bigg((-1)^k\binom{v}{k}\Bigg(e^{-\frac{(d+fi(v-2k))^2+2(2ie+4gk-2gv+\pi v)(ib+2ck-cv)}{4(b+ci(v-2k))}}\sqrt{b+ci(v-2k)}$$

$$(b-ic(v-2k))\operatorname{erfi}\left(\frac{d+fi(v-2k)+2bz+2ci(v-2k)z}{2\sqrt{b+ci(v-2k)}}\right)+e^{-\frac{(d-if(v-2k))^2+2(-2ie+4gk-2gv+\pi v)(-ib+2ck-cv)}{4(b-ic(v-2k))}}$$

$$(b+ci(v-2k))\sqrt{b-ic(v-2k)}\operatorname{erfi}\left(\frac{d-if(v-2k)+2(b-ic(v-2k))z}{2\sqrt{b-ic(v-2k)}}\right)\Bigg)\Bigg)+$$

$$2^{-m-v-1}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{k+s}\binom{v}{s}\Bigg(\Bigg(\Bigg(e^{-\frac{(d+i(2kp-mp+2fs-fv))^2+2(-2ie+m(\pi-2q)+4kq+4gs-2gv+\pi v)(-ib+2ak-am+2cs-cv)}{4(b+i(2ak-am+2cs-cv))}}$$

$$\operatorname{erfi}\left(\frac{d+i(2k-m)p+fi(2s-v)+2(b+ai(2k-m)+ci(2s-v))z}{2\sqrt{b+ai(2k-m)+ci(2s-v)}}\right)\Bigg)\Bigg/$$

$$\left(\sqrt{b+ai(2k-m)+ci(2s-v)}\right)+\Bigg(e^{-\frac{(d+i(-2kp+mp+2fs-fv))^2+2(ib+2ak-am-2cs+cv)(2ie+m(\pi-2q)+4kq-4gs+2gv-\pi v)}{4(b-i(2ak-am-2cs+cv))}}$$

$$\operatorname{erfi}\left(\frac{d+i(m-2k)p+fi(2s-v)+2(b+ai(m-2k)+ci(2s-v))z}{2\sqrt{b+ai(m-2k)+ci(2s-v)}}\right)\Bigg)\Bigg/$$

$$\left(\sqrt{b+ai(m-2k)+ci(2s-v)}\right)+\Bigg(e^{-\frac{(d+i(2kp-mp-2fs+fv))^2+2(-ib+2ak-am-2cs+cv)(-2ie+m(\pi-2q)+4kq-4gs+2gv-\pi v)}{4(b+i(2ak-am-2cs+cv))}}$$

$$\operatorname{erfi}\left(\frac{d+i(2k-m)p+fi(v-2s)+2(b+ai(2k-m)+ci(v-2s))z}{2\sqrt{b+ai(2k-m)+ci(v-2s)}}\right)\Bigg)\Bigg/$$

$$\left(\sqrt{b+ai(2k-m)+ci(v-2s)}\right)+\Bigg(e^{-\frac{(d+i(m-2k)p+fi(v-2s))^2+2(2ie+m(\pi-2q)+4kq+4gs-2gv+\pi v)(ib+2ak-am+2cs-cv)}{4(b+ai(m-2k)+ci(v-2s))}}$$

$$\operatorname{erfi}\left(\frac{d+i(m-2k)p+fi(v-2s)+2(b+ai(m-2k)+ci(v-2s))z}{2\sqrt{b+ai(m-2k)+ci(v-2s)}}\right)\Bigg)\Bigg/$$

$$\left(\sqrt{b+ai(m-2k)+ci(v-2s)}\right)\Bigg)\Bigg/;\ m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

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$$\int e^{\sqrt{z}\, b+d z+e} \sin^m\left(\sqrt{z}\, a+p z+q\right) \sin^\nu\left(\sqrt{z}\, c+f z+g\right) dz ==$$

$$2^{-m-\nu-2}\left(\frac{4 e^{\sqrt{z}\, b+d z}}{d}-\frac{2 b e^{-\frac{b^2}{4 d}} \sqrt{\pi}\, \operatorname{erfi}\left(\frac{b+2 d \sqrt{z}}{2 \sqrt{d}}\right)}{d^{3/2}}\right) e^e \binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}(1-m \bmod 2)(1-\nu \bmod 2)+$$

$$2^{-m-\nu-1}\binom{\nu}{\frac{\nu}{2}}\left(\sum_{s=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^s e^{e-i q (m-2 s)+\frac{i m \pi}{2}}\binom{m}{s}\right.$$

$$\left(\left(e^{-\frac{(b-i a m+2 i a s)^2}{4 (d-i m p+2 i p s)}} \sqrt{\pi}\, (i a (m-2 s)-b) \operatorname{erfi}\left(\frac{b-i a (m-2 s)+2 (d-i m p+2 i p s) \sqrt{z}}{2 \sqrt{d-i m p+2 i p s}}\right)\right) \Big/ (d-i m p+2 i p s)^{3/2}+\right.$$

$$\frac{2 e^{2 i q m-i \pi m-4 i q s+(d+i p (m-2 s)) z+(b+a i (m-2 s)) \sqrt{z}}}{d+i p (m-2 s)}-\frac{1}{(d+i p (m-2 s))^{3/2}}\left(e^{-\frac{(b+a i (m-2 s))^2}{4 (d+i p (m-2 s))}+2 i q (m-2 s)-i m \pi} \sqrt{\pi}\right.$$

$$\left.\left.(b+a i (m-2 s)) \operatorname{erfi}\left(\frac{b+a i (m-2 s)+2 (d+i m p-2 i p s) \sqrt{z}}{2 \sqrt{d+i p (m-2 s)}}\right)\right)+\frac{2 e^{\sqrt{z}\, (b-i a (m-2 s))+(d-i p (m-2 s)) z}}{d-i p (m-2 s)}\right)\right)$$

$$(1-\nu \bmod 2)+2^{-m-\nu-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2) \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k e^{e+\frac{i \pi \nu}{2}-i g (\nu-2 k)}\binom{\nu}{k}$$

$$\left(-\left(e^{-\frac{(b+2 i c k-i c \nu)^2}{4 (d+2 i f k-i f \nu)}} \sqrt{\pi}\, (b+2 i c k-i c \nu) \operatorname{erfi}\left(\frac{b+c i (2 k-\nu)+2 (d+2 i f k-i f \nu) \sqrt{z}}{2 \sqrt{d+2 i f k-i f \nu}}\right)\right) \Big/ (d+2 i f k-i f \nu)^{3/2}+\right.$$

$$\frac{2 e^{-4 g i k+2 i g \nu-i \pi \nu+(d+f i (\nu-2 k)) z+(b+c i (\nu-2 k)) \sqrt{z}}}{d+f i (\nu-2 k)}-\frac{1}{(d+f i (\nu-2 k))^{3/2}}\left(e^{-\frac{(b+c i (\nu-2 k))^2}{4 (d+f i (\nu-2 k))}-i \pi \nu+2 g i (\nu-2 k)} \sqrt{\pi}\right.$$

$$\left.\left.(b+c i (\nu-2 k)) \operatorname{erfi}\left(\frac{b+c i (\nu-2 k)+2 (d-2 i f k+i f \nu) \sqrt{z}}{2 \sqrt{d+f i (\nu-2 k)}}\right)\right)+\frac{2 e^{\sqrt{z}\, (b-i c (\nu-2 k))+(d-i f (\nu-2 k)) z}}{d-i f (\nu-2 k)}\right)+$$

$$2^{-m-\nu-1} \sum_{s=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\binom{m}{s} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{k+s}\binom{\nu}{k}\left(e^{e-i q (m-2 s)-i g (\nu-2 k)+\frac{1}{2} i \pi (m+\nu)}\left(\left(e^{-\frac{(b+i (a (m-2 s)+c (\nu-2 k)))^2}{4 (d+i p (m-2 s)+f i (\nu-2 k))}+2 i q (m-2 s)+2 g i (\nu-2 k)-i \pi (m+\nu)}\right.\right.\right.$$

$$\sqrt{\pi}\, (-i b+a (m-2 s)+c (\nu-2 k)) \operatorname{erfi}\left((b+a i (m-2 s)+c i (\nu-2 k)+\right.$$

$$\left.\left.\left.2 (d+i p (m-2 s)+f i (\nu-2 k)) \sqrt{z}\right) \Big/ \left(2 \sqrt{d+i p (m-2 s)+f i (\nu-2 k)}\right)\right)\right) \Big/$$

$$\left((i d+2 f k-m p+2 p s-f \nu) \sqrt{d+i p (m-2 s)+f i (\nu-2 k)}\right)+$$

$$\left(2 e^{2 i q (m-2 s)+2 g i (\nu-2 k)-i \pi (m+\nu)+(d+i p (m-2 s)+f i (\nu-2 k)) z+(b+i (-2 c k+a m-2 a s+c \nu)) \sqrt{z}}\right) \Big/$$

$$(d+i\,p\,(m-2\,s)+f\,i\,(v-2\,k))-\left(e^{\frac{i\,(i\,b+a\,(m-2\,s)+c\,(v-2\,k))^2}{4\,(i\,d+p\,(m-2\,s)+f\,(v-2\,k))}}\sqrt{\pi}\,(i\,b+a\,(m-2\,s)+c\,(v-2\,k))\right.$$

$$\operatorname{erfi}\Big(\Big(b+i\left(-a\,(m-2\,s)+c\,(2\,k-v)+2\,(-i\,d+2\,f\,k-m\,p+2\,p\,s-f\,v)\sqrt{z}\right)\Big)\Big/$$

$$\left(2\sqrt{d+i\,(2\,f\,k-m\,p+2\,p\,s-f\,v)}\right)\Big)\Big)\Big/\Big((i\,d+p\,(m-2\,s)+f\,(v-2\,k))$$

$$\left.\sqrt{d+i\,(2\,f\,k-m\,p+2\,p\,s-f\,v)}\Big)+\frac{2\,e^{\sqrt{z}\,(b-i\,(-2\,c\,k+a\,m-2\,a\,s+c\,v))+(d+i\,(2\,f\,k-m\,p+2\,p\,s-f\,v))\,z}}{d+i\,(2\,f\,k-m\,p+2\,p\,s-f\,v)}\right)+$$

$$e^{e-i\,q\,(m-2\,s)-i\,g\,(2\,k-v)-\frac{1}{2}\,i\,\pi\,(v-m)}\left(\left(e^{\frac{(i\,b-2\,c\,k-a\,m+2\,a\,s+c\,v)^2}{4\,(d+i\,(2\,f\,k+m\,p-2\,p\,s-f\,v))}+2\,i\,q\,(m-2\,s)+2\,g\,i\,(2\,k-v)+i\,\pi\,(v-m)}\sqrt{\pi}\,(-i\,b+2\,c\,k+a\,m-\right.\right.$$

$$2\,a\,s-c\,v)\operatorname{erfi}\Big(\Big(b+i\left(a\,(m-2\,s)+c\,(2\,k-v)+2\,(-i\,d+2\,f\,k+m\,p-2\,p\,s-f\,v)\sqrt{z}\right)\Big)\Big/$$

$$\left(2\sqrt{d+i\,(2\,f\,k+m\,p-2\,p\,s-f\,v)}\right)\Big)\Big)\Big/$$

$$\left((i\,d-2\,f\,k-m\,p+2\,p\,s+f\,v)\sqrt{d+i\,(2\,f\,k+m\,p-2\,p\,s-f\,v)}\right)+$$

$$\left(e^{\frac{(i\,b+2\,c\,k+a\,m-2\,a\,s-c\,v)^2}{4\,(d-i\,(2\,f\,k+m\,p-2\,p\,s-f\,v))}}\sqrt{\pi}\,(i\,b+2\,c\,k+a\,m-2\,a\,s-c\,v)\operatorname{erfi}\Big(\Big(b-i\left(a\,(m-2\,s)+c\,(2\,k-v)+\right.\right.$$

$$\left.2\,(i\,d+2\,f\,k+m\,p-2\,p\,s-f\,v)\sqrt{z}\right)\Big)\Big/\left(2\sqrt{d-i\,(2\,f\,k+m\,p-2\,p\,s-f\,v)}\right)\Big)\Big)\Big/$$

$$\left((-i\,d-2\,f\,k-m\,p+2\,p\,s+f\,v)\sqrt{d-i\,(2\,f\,k+m\,p-2\,p\,s-f\,v)}\right)+$$

$$\left(2\,e^{2\,i\,q\,(m-2\,s)+2\,g\,i\,(2\,k-v)+i\,\pi\,(v-m)+(d+i\,(2\,f\,k+m\,p-2\,p\,s-f\,v))\,z+(b+i\,(2\,c\,k+a\,m-2\,a\,s-c\,v))\sqrt{z}}\right)\Big/(d+i\,(2\,f\,k+$$

$$\left.\left.m\,p-2\,p\,s-f\,v))+\frac{2\,e^{\sqrt{z}\,(b-i\,(2\,c\,k+a\,m-2\,a\,s-c\,v))+(d-i\,(2\,f\,k+m\,p-2\,p\,s-f\,v))\,z}}{d-i\,(2\,f\,k+m\,p-2\,p\,s-f\,v)}\right)\right)/;\ m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving product of powers of two direct functions and rational functions of exp

Involving $\sin^m(e\,z)\sin^v(c\,z)\left(a+b\,e^{d\,z}\right)^{-n}$

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$$\int\frac{\sin^m(e\,z)\sin^v(c\,z)}{\left(a+b\,e^{d\,z}\right)^n}\,dz=$$

$$2^{-m-v}\left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{k+s}\binom{v}{s}\left(\left(\cos\left(\frac{1}{2}\,\pi\,(m+v)\right)\left(e^{(2\,i\,e\,k-i\,e\,m+2\,i\,c\,s-i\,c\,v)\,z}\,{}_2F_1\left(\frac{2\,i\,e\,k-i\,e\,m+2\,i\,c\,s-i\,c\,v}{d},\right.\right.\right.\right.\right.$$

$$\left.n;\ \frac{d+2\,i\,e\,k-i\,e\,m+2\,i\,c\,s-i\,c\,v}{d};-\frac{b\,e^{d\,z}}{a}\right)-e^{(-2\,e\,i\,k+i\,e\,m-2\,i\,c\,s+i\,c\,v)\,z}$$

$$\left.\left.\left.{}_2F_1\left(\frac{-2\,e\,i\,k+i\,e\,m-2\,i\,c\,s+i\,c\,v}{d},\ n;\ \frac{d-2\,i\,e\,k+i\,e\,m-2\,i\,c\,s+i\,c\,v}{d};-\frac{b\,e^{d\,z}}{a}\right)\right)\right)\right)\Big/$$

$$(2\,i\,e\,k - i\,e\,m + 2\,i\,c\,s - i\,c\,v) + \left(\cos\left(\frac{1}{2}\,\pi\,(m-v)\right)\left(e^{(2\,i\,e\,k - i\,e\,m - 2\,i\,c\,s + i\,c\,v)\,z}\right.\right.$$

$$\left.{}_2F_1\left(\frac{2\,i\,e\,k - i\,e\,m - 2\,i\,c\,s + i\,c\,v}{d},\, n;\, \frac{d + 2\,i\,e\,k - i\,e\,m - 2\,i\,c\,s + i\,c\,v}{d};\, -\frac{b\,e^{d\,z}}{a}\right) - \right.$$

$$e^{(-2\,e\,i\,k + i\,e\,m + 2\,i\,c\,s - i\,c\,v)\,z}\,{}_2F_1\left(\frac{-2\,e\,i\,k + i\,e\,m + 2\,i\,c\,s - i\,c\,v}{d},\, n;\right.$$

$$\left.\left.\left.\frac{d - 2\,i\,e\,k + i\,e\,m + 2\,i\,c\,s - i\,c\,v}{d};\, -\frac{b\,e^{d\,z}}{a}\right)\right)\right)\Big/ (2\,i\,e\,k - i\,e\,m - 2\,i\,c\,s + i\,c\,v) +$$

$$\left(i\left(e^{(2\,i\,e\,k - i\,e\,m - 2\,i\,c\,s + i\,c\,v)\,z}\,{}_2F_1\left(\frac{2\,i\,e\,k - i\,e\,m - 2\,i\,c\,s + i\,c\,v}{d},\, n;\, \frac{d + 2\,i\,e\,k - i\,e\,m - 2\,i\,c\,s + i\,c\,v}{d};\, -\frac{b\,e^{d\,z}}{a}\right) + \right.\right.$$

$$e^{(-2\,e\,i\,k + i\,e\,m + 2\,i\,c\,s - i\,c\,v)\,z}\,{}_2F_1\left(\frac{-2\,e\,i\,k + i\,e\,m + 2\,i\,c\,s - i\,c\,v}{d},\, n;\, \frac{d - 2\,i\,e\,k + i\,e\,m + 2\,i\,c\,s - i\,c\,v}{d};\right.$$

$$\left.\left.\left. -\frac{b\,e^{d\,z}}{a}\right)\right)\sin\left(\frac{1}{2}\,\pi\,(m-v)\right)\right)\Big/ (2\,i\,e\,k - i\,e\,m - 2\,i\,c\,s + i\,c\,v) + \left(i\left(e^{(-2\,e\,i\,k + i\,e\,m - 2\,i\,c\,s + i\,c\,v)\,z}\right.\right.$$

$${}_2F_1\left(\frac{-2\,e\,i\,k + i\,e\,m - 2\,i\,c\,s + i\,c\,v}{d},\, n;\, \frac{d - 2\,i\,e\,k + i\,e\,m - 2\,i\,c\,s + i\,c\,v}{d};\, -\frac{b\,e^{d\,z}}{a}\right) +$$

$$e^{(2\,i\,e\,k - i\,e\,m + 2\,i\,c\,s - i\,c\,v)\,z}\,{}_2F_1\left(\frac{2\,i\,e\,k - i\,e\,m + 2\,i\,c\,s - i\,c\,v}{d},\, n;\, \frac{d + 2\,i\,e\,k - i\,e\,m + 2\,i\,c\,s - i\,c\,v}{d};\right.$$

$$\left.\left.\left.\left. -\frac{b\,e^{d\,z}}{a}\right)\right)\sin\left(\frac{1}{2}\,\pi\,(m+v)\right)\right)\Big/ (2\,i\,e\,k - i\,e\,m + 2\,i\,c\,s - i\,c\,v)\right)\right)$$

$$a^{-n} - \frac{2^{-m-v}\,b^{-n}\,e^{-d\,n\,z}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}\,{}_2F_1\left(n,\, n;\, n+1;\, -\frac{a\,e^{-d\,z}}{b}\right)(m \bmod 2 - 1)\,(v \bmod 2 - 1)}{d\,n} -$$

$$\frac{1}{e}$$

$$\left(i\right.$$

$$2^{-m-v}$$

$$a^{-n}$$

$$\binom{v}{\frac{v}{2}}$$

$$(1 - v \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\frac{1}{m-2\,k}\left((-1)^k\binom{m}{k}\left(e^{i\,e\,(m-2\,k)\,z - \frac{i\,m\,\pi}{2}}\,{}_2F_1\left(\frac{i\,e\,(m-2\,k)}{d},\, n;\, \frac{d + e\,i\,(m-2\,k)}{d};\, -\frac{b\,e^{d\,z}}{a}\right) - \right.\right.$$

$$e^{\frac{i m \pi}{2} - i e (m-2k) z} \, {}_2F_1\left(-\frac{i e (m-2k)}{d}, n; \frac{d - i e (m-2k)}{d}; -\frac{b e^{d z}}{a}\right)\Bigg)\Bigg)\Bigg) -$$

$$\frac{1}{c}\Bigg(i\, 2^{-m-v} a^{-n} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} \frac{1}{v - 2s} \left((-1)^s \binom{v}{s} \left(e^{i c (v-2s) z - \frac{i \pi v}{2}} \, {}_2F_1\left(\frac{i c (v-2s)}{d}, n; \frac{d + c i (v-2s)}{d}; -\frac{b e^{d z}}{a}\right) -\right.\right.$$

$$\left.\left. e^{\frac{i \pi v}{2} - i c (v-2s) z} \, {}_2F_1\left(-\frac{i c (v-2s)}{d}, n; \frac{d - i c (v-2s)}{d}; -\frac{b e^{d z}}{a}\right)\right)\right)\Bigg) /; n \in \mathbb{N}^+ \bigwedge m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

Involving $e^{p z} \sin^m(e z) \sin^v(c z) \left(a + b e^{d z}\right)^{-n}$

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$$\int \frac{e^{p z} \sin^m(e z) \sin^v(c z)}{\left(a + b e^{d z}\right)^n} \, dz = 2^{-m-v} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)\, a^{-n}$$

$$\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \left((-1)^k \binom{m}{k} \left(e^{(e i (m-2k)+p) z - \frac{i m \pi}{2}} (i e (m-2k) - p) \, {}_2F_1\left(\frac{e i (m-2k) + p}{d}, n; \frac{d + e i (m-2k) + p}{d}; -\frac{b e^{d z}}{a}\right) -\right.\right.$$

$$\left.\left. e^{\frac{i \pi m}{2} + (p - i e (m-2k)) z} (e i (m-2k) + p) \, {}_2F_1\left(\frac{p - i e (m-2k)}{d}, n; \frac{d - i e (m-2k) + p}{d}; -\frac{b e^{d z}}{a}\right)\right)\right) \Big/$$

$$((i e (m-2k) - p)(e i (m-2k) + p)) + 2^{-m-v} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)\, a^{-n}$$

$$\sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} \left((-1)^s \binom{v}{s} \left(e^{(p + c i (v-2s)) z - \frac{i \pi v}{2}} (i c (v-2s) - p) \, {}_2F_1\left(\frac{p + c i (v-2s)}{d}, n; \frac{d + p + c i (v-2s)}{d}; -\frac{b e^{d z}}{a}\right) -\right.\right.$$

$$\left.\left. e^{\frac{i \pi v}{2} + (p - i c (v-2s)) z} (p + c i (v-2s)) \, {}_2F_1\left(\frac{p - i c (v-2s)}{d}, n; \frac{d + p - i c (v-2s)}{d}; -\frac{b e^{d z}}{a}\right)\right)\right) \Big/$$

$$((i c (v-2s) - p)(p + c i (v-2s))) + 2^{-m-v} a^{-n}$$

$$\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{k+s} \binom{v}{s} \Bigg(\Bigg(\cos\left(\frac{1}{2} \pi (m+v)\right) \Bigg(e^{(2 i e k - i e m + p + 2 i c s - i c v) z} (2 i e k - i e m - p + 2 i c s - i c v)$$

$${}_2F_1\left(\frac{2 i e k - i e m + p + 2 i c s - i c v}{d}, n; \frac{d + 2 i e k - i e m + p + 2 i c s - i c v}{d}; -\frac{b e^{d z}}{a}\right) -$$

$$e^{(-2 e i k + i e m + p - 2 i c s + i c v) z} (2 i e k - i e m + p + 2 i c s - i c v)$$

$${}_2F_1\left(\frac{-2 e i k + i e m + p - 2 i c s + i c v}{d}, n; \frac{d - 2 i e k + i e m + p - 2 i c s + i c v}{d}; -\frac{b e^{d z}}{a}\right)\Bigg)\Bigg) \Big/$$

$$((2 i e k - i e m - p + 2 i c s - i c v)(2 i e k - i e m + p + 2 i c s - i c v)) +$$

$$\left(\cos\left(\frac{1}{2} \pi (m - v)\right)\right) \Bigg(e^{(2 i e k - i e m + p - 2 i c s + i c v) z} (2 i e k - i e m - p - 2 i c s + i c v)$$

$${}_2F_1\left(\frac{2 i e k - i e m + p - 2 i c s + i c v}{d}, n; \frac{d + 2 i e k - i e m + p - 2 i c s + i c v}{d}; -\frac{b e^{d z}}{a}\right) -$$

$$e^{(-2 e i k+i e m+p+2 i c s-i c v) z}(2 i e k-i e m+p-2 i c s+i c v)\, {}_2F_1\left(\frac{-2 e i k+i e m+p+2 i c s-i c v}{d}, n; \frac{d-2 i e k+i e m+p+2 i c s-i c v}{d}; -\frac{b e^{d z}}{a}\right)\Bigg)\Bigg) \Big/$$

$$((2 i e k-i e m-p-2 i c s+i c v)(2 i e k-i e m+p-2 i c s+i c v))+$$

$$\Bigg(i\Bigg(e^{(2 i e k-i e m+p-2 i c s+i c v) z}(2 i e k-i e m-p-2 i c s+i c v)\, {}_2F_1\left(\frac{2 i e k-i e m+p-2 i c s+i c v}{d}, n; \frac{d+2 i e k-i e m+p-2 i c s+i c v}{d}; -\frac{b e^{d z}}{a}\right)+e^{(-2 e i k+i e m+p+2 i c s-i c v) z}(2 i e k-i e m+p-2 i c s+i c v)\, {}_2F_1\left(\frac{-2 e i k+i e m+p+2 i c s-i c v}{d}, n; \frac{d-2 i e k+i e m+p+2 i c s-i c v}{d}; -\frac{b e^{d z}}{a}\right)\Bigg) \sin\left(\frac{1}{2} \pi (m-v)\right)\Bigg) \Big/$$

$$((2 i e k-i e m-p-2 i c s+i c v)(2 i e k-i e m+p-2 i c s+i c v))+$$

$$\Bigg(i\Bigg(e^{(-2 e i k+i e m+p-2 i c s+i c v) z}(2 i e k-i e m+p+2 i c s-i c v)\, {}_2F_1\left(\frac{-2 e i k+i e m+p-2 i c s+i c v}{d}, n; \frac{d-2 i e k+i e m+p-2 i c s+i c v}{d}; -\frac{b e^{d z}}{a}\right)+e^{(2 i e k-i e m+p+2 i c s-i c v) z}(2 i e k-i e m-p+2 i c s-i c v)\, {}_2F_1\left(\frac{2 i e k-i e m+p+2 i c s-i c v}{d}, n; \frac{d+2 i e k-i e m+p+2 i c s-i c v}{d}; -\frac{b e^{d z}}{a}\right)\Bigg) \sin\left(\frac{1}{2} \pi (m+v)\right)\Bigg) \Big/$$

$$((2 i e k-i e m-p+2 i c s-i c v)(2 i e k-i e m+p+2 i c s-i c v))\Bigg)+$$

$$\frac{2^{-m-v} a^{-n} e^{p z}(1-m \bmod 2)(1-v \bmod 2)}{p}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}\, {}_2F_1\left(\frac{p}{d}, n; \frac{d+p}{d}; -\frac{b e^{d z}}{a}\right) /; n \in \mathbb{N}^+ \bigwedge m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

Involving product of powers of two direct functions and algebraic functions of exp

Involving $\left(a+b e^{d z}\right)^{\beta} \sin^{m}(e z) \sin^{v}(c z)$

01.06.21.1429.01

$$\int \left(a+b\,e^{d z}\right)^{\beta} \sin^{m}(e z)\sin^{\nu}(c z)\,dz = 2^{-m-\nu}\left(a+b\,e^{d z}\right)^{\beta}\Bigg(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{k+s}\binom{\nu}{s}\Bigg(\Bigg(\cos\left(\frac{1}{2}\pi(m+\nu)\right)\Bigg(e^{(2iek-iem+2ics-ic\nu)z}\,{}_2F_1\left(\frac{2iek-iem+2ics-ic\nu}{d},\right.$$

$$\left.-\beta;\frac{d+2iek-iem+2ics-ic\nu}{d};-\frac{b\,e^{dz}}{a}\right)-e^{(-2eik+iem-2ics+ic\nu)z}$$

$$\left.{}_2F_1\left(\frac{-2eik+iem-2ics+ic\nu}{d},-\beta;\frac{d-2iek+iem-2ics+ic\nu}{d};-\frac{b\,e^{dz}}{a}\right)\Bigg)\Bigg)\right/$$

$$(2iek-iem+2ics-ic\nu)+\Bigg(\cos\left(\frac{1}{2}\pi(m-\nu)\right)\Bigg(e^{(2iek-iem-2ics+ic\nu)z}$$

$${}_2F_1\left(\frac{2iek-iem-2ics+ic\nu}{d},-\beta;\frac{d+2iek-iem-2ics+ic\nu}{d};-\frac{b\,e^{dz}}{a}\right)-$$

$$e^{(-2eik+iem+2ics-ic\nu)z}\,{}_2F_1\left(\frac{-2eik+iem+2ics-ic\nu}{d},-\beta;\right.$$

$$\left.\left.\frac{d-2iek+iem+2ics-ic\nu}{d};-\frac{b\,e^{dz}}{a}\right)\Bigg)\Bigg)\right/(2iek-iem-2ics+ic\nu)+$$

$$\Bigg(i\Bigg(e^{(2iek-iem-2ics+ic\nu)z}\,{}_2F_1\left(\frac{2iek-iem-2ics+ic\nu}{d},-\beta;\frac{d+2iek-iem-2ics+ic\nu}{d};\right.$$

$$\left.-\frac{b\,e^{dz}}{a}\right)+e^{(-2eik+iem+2ics-ic\nu)z}\,{}_2F_1\left(\frac{-2eik+iem+2ics-ic\nu}{d},\right.$$

$$\left.\left.-\beta;\frac{d-2iek+iem+2ics-ic\nu}{d};-\frac{b\,e^{dz}}{a}\right)\Bigg)\sin\left(\frac{1}{2}\pi(m-\nu)\right)\Bigg)\right/$$

$$(2iek-iem-2ics+ic\nu)+\Bigg(i\Bigg(e^{(-2eik+iem-2ics+ic\nu)z}\,{}_2F_1\left(\frac{-2eik+iem-2ics+ic\nu}{d},\right.$$

$$\left.-\beta;\frac{d-2iek+iem-2ics+ic\nu}{d};-\frac{b\,e^{dz}}{a}\right)+e^{(2iek-iem+2ics-ic\nu)z}$$

$${}_2F_1\left(\frac{2iek-iem+2ics-ic\nu}{d},-\beta;\frac{d+2iek-iem+2ics-ic\nu}{d};-\frac{b\,e^{dz}}{a}\right)\Bigg)$$

$$\left.\sin\left(\frac{1}{2}\pi(m+\nu)\right)\Bigg)\right/(2iek-iem+2ics-ic\nu)\Bigg)\Bigg)\left(\frac{e^{dz}\,b}{a}+1\right)^{-\beta}+$$

$$\frac{1}{d\,\beta}\left(2^{-m-\nu}\left(\frac{e^{-dz}\,a}{b}+1\right)^{-\beta}\left(a+b\,e^{dz}\right)^{\beta}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}\,{}_2F_1\left(-\beta,-\beta;1-\beta;-\frac{a\,e^{-dz}}{b}\right)\right.$$

$$(m \bmod 2-1)$$

$$\left.(\nu \bmod 2-1)\right)-\frac{1}{e}\Bigg(i$$

$$2^{-m-\nu} \left(a+b\,e^{d z}\right)^{\beta} \left(\frac{e^{d z} b}{a}+1\right)^{-\beta} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} \frac{1}{m-2k} \left((-1)^k \binom{m}{k} \left(e^{i e (m-2k) z-\frac{i m \pi}{2}} {}_2F_1\left(\frac{i e (m-2k)}{d}, -\beta; \frac{d+e\,i\,(m-2k)}{d}; -\frac{b\,e^{d z}}{a}\right) - e^{\frac{i m \pi}{2}-i e (m-2k) z} {}_2F_1\left(-\frac{i e (m-2k)}{d}, -\beta; \frac{d-i e (m-2k)}{d}; -\frac{b\,e^{d z}}{a}\right)\right)\right) -$$

$$\frac{1}{c}\left(i\,2^{-m-\nu}\left(a+b\,e^{d z}\right)^{\beta}\left(\frac{e^{d z} b}{a}+1\right)^{-\beta}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{s=0}^{\left\lfloor \frac{\nu-1}{2}\right\rfloor}\frac{1}{\nu-2s} \left((-1)^s\binom{\nu}{s}\left(e^{i c (\nu-2s) z-\frac{i \pi \nu}{2}} {}_2F_1\left(\frac{i c (\nu-2s)}{d}, -\beta; \frac{d+c\,i\,(\nu-2s)}{d}; -\frac{b\,e^{d z}}{a}\right) - e^{\frac{i \pi \nu}{2}-i c (\nu-2s) z} {}_2F_1\left(-\frac{i c (\nu-2s)}{d}, -\beta; \frac{d-i c (\nu-2s)}{d}; -\frac{b\,e^{d z}}{a}\right)\right)\right)\right) /;\ m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

Involving $e^{p z}\left(a+b\,e^{d z}\right)^{\beta} \sin^m(e z) \sin^\nu(c z)$

01.06.21.1430.01

$$\int e^{p z}\left(a+b\,e^{d z}\right)^{\beta} \sin^m(e z)\sin^\nu(c z)\,dz = 2^{-m-\nu}\left(a+b\,e^{d z}\right)^{\beta}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\left(\frac{e^{d z} b}{a}+1\right)^{-\beta} \sum_{k=0}^{\left\lfloor \frac{m-1}{2}\right\rfloor}\left((-1)^k\binom{m}{k}\left(e^{(e\,i\,(m-2k)+p) z-\frac{i m \pi}{2}} (i e (m-2k)-p)\,{}_2F_1\left(\frac{e\,i\,(m-2k)+p}{d}, -\beta; \frac{d+e\,i\,(m-2k)+p}{d}; -\frac{b\,e^{d z}}{a}\right) - e^{\frac{i \pi m}{2}+(p-i e (m-2k)) z} (e\,i\,(m-2k)+p)\,{}_2F_1\left(\frac{p-i e (m-2k)}{d}, -\beta; \frac{d-i e (m-2k)+p}{d}; -\frac{b\,e^{d z}}{a}\right)\right)\Big/ \left((i e (m-2k)-p)(e\,i\,(m-2k)+p)\right)\right) + 2^{-m-\nu}\left(a+b\,e^{d z}\right)^{\beta}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\left(\frac{e^{d z} b}{a}+1\right)^{-\beta} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2}\right\rfloor}\left((-1)^s\binom{\nu}{s}\left(e^{(p+c\,i\,(\nu-2s)) z-\frac{i \pi \nu}{2}} (i c (\nu-2s)-p)\,{}_2F_1\left(\frac{p+c\,i\,(\nu-2s)}{d}, -\beta; \frac{d+p+c\,i\,(\nu-2s)}{d}; -\frac{b\,e^{d z}}{a}\right) - e^{\frac{i \pi \nu}{2}+(p-i c (\nu-2s)) z} (p+c\,i\,(\nu-2s))\,{}_2F_1\left(\frac{p-i c (\nu-2s)}{d}, -\beta; \frac{d+p-i c (\nu-2s)}{d}; -\frac{b\,e^{d z}}{a}\right)\right)\Big/\right.$$

$$((i\,c\,(v-2\,s)-p)\,(p+c\,i\,(v-2\,s)))+2^{-m-v}\left(a+b\,e^{d\,z}\right)^{\beta}\left(\frac{e^{d\,z}\,b}{a}+1\right)^{-\beta}$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^{k+s}\binom{v}{s}\Bigg(\Bigg(\cos\left(\frac{1}{2}\,\pi\,(m+v)\right)\Bigg(e^{(2\,i\,e\,k-i\,e\,m+p+2\,i\,c\,s-i\,c\,v)\,z}\,(2\,i\,e\,k-i\,e\,m-p+2\,i\,c\,s-i\,c\,v)$$

$$\,_2F_1\left(\frac{2\,i\,e\,k-i\,e\,m+p+2\,i\,c\,s-i\,c\,v}{d},-\beta;\frac{d+2\,i\,e\,k-i\,e\,m+p+2\,i\,c\,s-i\,c\,v}{d};-\frac{b\,e^{d\,z}}{a}\right)-$$

$$e^{(-2\,e\,i\,k+i\,e\,m+p-2\,i\,c\,s+i\,c\,v)\,z}\,(2\,i\,e\,k-i\,e\,m+p+2\,i\,c\,s-i\,c\,v)$$

$$\,_2F_1\left(\frac{-2\,e\,i\,k+i\,e\,m+p-2\,i\,c\,s+i\,c\,v}{d},-\beta;\frac{d-2\,i\,e\,k+i\,e\,m+p-2\,i\,c\,s+i\,c\,v}{d};-\frac{b\,e^{d\,z}}{a}\right)\Bigg)\Bigg)\Bigg/$$

$$((2\,i\,e\,k-i\,e\,m-p+2\,i\,c\,s-i\,c\,v)\,(2\,i\,e\,k-i\,e\,m+p+2\,i\,c\,s-i\,c\,v))+$$

$$\Bigg(\cos\left(\frac{1}{2}\,\pi\,(m-v)\right)\Bigg(e^{(2\,i\,e\,k-i\,e\,m+p-2\,i\,c\,s+i\,c\,v)\,z}\,(2\,i\,e\,k-i\,e\,m-p-2\,i\,c\,s+i\,c\,v)$$

$$\,_2F_1\left(\frac{2\,i\,e\,k-i\,e\,m+p-2\,i\,c\,s+i\,c\,v}{d},-\beta;\frac{d+2\,i\,e\,k-i\,e\,m+p-2\,i\,c\,s+i\,c\,v}{d};-\frac{b\,e^{d\,z}}{a}\right)-$$

$$e^{(-2\,e\,i\,k+i\,e\,m+p+2\,i\,c\,s-i\,c\,v)\,z}\,(2\,i\,e\,k-i\,e\,m+p-2\,i\,c\,s+i\,c\,v)$$

$$\,_2F_1\left(\frac{-2\,e\,i\,k+i\,e\,m+p+2\,i\,c\,s-i\,c\,v}{d},-\beta;\frac{d-2\,i\,e\,k+i\,e\,m+p+2\,i\,c\,s-i\,c\,v}{d};-\frac{b\,e^{d\,z}}{a}\right)\Bigg)\Bigg)\Bigg/$$

$$((2\,i\,e\,k-i\,e\,m-p-2\,i\,c\,s+i\,c\,v)\,(2\,i\,e\,k-i\,e\,m+p-2\,i\,c\,s+i\,c\,v))+$$

$$\Bigg(i\Bigg(e^{(2\,i\,e\,k-i\,e\,m+p-2\,i\,c\,s+i\,c\,v)\,z}\,(2\,i\,e\,k-i\,e\,m-p-2\,i\,c\,s+i\,c\,v)\,_2F_1\Bigg(\frac{2\,i\,e\,k-i\,e\,m+p-2\,i\,c\,s+i\,c\,v}{d},$$

$$-\beta;\frac{d+2\,i\,e\,k-i\,e\,m+p-2\,i\,c\,s+i\,c\,v}{d};-\frac{b\,e^{d\,z}}{a}\Bigg)+e^{(-2\,e\,i\,k+i\,e\,m+p+2\,i\,c\,s-i\,c\,v)\,z}$$

$$(2\,i\,e\,k-i\,e\,m+p-2\,i\,c\,s+i\,c\,v)\,_2F_1\Bigg(\frac{-2\,e\,i\,k+i\,e\,m+p+2\,i\,c\,s-i\,c\,v}{d},-\beta;$$

$$\frac{d-2\,i\,e\,k+i\,e\,m+p+2\,i\,c\,s-i\,c\,v}{d};-\frac{b\,e^{d\,z}}{a}\Bigg)\Bigg)\sin\left(\frac{1}{2}\,\pi\,(m-v)\right)\Bigg)\Bigg/$$

$$((2\,i\,e\,k-i\,e\,m-p-2\,i\,c\,s+i\,c\,v)\,(2\,i\,e\,k-i\,e\,m+p-2\,i\,c\,s+i\,c\,v))+$$

$$\Bigg(i\Bigg(e^{(-2\,e\,i\,k+i\,e\,m+p-2\,i\,c\,s+i\,c\,v)\,z}\,(2\,i\,e\,k-i\,e\,m+p+2\,i\,c\,s-i\,c\,v)\,_2F_1\Bigg(\frac{-2\,e\,i\,k+i\,e\,m+p-2\,i\,c\,s+i\,c\,v}{d},$$

$$-\beta;\frac{d-2\,i\,e\,k+i\,e\,m+p-2\,i\,c\,s+i\,c\,v}{d};-\frac{b\,e^{d\,z}}{a}\Bigg)+e^{(2\,i\,e\,k-i\,e\,m+p+2\,i\,c\,s-i\,c\,v)\,z}$$

$$(2\,i\,e\,k-i\,e\,m-p+2\,i\,c\,s-i\,c\,v)\,_2F_1\Bigg(\frac{2\,i\,e\,k-i\,e\,m+p+2\,i\,c\,s-i\,c\,v}{d},-\beta;$$

$$\frac{d+2\,i\,e\,k-i\,e\,m+p+2\,i\,c\,s-i\,c\,v}{d};-\frac{b\,e^{d\,z}}{a}\Bigg)\Bigg)\sin\left(\frac{1}{2}\,\pi\,(m+v)\right)\Bigg)\Bigg/$$

$$((2\,i\,e\,k-i\,e\,m-p+2\,i\,c\,s-i\,c\,v)\,(2\,i\,e\,k-i\,e\,m+p+2\,i\,c\,s-i\,c\,v))\Bigg)+$$

$$\frac{2^{-m-\nu}\,e^{p z}}{p}\left(a+b\,e^{d z}\right)^{\beta}\left(\frac{e^{d z} b}{a}+1\right)^{-\beta}\binom{m}{\frac{m}{2}}\binom{\nu}{\frac{\nu}{2}}\,{}_2F_1\!\left(\frac{p}{d},-\beta;\frac{d+p}{d};-\frac{b\,e^{d z}}{a}\right)$$
$$(1-m \bmod 2)\,(1-\nu \bmod 2)\;/;\;m\in\mathbb{N}^+\wedge\nu\in\mathbb{N}^+$$

Involving rational functions of the direct function and exponential function

Involving exp

Involving $\frac{e^{p z}}{a+b\sin(c z)}$

01.06.21.1431.01

$$\int\frac{e^{p z}}{a+b\sin(c z)}\,dz=-\frac{1}{b\sqrt{a^2-b^2}\,(c-i p)}\,e^{(i c+p) z}\left(\left(a+\sqrt{a^2-b^2}\right){}_2F_1\!\left(1-\frac{i p}{c},1;2-\frac{i p}{c};\frac{i b\,e^{i c z}}{a-\sqrt{a^2-b^2}}\right)+\left(\sqrt{a^2-b^2}-a\right){}_2F_1\!\left(1-\frac{i p}{c},1;2-\frac{i p}{c};\frac{i b\,e^{i c z}}{a+\sqrt{a^2-b^2}}\right)\right)$$

Involving $e^{p z}(a+b\sin(c z))^{-n}$

01.06.21.1432.01

$$\int\frac{e^{p z}}{(a+b\sin(c z))^2}\,dz=$$
$$\frac{i\,e^{(i c+p) z}}{b\left(a^2-b^2\right)^{3/2}(i c+p)}\left(-a\left(a+\sqrt{a^2-b^2}\right){}_2F_1\!\left(1-\frac{i p}{c},1;2-\frac{i p}{c};\frac{i b\,e^{i c z}}{a-\sqrt{a^2-b^2}}\right)+a\left(a-\sqrt{a^2-b^2}\right)\right.$$
$${}_2F_1\!\left(1-\frac{i p}{c},1;2-\frac{i p}{c};\frac{i b\,e^{i c z}}{a+\sqrt{a^2-b^2}}\right)+\left(a^2+\sqrt{a^2-b^2}\,a-b^2\right){}_2F_1\!\left(1-\frac{i p}{c},2;2-\frac{i p}{c};\frac{i b\,e^{i c z}}{a-\sqrt{a^2-b^2}}\right)+$$
$$\left.\left(-a^2+\sqrt{a^2-b^2}\,a+b^2\right){}_2F_1\!\left(1-\frac{i p}{c},2;2-\frac{i p}{c};\frac{i b\,e^{i c z}}{a+\sqrt{a^2-b^2}}\right)\right)$$

Involving $\frac{e^{p z}}{a+b\sin^2(c z)}$

01.06.21.1433.01

$$\int \frac{e^{p z}}{a + b\sin^2(c z)}\, dz = -\frac{1}{\sqrt{a}\, b \sqrt{a+b}\, (-2 i c + p)} \left(e^{(-2 i c + p) z} \left(\left(-2 a + 2\sqrt{a+b}\,\sqrt{a} - b\right) {}_2F_1\left(\frac{i p}{2 c} + 1, 1; \frac{i p}{2 c} + 2; \frac{b e^{-2 i c z}}{2 a + 2\sqrt{a+b}\,\sqrt{a} + b}\right) + \left(2 a + 2\sqrt{a+b}\,\sqrt{a} + b\right) {}_2F_1\left(\frac{i p}{2 c} + 1, 1; \frac{i p}{2 c} + 2; \frac{b e^{-2 i c z}}{2 a - 2\sqrt{a+b}\,\sqrt{a} + b}\right)\right)\right)$$

Involving $e^{p z}\left(a + b\sin^2(c z)\right)^{-n}$

01.06.21.1434.01

$$\int \frac{e^{p z}}{\left(a + b\sin^2(c z)\right)^2}\, dz = -\frac{1}{2 a^{3/2} b (a+b)^{3/2} (2 i c + p)} \left(e^{(2 i c + p) z} \left((2 a + b)\left(-2 a + 2\sqrt{a+b}\,\sqrt{a} - b\right) {}_2F_1\left(1 - \frac{i p}{2 c}, 1; 2 - \frac{i p}{2 c}; \frac{b e^{2 i c z}}{2 a + 2\sqrt{a+b}\,\sqrt{a} + b}\right) + (2 a + b)\left(2 a + 2\sqrt{a+b}\,\sqrt{a} + b\right) {}_2F_1\left(1 - \frac{i p}{2 c}, 1; 2 - \frac{i p}{2 c}; \frac{b e^{2 i c z}}{2 a - 2\sqrt{a+b}\,\sqrt{a} + b}\right) + 2\sqrt{a}\left(\left(2 a^{3/2} - 2\sqrt{a+b}\, a + 2 b\sqrt{a} - b\sqrt{a+b}\right) {}_2F_1\left(1 - \frac{i p}{2 c}, 2; 2 - \frac{i p}{2 c}; \frac{b e^{2 i c z}}{2 a + 2\sqrt{a+b}\,\sqrt{a} + b}\right) - \left(2 a^{3/2} + 2\sqrt{a+b}\, a + 2 b\sqrt{a} + b\sqrt{a+b}\right) {}_2F_1\left(1 - \frac{i p}{2 c}, 2; 2 - \frac{i p}{2 c}; \frac{b e^{2 i c z}}{2 a - 2\sqrt{a+b}\,\sqrt{a} + b}\right)\right)\right)\right)$$

Involving $\frac{e^{p z}\sin(d z)}{a + b\sin(c z)}$

01.06.21.1435.01

$$\int \frac{e^{p z}\sin(d z)}{a + b\sin(c z)}\, dz = \frac{i}{2 b\sqrt{a^2 - b^2}} \left(\frac{1}{c + d - i p} e^{(i c + i d + p) z} \left(\left(a + \sqrt{a^2 - b^2}\right) {}_2F_1\left(\frac{c + d - i p}{c}, 1; \frac{2 c + d - i p}{c}; \frac{i b e^{i c z}}{a - \sqrt{a^2 - b^2}}\right) + \left(\sqrt{a^2 - b^2} - a\right) {}_2F_1\left(\frac{c + d - i p}{c}, 1; \frac{2 c + d - i p}{c}; \frac{i b e^{i c z}}{a + \sqrt{a^2 - b^2}}\right)\right) - \frac{1}{c - d - i p} e^{(i c - i d + p) z} \left(\left(a + \sqrt{a^2 - b^2}\right) {}_2F_1\left(\frac{c - d - i p}{c}, 1; -\frac{-2 c + d + i p}{c}; \frac{i b e^{i c z}}{a - \sqrt{a^2 - b^2}}\right) + \left(\sqrt{a^2 - b^2} - a\right) {}_2F_1\left(\frac{c - d - i p}{c}, 1; -\frac{-2 c + d + i p}{c}; \frac{i b e^{i c z}}{a + \sqrt{a^2 - b^2}}\right)\right)\right)$$

Involving $e^{p z}(a+b \sin(c z))^{-n} \sin(d z)$

01.06.21.1436.01

$$\int \frac{e^{p z} \sin(d z)}{(a+b \sin(c z))^2}\, dz = \frac{1}{2 b \left(a^2-b^2\right)^{3/2}} \left(\frac{1}{i c+i d+p} \left(e^{(i c+i d+p) z} \left(-a \left(a+\sqrt{a^2-b^2}\right) {}_2F_1\left(\frac{c+d-i p}{c}, 1; \frac{2 c+d-i p}{c}; \frac{i b e^{i c z}}{a-\sqrt{a^2-b^2}}\right) + a \left(a-\sqrt{a^2-b^2}\right) {}_2F_1\left(\frac{c+d-i p}{c}, 1; \frac{2 c+d-i p}{c}; \frac{i b e^{i c z}}{a+\sqrt{a^2-b^2}}\right) + \left(a^2+\sqrt{a^2-b^2}\, a-b^2\right) {}_2F_1\left(\frac{c+d-i p}{c}, 2; \frac{2 c+d-i p}{c}; \frac{i b e^{i c z}}{a-\sqrt{a^2-b^2}}\right) + \left(-a^2+\sqrt{a^2-b^2}\, a+b^2\right) {}_2F_1\left(\frac{c+d-i p}{c}, 2; \frac{2 c+d-i p}{c}; \frac{i b e^{i c z}}{a+\sqrt{a^2-b^2}}\right)\right)\right) - \frac{1}{i c-i d+p} \left(e^{(i c-i d+p) z} \left(-a \left(a+\sqrt{a^2-b^2}\right) {}_2F_1\left(\frac{c-d-i p}{c}, 1; -\frac{-2 c+d+i p}{c}; \frac{i b e^{i c z}}{a-\sqrt{a^2-b^2}}\right) + a \left(a-\sqrt{a^2-b^2}\right) {}_2F_1\left(\frac{c-d-i p}{c}, 1; -\frac{-2 c+d+i p}{c}; \frac{i b e^{i c z}}{a+\sqrt{a^2-b^2}}\right) + \left(a^2+\sqrt{a^2-b^2}\, a-b^2\right) {}_2F_1\left(\frac{c-d-i p}{c}, 2; -\frac{-2 c+d+i p}{c}; \frac{i b e^{i c z}}{a-\sqrt{a^2-b^2}}\right) + \left(-a^2+\sqrt{a^2-b^2}\, a+b^2\right) {}_2F_1\left(\frac{c-d-i p}{c}, 2; -\frac{-2 c+d+i p}{c}; \frac{i b e^{i c z}}{a+\sqrt{a^2-b^2}}\right)\right)\right)\right)$$

Involving $\frac{e^{p z} \sin(d z)}{a+b \sin^2(c z)}$

01.06.21.1437.01

$$\int \frac{e^{p z} \sin(d z)}{a + b \sin^2(c z)} \, dz = \frac{i}{2 \sqrt{a} \, b \sqrt{a+b}} \left(\frac{1}{-2 i c + i d + p} \left(e^{(-2 i c + i d + p) z} \left(\left(-2 a + 2 \sqrt{a+b} \sqrt{a} - b\right) {}_2F_1\left(1 - \frac{d - i p}{2 c}, 1; 2 - \frac{d - i p}{2 c}; \frac{b e^{-2 i c z}}{2 a + 2 \sqrt{a+b} \sqrt{a} + b}\right) + \left(2 a + 2 \sqrt{a+b} \sqrt{a} + b\right) {}_2F_1\left(1 - \frac{d - i p}{2 c}, 1; 2 - \frac{d - i p}{2 c}; \frac{b e^{-2 i c z}}{2 a - 2 \sqrt{a+b} \sqrt{a} + b}\right)\right)\right) - \frac{1}{2 c + d + i p} \left(i e^{(-2 i c - i d + p) z} \left(\left(-2 a + 2 \sqrt{a+b} \sqrt{a} - b\right) {}_2F_1\left(\frac{2 c + d + i p}{2 c}, 1; \frac{4 c + d + i p}{2 c}; \frac{b e^{-2 i c z}}{2 a + 2 \sqrt{a+b} \sqrt{a} + b}\right) + \left(2 a + 2 \sqrt{a+b} \sqrt{a} + b\right) {}_2F_1\left(\frac{2 c + d + i p}{2 c}, 1; \frac{4 c + d + i p}{2 c}; \frac{b e^{-2 i c z}}{2 a - 2 \sqrt{a+b} \sqrt{a} + b}\right)\right)\right)\right)$$

01.06.21.1438.01

$$\int \frac{e^{p z} \sin(c z)}{a + b \sin^2(c z)} \, dz = \frac{i}{2 \sqrt{a} \, b \sqrt{a+b}} \left(\frac{1}{-i c + p} \left(e^{(-i c + p) z} \left(\left(-2 a + 2 \sqrt{a+b} \sqrt{a} - b\right) {}_2F_1\left(\frac{c + i p}{2 c}, 1; \frac{i p}{2 c} + \frac{3}{2}; \frac{b e^{-2 i c z}}{2 a + 2 \sqrt{a+b} \sqrt{a} + b}\right) + \left(2 a + 2 \sqrt{a+b} \sqrt{a} + b\right) {}_2F_1\left(\frac{c + i p}{2 c}, 1; \frac{i p}{2 c} + \frac{3}{2}; \frac{b e^{-2 i c z}}{2 a - 2 \sqrt{a+b} \sqrt{a} + b}\right)\right)\right) - \frac{1}{-3 i c + p} \left(e^{(-3 i c + p) z} \left(\left(-2 a + 2 \sqrt{a+b} \sqrt{a} - b\right) {}_2F_1\left(\frac{i p}{2 c} + \frac{3}{2}, 1; \frac{i p}{2 c} + \frac{5}{2}; \frac{b e^{-2 i c z}}{2 a + 2 \sqrt{a+b} \sqrt{a} + b}\right) + \left(2 a + 2 \sqrt{a+b} \sqrt{a} + b\right) {}_2F_1\left(\frac{i p}{2 c} + \frac{3}{2}, 1; \frac{i p}{2 c} + \frac{5}{2}; \frac{b e^{-2 i c z}}{2 a - 2 \sqrt{a+b} \sqrt{a} + b}\right)\right)\right)\right)$$

Involving $e^{p z} \left(a + b \sin^2(c z)\right)^{-n} \sin(d z)$

01.06.21.1439.01

$$\int \frac{e^{p z}\sin(d z)}{\left(a+b\sin^2(c z)\right)^2}\,dz = \frac{i}{4 a^{3/2} b (a+b)^{3/2}}\left(\frac{1}{2 i c + i d + p} e^{(2 i c + i d + p) z}\right.$$

$$\left((2a+b)\left(-2a+2\sqrt{a+b}\sqrt{a}-b\right){}_2F_1\left(\frac{2c+d-i p}{2c}, 1; \frac{4c+d-i p}{2c}; \frac{b e^{2 i c z}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right)+\right.$$

$$(2a+b)\left(2a+2\sqrt{a+b}\sqrt{a}+b\right){}_2F_1\left(\frac{2c+d-i p}{2c}, 1; \frac{4c+d-i p}{2c}; \frac{b e^{2 i c z}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)+2\sqrt{a}$$

$$\left(\left(2a^{3/2}-2\sqrt{a+b}\,a+2b\sqrt{a}-b\sqrt{a+b}\right){}_2F_1\left(\frac{2c+d-i p}{2c}, 2; \frac{4c+d-i p}{2c}; \frac{b e^{2 i c z}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right)-\right.$$

$$\left(2a^{3/2}+2\sqrt{a+b}\,a+2b\sqrt{a}+b\sqrt{a+b}\right)$$

$$\left.\left.\left.{}_2F_1\left(\frac{2c+d-i p}{2c}, 2; \frac{4c+d-i p}{2c}; \frac{b e^{2 i c z}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)\right)\right)-\frac{1}{2 i c - i d + p} e^{(2 i c - i d + p) z}$$

$$\left((2a+b)\left(-2a+2\sqrt{a+b}\sqrt{a}-b\right){}_2F_1\left(1-\frac{d+i p}{2c}, 1; 2-\frac{d+i p}{2c}; \frac{b e^{2 i c z}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right)+\right.$$

$$(2a+b)\left(2a+2\sqrt{a+b}\sqrt{a}+b\right){}_2F_1\left(1-\frac{d+i p}{2c}, 1; 2-\frac{d+i p}{2c}; \frac{b e^{2 i c z}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)+$$

$$2\sqrt{a}\left(\left(2a^{3/2}-2\sqrt{a+b}\,a+2b\sqrt{a}-b\sqrt{a+b}\right){}_2F_1\left(1-\frac{d+i p}{2c}, 2; 2-\frac{d+i p}{2c}; \frac{b e^{2 i c z}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right)-\right.$$

$$\left.\left.\left.\left(2a^{3/2}+2\sqrt{a+b}\,a+2b\sqrt{a}+b\sqrt{a+b}\right){}_2F_1\left(1-\frac{d+i p}{2c}, 2; 2-\frac{d+i p}{2c}; \frac{b e^{2 i c z}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)\right)\right)\right)$$

Involving $\frac{e^{p z}\sin(e z)\sin(d z)}{a+b\sin(c z)}$

01.06.21.1440.01

$$\int \frac{e^{p z} \sin(e z) \sin(d z)}{a + b \sin(c z)} \, dz = -\frac{1}{4 b \sqrt{a^2 - b^2}} \left(\frac{1}{c + d - e - i p} \left(e^{i (c+d-e-i p) z} \left(\left(a + \sqrt{a^2 - b^2}\right) {}_2F_1\left(\frac{c + d - e - i p}{c}, 1; \frac{2 c + d - e - i p}{c}; \frac{i b e^{i c z}}{a - \sqrt{a^2 - b^2}}\right) + \left(\sqrt{a^2 - b^2} - a\right) {}_2F_1\left(\frac{c + d - e - i p}{c}, 1; \frac{2 c + d - e - i p}{c}; \frac{i b e^{i c z}}{a + \sqrt{a^2 - b^2}}\right)\right)\right) + \frac{1}{c - d + e - i p} \left(e^{i (c-d+e-i p) z} \left(\left(a + \sqrt{a^2 - b^2}\right) {}_2F_1\left(\frac{c - d + e - i p}{c}, 1; \frac{2 c - d + e - i p}{c}; \frac{i b e^{i c z}}{a - \sqrt{a^2 - b^2}}\right) + \left(\sqrt{a^2 - b^2} - a\right) {}_2F_1\left(\frac{c - d + e - i p}{c}, 1; \frac{2 c - d + e - i p}{c}; \frac{i b e^{i c z}}{a + \sqrt{a^2 - b^2}}\right)\right)\right) - \frac{1}{c + d + e - i p} \left(e^{i (c+d+e-i p) z} \left(\left(a + \sqrt{a^2 - b^2}\right) {}_2F_1\left(\frac{c + d + e - i p}{c}, 1; \frac{2 c + d + e - i p}{c}; \frac{i b e^{i c z}}{a - \sqrt{a^2 - b^2}}\right) + \left(\sqrt{a^2 - b^2} - a\right) {}_2F_1\left(\frac{c + d + e - i p}{c}, 1; \frac{2 c + d + e - i p}{c}; \frac{i b e^{i c z}}{a + \sqrt{a^2 - b^2}}\right)\right)\right) + \frac{1}{-c + d + e + i p} \left(e^{(i c - i (d+e+i p)) z} \left(\left(a + \sqrt{a^2 - b^2}\right) {}_2F_1\left(-\frac{-c + d + e + i p}{c}, 1; -\frac{-2 c + d + e + i p}{c}; \frac{i b e^{i c z}}{a - \sqrt{a^2 - b^2}}\right) + \left(\sqrt{a^2 - b^2} - a\right) {}_2F_1\left(-\frac{-c + d + e + i p}{c}, 1; -\frac{-2 c + d + e + i p}{c}; \frac{i b e^{i c z}}{a + \sqrt{a^2 - b^2}}\right)\right)\right)\right)$$

Involving $e^{p z} \sin(e z) \sin(d z) (a + b \sin(c z))^{-n}$

01.06.21.1441.01

$$\int \frac{e^{p z} \sin(e z) \sin(d z)}{(a + b \sin(c z))^2} \, dz = \frac{1}{4 b \left(a^2 - b^2\right)^{3/2}} \left(\frac{1}{c + d - e - i p} \left(e^{i (c+d-e-i p) z} \left(-a \left(a + \sqrt{a^2 - b^2}\right) {}_2F_1\left(\frac{c + d - e - i p}{c}, 1; \frac{2 c + d - e - i p}{c}; \frac{i b e^{i c z}}{a - \sqrt{a^2 - b^2}}\right) + a \left(a - \sqrt{a^2 - b^2}\right) {}_2F_1\left(\frac{c + d - e - i p}{c}, 1; \frac{2 c + d - e - i p}{c}; \frac{i b e^{i c z}}{a + \sqrt{a^2 - b^2}}\right) + \left(a^2 + \sqrt{a^2 - b^2}\, a - b^2\right) {}_2F_1\left(\frac{c + d - e - i p}{c}, 2; \frac{2 c + d - e - i p}{c}; \frac{i b e^{i c z}}{a - \sqrt{a^2 - b^2}}\right) + \right.\right.\right.$$

$$\Big(-a^2+\sqrt{a^2-b^2}\;a+b^2\Big)\,{}_2F_1\Bigg(\frac{c+d-e-i\,p}{c},\,2;\;\frac{2\,c+d-e-i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\Bigg)\Bigg)\Bigg)\Bigg)+$$

$$\frac{1}{c-d+e-i\,p}\Bigg(e^{i\,(c-d+e-i\,p)\,z}\Bigg(-a\Big(a+\sqrt{a^2-b^2}\,\Big)\,{}_2F_1\Bigg(\frac{c-d+e-i\,p}{c},\,1;\;\frac{2\,c-d+e-i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\Bigg)+$$

$$a\Big(a-\sqrt{a^2-b^2}\,\Big)\,{}_2F_1\Bigg(\frac{c-d+e-i\,p}{c},\,1;\;\frac{2\,c-d+e-i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\Bigg)+$$

$$\Big(a^2+\sqrt{a^2-b^2}\;a-b^2\Big)\,{}_2F_1\Bigg(\frac{c-d+e-i\,p}{c},\,2;\;\frac{2\,c-d+e-i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\Bigg)+$$

$$\Big(-a^2+\sqrt{a^2-b^2}\;a+b^2\Big)\,{}_2F_1\Bigg(\frac{c-d+e-i\,p}{c},\,2;\;\frac{2\,c-d+e-i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\Bigg)\Bigg)\Bigg)-$$

$$\frac{1}{c+d+e-i\,p}\Bigg(e^{i\,(c+d+e-i\,p)\,z}\Bigg(-a\Big(a+\sqrt{a^2-b^2}\,\Big)\,{}_2F_1\Bigg(\frac{c+d+e-i\,p}{c},\,1;\;\frac{2\,c+d+e-i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\Bigg)+$$

$$a\Big(a-\sqrt{a^2-b^2}\,\Big)\,{}_2F_1\Bigg(\frac{c+d+e-i\,p}{c},\,1;\;\frac{2\,c+d+e-i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\Bigg)+$$

$$\Big(a^2+\sqrt{a^2-b^2}\;a-b^2\Big)\,{}_2F_1\Bigg(\frac{c+d+e-i\,p}{c},\,2;\;\frac{2\,c+d+e-i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\Bigg)+$$

$$\Big(-a^2+\sqrt{a^2-b^2}\;a+b^2\Big)\,{}_2F_1\Bigg(\frac{c+d+e-i\,p}{c},\,2;\;\frac{2\,c+d+e-i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\Bigg)\Bigg)\Bigg)+$$

$$\frac{1}{-c+d+e+i\,p}\Bigg(e^{(i\,c-i\,(d+e+i\,p))\,z}\Bigg(-a\Big(a+\sqrt{a^2-b^2}\,\Big)\,{}_2F_1\Bigg(-\frac{-c+d+e+i\,p}{c},\,1;\,-\frac{-2\,c+d+e+i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\Bigg)+$$

$$a\Big(a-\sqrt{a^2-b^2}\,\Big)\,{}_2F_1\Bigg(-\frac{-c+d+e+i\,p}{c},\,1;\,-\frac{-2\,c+d+e+i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\Bigg)+$$

$$\Big(a^2+\sqrt{a^2-b^2}\;a-b^2\Big)\,{}_2F_1\Bigg(-\frac{-c+d+e+i\,p}{c},\,2;\,-\frac{-2\,c+d+e+i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a-\sqrt{a^2-b^2}}\Bigg)+$$

$$\Big(-a^2+\sqrt{a^2-b^2}\;a+b^2\Big)\,{}_2F_1\Bigg(-\frac{-c+d+e+i\,p}{c},\,2;\,-\frac{-2\,c+d+e+i\,p}{c};\;\frac{i\,b\,e^{i\,c\,z}}{a+\sqrt{a^2-b^2}}\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)$$

Involving $\frac{e^{p z} \sin(e z) \sin(d z)}{a+b \sin^2(c z)}$

01.06.21.1442.01

$$\int \frac{e^{p z} \sin(e z) \sin(d z)}{a + b \sin^2(c z)} dz = -\frac{1}{4 \sqrt{a}\, b \sqrt{a+b}} \left(\frac{1}{2 c + d - e + i p} \left(i e^{(-2 i c - i d + i e + p) z} \left(\left(-2 a + 2 \sqrt{a+b} \sqrt{a} - b\right) {}_2F_1\left(\frac{2 c + d - e + i p}{2 c}, 1; \frac{4 c + d - e + i p}{2 c}; \frac{b e^{-2 i c z}}{2 a + 2 \sqrt{a+b} \sqrt{a} + b}\right) + \left(2 a + 2 \sqrt{a+b} \sqrt{a} + b\right) {}_2F_1\left(\frac{2 c + d - e + i p}{2 c}, 1; \frac{4 c + d - e + i p}{2 c}; \frac{b e^{-2 i c z}}{2 a - 2 \sqrt{a+b} \sqrt{a} + b}\right)\right)\right) + \frac{1}{2 c - d + e + i p} \left(i e^{(-2 i c + i d - i e + p) z} \left(\left(-2 a + 2 \sqrt{a+b} \sqrt{a} - b\right) {}_2F_1\left(\frac{2 c - d + e + i p}{2 c}, 1; \frac{4 c - d + e + i p}{2 c}; \frac{b e^{-2 i c z}}{2 a + 2 \sqrt{a+b} \sqrt{a} + b}\right) + \left(2 a + 2 \sqrt{a+b} \sqrt{a} + b\right) {}_2F_1\left(\frac{2 c - d + e + i p}{2 c}, 1; \frac{4 c - d + e + i p}{2 c}; \frac{b e^{-2 i c z}}{2 a - 2 \sqrt{a+b} \sqrt{a} + b}\right)\right)\right) - \frac{1}{2 c + d + e + i p} \left(i e^{-i (2 c + d + e + i p) z} \left(\left(-2 a + 2 \sqrt{a+b} \sqrt{a} - b\right) {}_2F_1\left(\frac{2 c + d + e + i p}{2 c}, 1; \frac{4 c + d + e + i p}{2 c}; \frac{b e^{-2 i c z}}{2 a + 2 \sqrt{a+b} \sqrt{a} + b}\right) + \left(2 a + 2 \sqrt{a+b} \sqrt{a} + b\right) {}_2F_1\left(\frac{2 c + d + e + i p}{2 c}, 1; \frac{4 c + d + e + i p}{2 c}; \frac{b e^{-2 i c z}}{2 a - 2 \sqrt{a+b} \sqrt{a} + b}\right)\right)\right) - \frac{1}{-2 i c + i d + i e + p} \left(e^{(-2 i c + i d + i e + p) z} \left(\left(-2 a + 2 \sqrt{a+b} \sqrt{a} - b\right) {}_2F_1\left(1 - \frac{d + e - i p}{2 c}, 1; 2 - \frac{d + e - i p}{2 c}; \frac{b e^{-2 i c z}}{2 a + 2 \sqrt{a+b} \sqrt{a} + b}\right) + \left(2 a + 2 \sqrt{a+b} \sqrt{a} + b\right) {}_2F_1\left(1 - \frac{d + e - i p}{2 c}, 1; 2 - \frac{d + e - i p}{2 c}; \frac{b e^{-2 i c z}}{2 a - 2 \sqrt{a+b} \sqrt{a} + b}\right)\right)\right)\right)$$

Involving $e^{p z} \sin(e z) \sin(d z) \left(a + b \sin^2(c z)\right)^{-n}$

01.06.21.1443.01

$$\int \frac{e^{p z} \sin(e z) \sin(d z)}{\left(a + b \sin^2(c z)\right)^2} dz = \frac{1}{8 a^{3/2} b (a+b)^{3/2}} \left(-\frac{1}{2 i c + i d - i e + p} \left(e^{(2 i c + i d - i e + p) z} \left((2 a + b) \left(-2 a + 2 \sqrt{a+b} \sqrt{a} - b\right) {}_2F_1\left(\frac{2 c + d - e - i p}{2 c}, 1; \frac{4 c + d - e - i p}{2 c}; \frac{b e^{2 i c z}}{2 a + 2 \sqrt{a+b} \sqrt{a} + b}\right) + (2 a + b) \left(2 a + 2 \sqrt{a+b} \sqrt{a} + b\right) {}_2F_1\left(\frac{2 c + d - e - i p}{2 c}, 1; \frac{4 c + d - e - i p}{2 c}; \frac{b e^{2 i c z}}{2 a - 2 \sqrt{a+b} \sqrt{a} + b}\right) + 2 \sqrt{a} \left(\left(2 a^{3/2} - 2 \sqrt{a+b}\, a + 2 b \sqrt{a} - b \sqrt{a+b}\right)\right.\right.\right.$$

$$
{}_2F_1\left(\frac{2c+d-e-i p}{2c}, 2; \frac{4c+d-e-i p}{2c}; \frac{b e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right) - \left(2a^{3/2}+2\sqrt{a+b}\, a + 2b\sqrt{a}+b\sqrt{a+b}\right) {}_2F_1\left(\frac{2c+d-e-i p}{2c}, 2; \frac{4c+d-e-i p}{2c}; \frac{b e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)\Bigg)\Bigg)\Bigg) -
$$

$$
\frac{1}{2ic-id+ie+p}\Bigg(e^{(2ic-id+ie+p)z}\Bigg((2a+b)\left(-2a+2\sqrt{a+b}\sqrt{a}-b\right) {}_2F_1\left(\frac{2c-d+e-i p}{2c}, 1; \frac{4c-d+e-i p}{2c}; \frac{b e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right) +
$$

$$
(2a+b)\left(2a+2\sqrt{a+b}\sqrt{a}+b\right) {}_2F_1\left(\frac{2c-d+e-i p}{2c}, 1; \frac{4c-d+e-i p}{2c}; \frac{b e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right) +
$$

$$
2\sqrt{a}\Bigg(\left(2a^{3/2}-2\sqrt{a+b}\, a+2b\sqrt{a}-b\sqrt{a+b}\right) {}_2F_1\left(\frac{2c-d+e-i p}{2c}, 2; \frac{4c-d+e-i p}{2c}; \frac{b e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right) - \left(2a^{3/2}+2\sqrt{a+b}\, a+2b\sqrt{a}+b\sqrt{a+b}\right)
$$

$$
{}_2F_1\left(\frac{2c-d+e-i p}{2c}, 2; \frac{4c-d+e-i p}{2c}; \frac{b e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)\Bigg)\Bigg)\Bigg) -
$$

$$
\frac{1}{2c+d+e-i p}\Bigg(i e^{i(2c+d+e-i p)z}\Bigg((2a+b)\left(-2a+2\sqrt{a+b}\sqrt{a}-b\right) {}_2F_1\left(\frac{2c+d+e-i p}{2c}, 1; \frac{4c+d+e-i p}{2c}; \frac{b e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right) +
$$

$$
(2a+b)\left(2a+2\sqrt{a+b}\sqrt{a}+b\right) {}_2F_1\left(\frac{2c+d+e-i p}{2c}, 1; \frac{4c+d+e-i p}{2c}; \frac{b e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right) +
$$

$$
2\sqrt{a}\Bigg(\left(2a^{3/2}-2\sqrt{a+b}\, a+2b\sqrt{a}-b\sqrt{a+b}\right) {}_2F_1\left(\frac{2c+d+e-i p}{2c}, 2; \frac{4c+d+e-i p}{2c}; \frac{b e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right) - \left(2a^{3/2}+2\sqrt{a+b}\, a+2b\sqrt{a}+b\sqrt{a+b}\right)
$$

$$
{}_2F_1\left(\frac{2c+d+e-i p}{2c}, 2; \frac{4c+d+e-i p}{2c}; \frac{b e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)\Bigg)\Bigg)\Bigg) +
$$

$$
\frac{1}{-2c+d+e+i p}\Bigg(i e^{(2ic-i(d+e+i p))z}\Bigg((2a+b)\left(-2a+2\sqrt{a+b}\sqrt{a}-b\right) {}_2F_1\left(-\frac{-2c+d+e+i p}{2c}, 1; -\frac{-4c+d+e+i p}{2c}; \frac{b e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right) + (2a+b)\left(2a+2\sqrt{a+b}\sqrt{a}+b\right)
$$

$$
{}_2F_1\left(-\frac{-2c+d+e+i p}{2c}, 1; -\frac{-4c+d+e+i p}{2c}; \frac{b e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right) +
$$

$$2\sqrt{a}\left(\left(2a^{3/2}-2\sqrt{a+b}\,a+2b\sqrt{a}-b\sqrt{a+b}\right){}_2F_1\left(-\frac{-2c+d+e+i p}{2c},2;-\frac{-4c+d+e+i p}{2c};\frac{b\,e^{2icz}}{2a+2\sqrt{a+b}\sqrt{a}+b}\right)-\left(2a^{3/2}+2\sqrt{a+b}\,a+2b\sqrt{a}+b\sqrt{a+b}\right){}_2F_1\left(-\frac{-2c+d+e+i p}{2c},2;-\frac{-4c+d+e+i p}{2c};\frac{b\,e^{2icz}}{2a-2\sqrt{a+b}\sqrt{a}+b}\right)\right)\right)\right)\right)$$

Involving algebraic functions of the direct function and exponential function

Involving exp

Involving $e^{p z}\,(a+b\sin(d\,z))^{\beta}$

01.06.21.1444.01

$$\int e^{p z}\,(a+b\sin(d\,z))^{\beta}\,dz = \frac{e^{p z}}{p-i\,d\,\beta}\left(1-\frac{i\,b\,e^{i d z}}{a-\sqrt{a^2-b^2}}\right)^{-\beta}\left(1-\frac{i\,b\,e^{i d z}}{a+\sqrt{a^2-b^2}}\right)^{-\beta}(a+b\sin(d\,z))^{\beta}\,F_1\left(-\frac{i\,p}{d}-\beta;-\beta,-\beta;-\frac{i\,p}{d}-\beta+1;\frac{i\,b\,e^{i d z}}{a+\sqrt{a^2-b^2}},-\frac{i\,b\,e^{i d z}}{\sqrt{a^2-b^2}-a}\right)$$

Involving $e^{p z}\,\left(a+b\sin^2(d\,z)\right)^{\beta}$

01.06.21.1445.01

$$\int e^{p z}\left(a+b\sin^2(d\,z)\right)^{\beta}dz = \frac{1}{p-2\,i\,d\,\beta}\,e^{p z}\left(1-\frac{b\,e^{2 i d z}}{2a+b-2\sqrt{a(a+b)}}\right)^{-\beta}\left(1-\frac{b\,e^{2 i d z}}{2a+b+2\sqrt{a(a+b)}}\right)^{-\beta}\left(a-\frac{1}{4}\,b\,e^{-2 i d z}\left(-1+e^{2 i d z}\right)^2\right)^{\beta}F_1\left(-\frac{i\,p}{2d}-\beta;-\beta,-\beta;-\frac{i\,p}{2d}-\beta+1;\frac{b\,e^{2 i d z}}{2a+b+2\sqrt{a(a+b)}},\frac{b\,e^{2 i d z}}{2a+b-2\sqrt{a(a+b)}}\right)$$

Involving $e^{p z}(a+b\sin(d\,z))^{\beta}\sin(c\,z)$

01.06.21.1446.01

$$\int e^{p z} (a + b \sin(d z))^{\beta} \sin(c z)\, dz = i \left(1 + \frac{i b e^{i d z}}{\sqrt{a^2 - b^2} - a}\right)^{-\beta} \left(1 - \frac{i b e^{i d z}}{a + \sqrt{a^2 - b^2}}\right)^{-\beta} (a + b \sin(d z))^{\beta} \left(e^{(i c + p) z}\, i\, (c + i p + d \beta)\, F_1\left(\frac{c - i p - d \beta}{d}; -\beta, -\beta; \frac{c + d - i p - d \beta}{d}; \frac{i b e^{i d z}}{a + \sqrt{a^2 - b^2}}, \frac{i b e^{i d z}}{a - \sqrt{a^2 - b^2}}\right) + e^{(-i c + p) z} (i c + p - i d \beta)\, F_1\left(-\frac{c + i p + d \beta}{d}; -\beta, -\beta; -\frac{c + i p + d (\beta - 1)}{d}; \frac{i b e^{i d z}}{a + \sqrt{a^2 - b^2}}, \frac{i b e^{i d z}}{a - \sqrt{a^2 - b^2}}\right)\right) \Big/ (2 (c - i p - d \beta) (c + i p + d \beta))$$

Involving $e^{p z} \left(a + b \sin^2(d z)\right)^{\beta} \sin(c z)$

01.06.21.1447.01

$$\int e^{p z} \left(a + b \sin^2(d z)\right)^{\beta} \sin(c z)\, dz = \frac{1}{2 \left(c^2 + (p - 2 i d \beta)^2\right)} \left(1 - \frac{b e^{2 i d z}}{2 a + b - 2 \sqrt{a (a + b)}}\right)^{-\beta} \left(1 - \frac{b e^{2 i d z}}{2 a + b + 2 \sqrt{a (a + b)}}\right)^{-\beta} \left(a - \frac{1}{4} b e^{-2 i d z} \left(-1 + e^{2 i d z}\right)^2\right)^{\beta} \left(i e^{(-i c + p) z} (i c + p - 2 i d \beta)\, F_1\left(-\frac{c + i p + 2 d \beta}{2 d}; -\beta, -\beta; -\frac{c + i p + 2 d (\beta - 1)}{2 d}; \frac{b e^{2 i d z}}{2 a + b + 2 \sqrt{a (a + b)}}, \frac{b e^{2 i d z}}{2 a + b - 2 \sqrt{a (a + b)}}\right) - e^{(i c + p) z} (c + i p + 2 d \beta)\, F_1\left(\frac{c - i p - 2 d \beta}{2 d}; -\beta, -\beta; \frac{c + 2 d - i p - 2 d \beta}{2 d}; \frac{b e^{2 i d z}}{2 a + b + 2 \sqrt{a (a + b)}}, \frac{b e^{2 i d z}}{2 a + b - 2 \sqrt{a (a + b)}}\right)\right)$$

Involving $e^{p z} \sin(e z) \sin(c z) (a + b \sin(d z))^{\beta}$

01.06.21.1448.01

$$\int e^{pz}\sin(ez)\sin(cz)(a+b\sin(dz))^{\beta}\,dz = \frac{1}{4}i\left(1+\frac{i b e^{idz}}{\sqrt{a^2-b^2}-a}\right)^{-\beta}\left(1-\frac{i b e^{idz}}{a+\sqrt{a^2-b^2}}\right)^{-\beta}(a+b\sin(dz))^{\beta}$$
$$\left(\frac{e^{(ic+ie+p)z}}{c+e-ip-d\beta}F_1\left(\frac{c+e-ip-d\beta}{d};-\beta,-\beta;\frac{c+d+e-ip-d\beta}{d};\frac{i b e^{idz}}{a+\sqrt{a^2-b^2}},\frac{i b e^{idz}}{a-\sqrt{a^2-b^2}}\right)+\right.$$
$$\frac{e^{(-ic+ie+p)z}}{c-e+ip+d\beta}F_1\left(-\frac{c-e+ip+d\beta}{d};-\beta,-\beta;\frac{-c+d+e-ip-d\beta}{d};\frac{i b e^{idz}}{a+\sqrt{a^2-b^2}},\frac{i b e^{idz}}{a-\sqrt{a^2-b^2}}\right)+$$
$$\frac{e^{(ic-ie+p)z}}{-c+e+ip+d\beta}F_1\left(-\frac{-c+e+ip+d\beta}{d};-\beta,-\beta;\frac{c+d-e-ip-d\beta}{d};\frac{i b e^{idz}}{a+\sqrt{a^2-b^2}},\frac{i b e^{idz}}{a-\sqrt{a^2-b^2}}\right)-$$
$$\left.\frac{e^{-i(c+e+ip)z}}{c+e+ip+d\beta}F_1\left(-\frac{c+e+ip+d\beta}{d};-\beta,-\beta;-\frac{c+e+ip+d(\beta-1)}{d};\frac{i b e^{idz}}{a+\sqrt{a^2-b^2}},\frac{i b e^{idz}}{a-\sqrt{a^2-b^2}}\right)\right)$$

Involving $e^{pz}\sin(ez)\sin(cz)\left(a+b\sin^2(dz)\right)^{\beta}$

01.06.21.1449.01

$$\int e^{pz}\sin(ez)\sin(cz)\left(a+b\sin^2(dz)\right)^{\beta}dz =$$
$$\frac{1}{4}i\left(1-\frac{b e^{2idz}}{2a+b-2\sqrt{a(a+b)}}\right)^{-\beta}\left(1-\frac{b e^{2idz}}{2a+b+2\sqrt{a(a+b)}}\right)^{-\beta}\left(a-\frac{1}{4}b e^{-2idz}\left(-1+e^{2idz}\right)^2\right)^{\beta}$$
$$\left(\frac{e^{(ic+ie+p)z}}{c+e-ip-2d\beta}F_1\left(\frac{c+e-ip-2d\beta}{2d};-\beta,-\beta;\frac{c+2d+e-ip-2d\beta}{2d};\frac{b e^{2idz}}{2a+b+2\sqrt{a(a+b)}},\right.\right.$$
$$\left.\frac{b e^{2idz}}{2a+b-2\sqrt{a(a+b)}}\right)+\frac{e^{(-ic+ie+p)z}}{c-e+ip+2d\beta}F_1\left(-\frac{c-e+ip+2d\beta}{2d};-\beta,-\beta;-\frac{c-e+ip+2d(\beta-1)}{2d};\right.$$
$$\left.\frac{b e^{2idz}}{2a+b+2\sqrt{a(a+b)}},\frac{b e^{2idz}}{2a+b-2\sqrt{a(a+b)}}\right)-\frac{e^{(ic-ie+p)z}}{c-e-ip-2d\beta}F_1\left(-\frac{-c+e+ip+2d\beta}{2d};-\beta,\right.$$
$$\left.-\beta;\frac{c+2d-e-ip-2d\beta}{2d};\frac{b e^{2idz}}{2a+b+2\sqrt{a(a+b)}},\frac{b e^{2idz}}{2a+b-2\sqrt{a(a+b)}}\right)-\frac{e^{-i(c+e+ip)z}}{c+e+ip+2d\beta}$$
$$\left.F_1\left(-\frac{c+e+ip+2d\beta}{2d};-\beta,-\beta;-\frac{c+e+ip+2d(\beta-1)}{2d};\frac{b e^{2idz}}{2a+b+2\sqrt{a(a+b)}},\frac{b e^{2idz}}{2a+b-2\sqrt{a(a+b)}}\right)\right)$$

Involving functions of the direct function, exponential and a power functions

Involving powers of the direct function, exponential and a power functions

Involving powers of sin, exp and power

Involving $z^{\alpha-1} e^{bz} \sin^{\nu}(az)$

01.06.21.1450.01

$$\int z^n e^{bz} \sin^{\nu}(az)\,dz = n!\, e^{bz} \sin^{\nu}(az) \left(1 - e^{2 i a z}\right)^{-\nu} \sum_{p=0}^{n} \frac{(-1)^p z^{n-p}}{(n-p)!\,(b - i a \nu)^{p+1}} \, {}_{p+2}F_{p+1}\!\left(-\frac{i b + a\nu}{2a}, \ldots, -\frac{i b + a\nu}{2a}, -\nu; 1 - \frac{i b + a\nu}{2a}, \ldots, 1 - \frac{i b + a\nu}{2a}; e^{2 i a z}\right) /; n \in \mathbb{N}$$

01.06.21.1451.01

$$\int z^{\alpha-1} e^{bz} \sin^{\nu}(az)\,dz = -2^{-\nu} \binom{\nu}{\frac{\nu}{2}} E_{1-\alpha}(-bz)\,(1 - \nu \bmod 2)\, z^{\alpha} - 2^{-\nu} z^{\alpha} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} e^{-\frac{i\pi\nu}{2}} \left(E_{1-\alpha}(-(b + a i(\nu - 2k))z) + (-1)^{\nu} E_{1-\alpha}(-(b - i a(\nu - 2k))z)\right) /; \nu \in \mathbb{N}$$

01.06.21.1452.01

$$\int z^n e^{pz} \sin^{\nu}(az)\,dz = -2^{-\nu} \binom{\nu}{\frac{\nu}{2}} E_{-n}(-pz)\,(1 - \nu \bmod 2)\, z^{n+1} - 2^{-\nu} z^{n+1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{-\frac{i\pi\nu}{2}} \binom{\nu}{s} \left((-1)^{\nu} E_{-n}((i a(\nu - 2s) - p)z) + E_{-n}((-p - i a(\nu - 2s))z)\right) /; n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1453.01

$$\int z^n e^{pz} \sin^{\nu}(az)\,dz = -2^{-\nu} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2)\,(-p)^{-n-1} \left(\frac{(-1)^{-n} \operatorname{Ei}(pz)}{(-n-1)!} + e^{pz} \sum_{k=0}^{n} \frac{(-pz)^k}{(n+1)_{k-n}} - e^{pz} \sum_{k=n+1}^{-1} \frac{(-pz)^k}{(n+1)_{k-n}}\right) - 2^{-\nu} z^{n+1} i^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \Bigg((-1)^{\nu} \Bigg(\frac{(-1)^{-n} \operatorname{Ei}(-(i a(\nu - 2s) - p)z)}{(-n-1)!} + e^{-(i a(\nu-2s)-p)z} \sum_{k=0}^{n} \frac{((i a(\nu - 2s) - p)z)^k}{(n+1)_{k-n}} - e^{-(i a(\nu-2s)-p)z} \sum_{k=n+1}^{-1} \frac{((i a(\nu - 2s) - p)z)^k}{(n+1)_{k-n}}\Bigg) ((i a(\nu - 2s) - p)z)^{-n-1} + ((-p - i a(\nu - 2s))z)^{-n-1} \Bigg(\frac{(-1)^{-n} \operatorname{Ei}(-(-p - i a(\nu - 2s))z)}{(-n-1)!} + e^{-(-p-i a(\nu-2s))z} \sum_{k=0}^{n} \frac{((-p - i a(\nu - 2s))z)^k}{(n+1)_{k-n}} - e^{-(-p-i a(\nu-2s))z} \sum_{k=n+1}^{-1} \frac{((-p - i a(\nu - 2s))z)^k}{(n+1)_{k-n}}\Bigg)\Bigg) /; n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1454.01

$$\int z^{n+\frac{1}{2}} e^{pz} \sin^{\nu}(az)\,dz = -2^{-\nu} \binom{\nu}{\frac{\nu}{2}} E_{-n-\frac{1}{2}}(-pz)\,(1 - \nu \bmod 2)\, z^{n+\frac{3}{2}} - 2^{-\nu} i^{-\nu} z^{n+\frac{3}{2}} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu} E_{-n-\frac{1}{2}}((i a(\nu - 2s) - p)z) + E_{-n-\frac{1}{2}}((-p - i a(\nu - 2s))z)\right) /; n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1455.01

$$\int z^{n+\frac{1}{2}} e^{p z} \sin^{\nu}(a z)\, dz = -2^{-\nu} (-p)^{-n-2} z^{-\frac{1}{2}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \sqrt{-p z} \left(\operatorname{erfc}\left(\sqrt{-p z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{p z} \sum_{k=0}^{n} \frac{(-p z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{p z} \sum_{k=n+1}^{-1} \frac{(-p z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right) - 2^{-\nu} z^{n+\frac{3}{2}} i^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu} \left(\operatorname{erfc}\left(\sqrt{(i a (\nu-2 s)-p) z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{-(i a (\nu-2 s)-p) z} \sum_{k=0}^{n} \frac{((i a (\nu-2 s)-p) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{-(i a (\nu-2 s)-p) z} \sum_{k=n+1}^{-1} \frac{((i a (\nu-2 s)-p) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right) ((i a (\nu-2 s)-p) z)^{-n-\frac{3}{2}} + ((-p-i a (\nu-2 s)) z)^{-n-\frac{3}{2}} \left(\operatorname{erfc}\left(\sqrt{(-p-i a (\nu-2 s)) z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{-(-p-i a (\nu-2 s)) z} \sum_{k=0}^{n} \frac{((-p-i a (\nu-2 s)) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{-(-p-i a (\nu-2 s)) z} \sum_{k=n+1}^{-1} \frac{((-p-i a (\nu-2 s)) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right)\right) /; n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1456.01

$$\int z\, e^{b z} \sin^2(a z)\, dz = \frac{1}{2 \left(b^3 + 4 a^2 b\right)^2} \left(e^{b z} \left(-\left(4 (b z+1) a^2 + b^2 (b z-1)\right) \cos(2 a z) b^2 - 2 a \left(4 z a^2 - 2 b + b^2 z\right) \sin(2 a z) b^2 + \left(4 a^2 + b^2\right)^2 (b z-1)\right)\right)$$

Involving $z^{\alpha-1} e^{b z+e} \sin^{\nu}(a z)$

01.06.21.1457.01

$$\int z^n e^{b z+e} \sin^{\nu}(a z)\, dz = n!\, e^{b z+e} \sin^{\nu}(a z) \left(1 - e^{2 i a z}\right)^{-\nu} \sum_{p=0}^{n} \frac{(-1)^p z^{n-p}}{(n-p)!\, (b - i a \nu)^{p+1}} \, {}_{p+2}F_{p+1}\left(-\frac{i b + a \nu}{2 a}, \ldots, -\frac{i b + a \nu}{2 a}, -\nu; 1 - \frac{i b + a \nu}{2 a}, \ldots, 1 - \frac{i b + a \nu}{2 a}; e^{2 i a z}\right) /; n \in \mathbb{N}$$

01.06.21.1458.01

$$\int z^{\alpha-1} e^{e+b z} \sin^{\nu}(a z)\, dz = -2^{-\nu} e^{e} \binom{\nu}{\frac{\nu}{2}} E_{1-\alpha}(-b z) (1-\nu \bmod 2) z^{\alpha} - 2^{-\nu} z^{\alpha} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} e^{e-\frac{i \pi \nu}{2}} \left(E_{1-\alpha}(-(b + a i (\nu-2 k)) z) + (-1)^{\nu} E_{1-\alpha}(-(b - i a (\nu-2 k)) z)\right) /; \nu \in \mathbb{N}$$

01.06.21.1459.01

$$\int z^n e^{e+p z} \sin^\nu(a z)\, dz = -2^{-\nu} e^e \binom{\nu}{\frac{\nu}{2}} E_{-n}(-p z)\,(1-\nu \bmod 2)\, z^{n+1} - 2^{-\nu} z^{n+1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{e-\frac{i\pi\nu}{2}} \binom{\nu}{s} \left((-1)^\nu E_{-n}((i a(\nu-2s)-p) z) + E_{-n}((-p-i a(\nu-2s)) z)\right) /;\ n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1460.01

$$\int z^n e^{p z+e} \sin^\nu(a z)\, dz = -2^{-\nu} e^e \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)\,(-p)^{-n-1} \left(\frac{(-1)^{-n} \operatorname{Ei}(p z)}{(-n-1)!} + e^{p z} \sum_{k=0}^{n} \frac{(-p z)^k}{(n+1)_{k-n}} - e^{p z} \sum_{k=n+1}^{-1} \frac{(-p z)^k}{(n+1)_{k-n}}\right) - 2^{-\nu} z^{n+1} i^{-\nu} e^e \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu \left(\frac{(-1)^{-n} \operatorname{Ei}(-(i a(\nu-2s)-p) z)}{(-n-1)!} + e^{-(i a(\nu-2s)-p) z} \sum_{k=0}^{n} \frac{((i a(\nu-2s)-p) z)^k}{(n+1)_{k-n}} - e^{-(i a(\nu-2s)-p) z} \sum_{k=n+1}^{-1} \frac{((i a(\nu-2s)-p) z)^k}{(n+1)_{k-n}}\right) ((i a(\nu-2s)-p) z)^{-n-1} + ((-p-i a(\nu-2s)) z)^{-n-1} \left(\frac{(-1)^{-n} \operatorname{Ei}(-(-p-i a(\nu-2s)) z)}{(-n-1)!} + e^{-(-p-i a(\nu-2s)) z} \sum_{k=0}^{n} \frac{((-p-i a(\nu-2s)) z)^k}{(n+1)_{k-n}} - e^{-(-p-i a(\nu-2s)) z} \sum_{k=n+1}^{-1} \frac{((-p-i a(\nu-2s)) z)^k}{(n+1)_{k-n}}\right)\right) /;\ n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1461.01

$$\int z^{n+\frac{1}{2}} e^{p z+e} \sin^\nu(a z)\, dz = -2^{-\nu} e^e \binom{\nu}{\frac{\nu}{2}} E_{-n-\frac{1}{2}}(-p z)\,(1-\nu \bmod 2)\, z^{n+\frac{3}{2}} - 2^{-\nu} i^{-\nu} z^{n+\frac{3}{2}} e^e \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu E_{-n-\frac{1}{2}}((i a(\nu-2s)-p) z) + E_{-n-\frac{1}{2}}((-p-i a(\nu-2s)) z)\right) /;\ n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1462.01

$$\int z^{n+\frac{1}{2}} e^{e+p z} \sin^{\nu}(a z)\, dz = -2^{-\nu} e^{e} (-p)^{-n-2} z^{-\frac{1}{2}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\operatorname{erfc}\left(\sqrt{-p z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{p z} \sum_{k=0}^{n} \frac{(-p z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{p z} \sum_{k=n+1}^{-1} \frac{(-p z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right) \sqrt{-p z} - 2^{-\nu} z^{n+\frac{3}{2}} i^{-\nu} e^{e} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s} \binom{\nu}{s} \left((-1)^{\nu} \left(\operatorname{erfc}\left(\sqrt{(i a (\nu-2 s)-p) z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{-(i a (\nu-2 s)-p) z} \sum_{k=0}^{n} \frac{((i a (\nu-2 s)-p) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{-(i a (\nu-2 s)-p) z} \sum_{k=n+1}^{-1} \frac{((i a (\nu-2 s)-p) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right) ((i a (\nu-2 s)-p) z)^{-n-\frac{3}{2}} + ((-p-i a (\nu-2 s)) z)^{-n-\frac{3}{2}} \left(\operatorname{erfc}\left(\sqrt{(-p-i a (\nu-2 s)) z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{-(-p-i a (\nu-2 s)) z} \sum_{k=0}^{n} \frac{((-p-i a (\nu-2 s)) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{-(-p-i a (\nu-2 s)) z} \sum_{k=n+1}^{-1} \frac{((-p-i a (\nu-2 s)) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right)\right) /;\ n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

Involving $z^{\alpha-1} e^{p z} \sin^{\nu}(a z + b)$

01.06.21.1463.01

$$\int z^{n} e^{p z} \sin^{\nu}(a z+b)\, dz = n!\, e^{p z} \sin^{\nu}(b+a z) \left(1-e^{2 i (b+a z)}\right)^{-\nu} \sum_{j=0}^{n} \frac{(-1)^{j} z^{n-j}}{(n-j)!\, (p-i a \nu)^{j+1}}\, {}_{j+2}F_{j+1}\left(-\frac{i p+a \nu}{2 a}, \ldots, -\frac{i p+a \nu}{2 a}, -\nu; 1-\frac{i p+a \nu}{2 a}, \ldots, 1-\frac{i p+a \nu}{2 a}; e^{2 i (b+a z)}\right) /;\ n \in \mathbb{N}^{+}$$

01.06.21.1464.01

$$\int z^{\alpha-1} e^{p z} \sin^{\nu}(b+a z)\, dz = -2^{-\nu} \binom{\nu}{\frac{\nu}{2}} E_{1-\alpha}(-p z) (1-\nu \bmod 2) z^{\alpha} - 2^{-\nu} z^{\alpha} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{k} \binom{\nu}{k} e^{-\frac{1}{2} i (\pi \nu+2 b (2 k+\nu))} \left(e^{2 i b \nu} E_{1-\alpha}(-(p+a i (\nu-2 k)) z) + e^{i (4 b k+\pi \nu)} E_{1-\alpha}(-(p-i a (\nu-2 k)) z)\right) /;\ \nu \in \mathbb{N}$$

01.06.21.1465.01

$$\int z^{n} e^{p z} \sin^{\nu}(a z+b)\, dz = -2^{-\nu} \binom{\nu}{\frac{\nu}{2}} E_{-n}(-p z) (1-\nu \bmod 2) z^{n+1} - 2^{-\nu} z^{n+1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^{s} e^{-\frac{1}{2} i (\pi \nu+2 b (2 s+\nu))} \binom{\nu}{s} \left(e^{i (4 b s+\pi \nu)} E_{-n}((i a (\nu-2 s)-p) z) + e^{2 i b \nu} E_{-n}((-p-i a (\nu-2 s)) z)\right) /;\ n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1466.01

$$\int z^n e^{p z} \sin^\nu(a z + b)\, dz = -2^{-\nu} (-p)^{-n-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(\frac{(-1)^{-n} \operatorname{Ei}(p z)}{(-n-1)!} + e^{p z} \sum_{k=0}^{n} \frac{(-p z)^k}{(n+1)_{k-n}} - e^{p z} \sum_{k=n+1}^{-1} \frac{(-p z)^k}{(n+1)_{k-n}} \right) - 2^{-\nu} z^{n+1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{-\frac{1}{2} i (\pi \nu + 2 b (2 s + \nu))} \binom{\nu}{s} \left(e^{i (4 b s + \pi \nu)} \left(\frac{(-1)^{-n} \operatorname{Ei}(-(i a (\nu - 2 s) - p) z)}{(-n-1)!} + e^{-(i a (\nu - 2 s) - p) z} \sum_{k=0}^{n} \frac{((i a (\nu - 2 s) - p) z)^k}{(n+1)_{k-n}} - e^{-(i a (\nu - 2 s) - p) z} \sum_{k=n+1}^{-1} \frac{((i a (\nu - 2 s) - p) z)^k}{(n+1)_{k-n}} \right) ((i a (\nu - 2 s) - p) z)^{-n-1} + e^{2 i b \nu} ((-p - i a (\nu - 2 s)) z)^{-n-1} \left(\frac{(-1)^{-n} \operatorname{Ei}(-(-p - i a (\nu - 2 s)) z)}{(-n-1)!} + e^{-(-p - i a (\nu - 2 s)) z} \sum_{k=0}^{n} \frac{((-p - i a (\nu - 2 s)) z)^k}{(n+1)_{k-n}} - e^{-(-p - i a (\nu - 2 s)) z} \sum_{k=n+1}^{-1} \frac{((-p - i a (\nu - 2 s)) z)^k}{(n+1)_{k-n}} \right) \right) /;\ n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1467.01

$$\int z^{n+\frac{1}{2}} e^{p z} \sin^\nu(a z + b)\, dz = -2^{-\nu} \binom{\nu}{\frac{\nu}{2}} E_{-n-\frac{1}{2}}(-p z) (1 - \nu \bmod 2) z^{n+\frac{3}{2}} - 2^{-\nu} z^{n+\frac{3}{2}} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{-\frac{1}{2} i (\pi \nu + 2 b (2 s + \nu))} \binom{\nu}{s} \left(e^{i (4 b s + \pi \nu)} E_{-n-\frac{1}{2}}((i a (\nu - 2 s) - p) z) + e^{2 i b \nu} E_{-n-\frac{1}{2}}((-p - i a (\nu - 2 s)) z) \right) /;\ n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1468.01

$$\int z^{n+\frac{1}{2}} e^{p z} \sin^\nu(a z + b)\, dz = -2^{-\nu} (-p)^{-n-2} z^{-\frac{1}{2}} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(\operatorname{erfc}\left(\sqrt{-p z}\right) \Gamma\left(n + \frac{3}{2}\right) + e^{p z} \sum_{k=0}^{n} \frac{(-p z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} - e^{p z} \sum_{k=n+1}^{-1} \frac{(-p z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} \right) \sqrt{-p z} - 2^{-\nu} z^{n+\frac{3}{2}} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{-\frac{1}{2} i (\pi \nu + 2 b (2 s + \nu))} \binom{\nu}{s} \left(e^{i (4 b s + \pi \nu)} \left(\operatorname{erfc}\left(\sqrt{(i a (\nu - 2 s) - p) z}\right) \Gamma\left(n + \frac{3}{2}\right) + e^{-(i a (\nu - 2 s) - p) z} \sum_{k=0}^{n} \frac{((i a (\nu - 2 s) - p) z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} - e^{-(i a (\nu - 2 s) - p) z} \sum_{k=n+1}^{-1} \frac{((i a (\nu - 2 s) - p) z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} \right) ((i a (\nu - 2 s) - p) z)^{-n-\frac{3}{2}} + e^{2 i b \nu} ((-p - i a (\nu - 2 s)) z)^{-n-\frac{3}{2}} \left(\operatorname{erfc}\left(\sqrt{(-p - i a (\nu - 2 s)) z}\right) \Gamma\left(n + \frac{3}{2}\right) + e^{-(-p - i a (\nu - 2 s)) z} \sum_{k=0}^{n} \frac{((-p - i a (\nu - 2 s)) z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} - e^{-(-p - i a (\nu - 2 s)) z} \sum_{k=n+1}^{-1} \frac{((-p - i a (\nu - 2 s)) z)^{k+\frac{1}{2}}}{\left(n + \frac{3}{2}\right)_{k-n}} \right) \right) /;\ n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

Involving $z^{\alpha-1}\, e^{p z+e} \sin^\nu(a z+b)$

01.06.21.1469.01

$$\int z^n\, e^{p z+e} \sin^\nu(a z+b)\, dz = n!\, e^{p z+e} \sin^\nu(b+a z) \left(1-e^{2 i (b+a z)}\right)^{-\nu} \sum_{j=0}^{n} \frac{(-1)^j z^{n-j}}{(n-j)!\,(p-i a \nu)^{j+1}}\, {}_{j+2}F_{j+1}\left(-\frac{i p+a \nu}{2 a}, \ldots, -\frac{i p+a \nu}{2 a}, -\nu; 1-\frac{i p+a \nu}{2 a}, \ldots, 1-\frac{i p+a \nu}{2 a}; e^{2 i (b+a z)}\right) /;\, n \in \mathbb{N}^+$$

01.06.21.1470.01

$$\int z^{\alpha-1}\, e^{p z+e} \sin^\nu(b+a z)\, dz = -2^{-\nu} e^e \binom{\nu}{\frac{\nu}{2}} E_{1-\alpha}(-p z)\,(1-\nu \bmod 2)\, z^\alpha - 2^{-\nu} z^\alpha \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} e^{e-\frac{1}{2} i (\pi \nu+2 b (2 k+\nu))} \left(e^{2 i b \nu} E_{1-\alpha}(-(p+a i (\nu-2 k)) z) + e^{i (4 b k+\pi \nu)} E_{1-\alpha}(-(p-i a (\nu-2 k)) z)\right) /;\, \nu \in \mathbb{N}$$

01.06.21.1471.01

$$\int z^n\, e^{p z+e} \sin^\nu(a z+b)\, dz = -2^{-\nu} e^e \binom{\nu}{\frac{\nu}{2}} E_{-n}(-p z)\,(1-\nu \bmod 2)\, z^{n+1} - 2^{-\nu} z^{n+1} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s e^{e-\frac{1}{2} i (\pi \nu+2 b (2 s+\nu))} \binom{\nu}{s} \left(e^{i (4 b s+\pi \nu)} E_{-n}((i a (\nu-2 s)-p) z) + e^{2 i b \nu} E_{-n}((-p-i a (\nu-2 s)) z)\right) /;\, n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1472.01

$$\int z^n\, e^{p z+e} \sin^\nu(a z+b)\, dz = -2^{-\nu} (-p)^{-n-1} e^e \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\frac{(-1)^{-n} \operatorname{Ei}(p z)}{(-n-1)!} + e^{p z} \sum_{k=0}^{n} \frac{(-p z)^k}{(n+1)_{k-n}} - e^{p z} \sum_{k=n+1}^{-1} \frac{(-p z)^k}{(n+1)_{k-n}}\right) - 2^{-\nu} z^{n+1} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s e^{e-\frac{1}{2} i (\pi \nu+2 b (2 s+\nu))} \binom{\nu}{s} \left(e^{i (4 b s+\pi \nu)} \left(\frac{(-1)^{-n} \operatorname{Ei}(-(i a (\nu-2 s)-p) z)}{(-n-1)!} + e^{-(i a (\nu-2 s)-p) z} \sum_{k=0}^{n} \frac{((i a (\nu-2 s)-p) z)^k}{(n+1)_{k-n}} - e^{-(i a (\nu-2 s)-p) z} \sum_{k=n+1}^{-1} \frac{((i a (\nu-2 s)-p) z)^k}{(n+1)_{k-n}}\right) ((i a (\nu-2 s)-p) z)^{-n-1} + e^{2 i b \nu} ((-p-i a (\nu-2 s)) z)^{-n-1} \left(\frac{(-1)^{-n} \operatorname{Ei}(-(-p-i a (\nu-2 s)) z)}{(-n-1)!} + e^{-(-p-i a (\nu-2 s)) z} \sum_{k=0}^{n} \frac{((-p-i a (\nu-2 s)) z)^k}{(n+1)_{k-n}} - e^{-(-p-i a (\nu-2 s)) z} \sum_{k=n+1}^{-1} \frac{((-p-i a (\nu-2 s)) z)^k}{(n+1)_{k-n}}\right)\right) /;\, n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1473.01

$$\int z^{n+\frac{1}{2}}\, e^{p z+e} \sin^\nu(a z+b)\, dz = -2^{-\nu} e^e \binom{\nu}{\frac{\nu}{2}} E_{-n-\frac{1}{2}}(-p z)\,(1-\nu \bmod 2)\, z^{n+\frac{3}{2}} - 2^{-\nu} z^{n+\frac{3}{2}} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s e^{e-\frac{1}{2} i (\pi \nu+2 b (2 s+\nu))} \binom{\nu}{s} \left(e^{i (4 b s+\pi \nu)} E_{-n-\frac{1}{2}}((i a (\nu-2 s)-p) z) + e^{2 i b \nu} E_{-n-\frac{1}{2}}((-p-i a (\nu-2 s)) z)\right) /;\, n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

01.06.21.1474.01

$$\int z^{n+\frac{1}{2}} e^{p z+e} \sin^{\nu}(a z+b)\, dz = -2^{-\nu} (-p)^{-n-2} z^{-\frac{1}{2}} e^{e} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\operatorname{erfc}\left(\sqrt{-p z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{p z} \sum_{k=0}^{n} \frac{(-p z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{p z} \sum_{k=n+1}^{-1} \frac{(-p z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right) \sqrt{-p z} - 2^{-\nu} z^{n+\frac{3}{2}} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{e-\frac{1}{2} i (\pi \nu+2 b (2 s+\nu))} \binom{\nu}{s} \left(e^{i (4 b s+\pi \nu)} \left(\operatorname{erfc}\left(\sqrt{(i a (\nu-2 s)-p) z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{-(i a (\nu-2 s)-p) z} \sum_{k=0}^{n} \frac{((i a (\nu-2 s)-p) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{-(i a (\nu-2 s)-p) z} \sum_{k=n+1}^{-1} \frac{((i a (\nu-2 s)-p) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right) ((i a (\nu-2 s)-p) z)^{-n-\frac{3}{2}} + e^{2 i b \nu} ((-p-i a (\nu-2 s)) z)^{-n-\frac{3}{2}} \left(\operatorname{erfc}\left(\sqrt{(-p-i a (\nu-2 s)) z}\right) \Gamma\left(n+\frac{3}{2}\right) + e^{-(-p-i a (\nu-2 s)) z} \sum_{k=0}^{n} \frac{((-p-i a (\nu-2 s)) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}} - e^{-(-p-i a (\nu-2 s)) z} \sum_{k=n+1}^{-1} \frac{((-p-i a (\nu-2 s)) z)^{k+\frac{1}{2}}}{\left(n+\frac{3}{2}\right)_{k-n}}\right)\right) /;\ n \in \mathbb{Z} \land \nu \in \mathbb{N}$$

Involving $z^n e^{b z^r} \sin^{\nu}(c z)$

01.06.21.1475.01

$$\int z^n e^{b z^2} \sin^{\nu}(c z)\, dz = -i^{-\nu} 2^{-\nu-1} b^{-n-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{\frac{c^2 (\nu-2 k)^2}{4 b}} \binom{\nu}{k} \left((-1)^{\nu} \sum_{q=0}^{n} \binom{n}{q} 2^{q-n} (i c (\nu-2 k))^{n-q} (2 i c k - i c \nu + 2 b z)^{q+1} \left(-\frac{(2 i c k - i c \nu + 2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \Gamma\left(\frac{q+1}{2}, -\frac{(2 i c k - i c \nu + 2 b z)^2}{4 b}\right) + \sum_{q=0}^{n} \binom{n}{q} \left(i c \left(k - \frac{\nu}{2}\right)\right)^{n-q} (c i (\nu-2 k) + 2 b z)^{q+1} \left(-\frac{(c i (\nu-2 k) + 2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \Gamma\left(\frac{q+1}{2}, -\frac{(c i (\nu-2 k) + 2 b z)^2}{4 b}\right)\right) - 2^{-\nu-1} z^{n+1} \left(-b z^2\right)^{\frac{1}{2}(-n-1)} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1-\nu \bmod 2) /;\ n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

01.06.21.1476.01

$$\int z^n e^{b\sqrt{z}} \sin^\nu(c z)\, dz = i^{-\nu}\, 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s\, e^{\frac{b^2}{8 i c s - 4 i c \nu}} \left(-c^2 (\nu - 2s)^2\right)^{-2n-1} \binom{\nu}{s}$$

$$\left((i\, c\, (2s-\nu))^{2n} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, b^{-h-k+2n} \left(b + 2 c\, i\, (\nu - 2s)\sqrt{z}\right)^{h+k} \left(\frac{i\left(b + 2 c\, i\, (\nu - 2s)\sqrt{z}\right)^2}{c\,(\nu - 2s)}\right)^{\frac{1}{2}(-h-k-1)}\right.$$

$$\binom{k}{h}\binom{n}{k} \left(b\left(b + 2 c\, i\, (\nu - 2s)\sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+k+1), -\frac{i\left(b + 2 c\, i\, (\nu - 2s)\sqrt{z}\right)^2}{c\,(8s - 4\nu)}\right) + \right.$$

$$\left.\left. 2 c\, i \sqrt{-\frac{i\left(b + 2 c\, i\, (\nu - 2s)\sqrt{z}\right)^2}{c\,(2s - \nu)}}\; (\nu - 2s)\, \Gamma\!\left(\frac{1}{2}(h+k+2), -\frac{i\left(b + 2 c\, i\, (\nu - 2s)\sqrt{z}\right)^2}{c\,(8s - 4\nu)}\right)\right) + \right.$$

$$(-1)^\nu\, e^{\frac{b^2}{2 i c \nu - 4 i c s}}\, (i\, c\, (\nu - 2s))^{2n} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, b^{-h-k+2n} \left(b - 2 i\, c\, (\nu - 2s)\sqrt{z}\right)^{h+k}$$

$$\left(-\frac{i\left(b - 2 i\, c\, (\nu - 2s)\sqrt{z}\right)^2}{c\,(\nu - 2s)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k}$$

$$\left(b\left(b - 2 i\, c\, (\nu - 2s)\sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+k+1), -\frac{i\left(b - 2 i\, c\, (\nu - 2s)\sqrt{z}\right)^2}{4 c\,(\nu - 2s)}\right) - \right.$$

$$\left.\left. 2 i\, c\, (\nu - 2s) \sqrt{-\frac{i\left(b - 2 i\, c\, (\nu - 2s)\sqrt{z}\right)^2}{c\,(\nu - 2s)}}\; \Gamma\!\left(\frac{1}{2}(h+k+2), -\frac{i\left(b - 2 i\, c\, (\nu - 2s)\sqrt{z}\right)^2}{4 c\,(\nu - 2s)}\right)\right)\right) -$$

$$2^{1-\nu}\, b^{-2n-2} \binom{\nu}{\frac{\nu}{2}} \Gamma\!\left(2(n+1), -b\sqrt{z}\right) (1 - \nu \bmod 2) \;/;\; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n e^{b z^r + e} \sin^\nu(c z)$

01.06.21.1477.01

$$\int z^n e^{b z^2+e} \sin^\nu(c z)\, dz = -2^{-\nu-1} e^e z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1 - \nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} - i^{-\nu} 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{e-\frac{(2 i c s - i c \nu)^2}{4 b}} \left(\sum_{q=0}^{n} 2^{q-n} (i c \nu - 2 i c s)^{n-q} (2 i c s - i c \nu + 2 b z)^{q+1} \left(-\frac{(2 i c s - i c \nu + 2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(2 i c s - i c \nu + 2 b z)^2}{4 b}\right) \right) b^{-n-1} + e^{e-\frac{(i c \nu - 2 i c s)^2}{4 b}} \left(\sum_{q=0}^{n} 2^{q-n} (2 i c s - i c \nu)^{n-q} (c i (\nu - 2 s) + 2 b z)^{q+1} \left(-\frac{(c i (\nu - 2 s) + 2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(c i (\nu - 2 s) + 2 b z)^2}{4 b}\right) \right) b^{-n-1} \right) /;\, n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1478.01

$$\int z^n e^{\sqrt{z}\, b+e} \sin^\nu(c z)\, dz = i^{-\nu}\, 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{\frac{i b^2}{4c(2s-\nu)}+e} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, b^{-h-k+2n} \left(b + 2 c i (2s-\nu)\sqrt{z}\right)^{h+k} \left(\frac{i \left(b + 2 c i (2s-\nu)\sqrt{z}\right)^2}{c(2s-\nu)} \right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b \left(b + 2 c i (2s-\nu)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i \left(b + 2 c i (2s-\nu)\sqrt{z}\right)^2}{4c(2s-\nu)} \right) + 2 c i (2s-\nu) \sqrt{\frac{i \left(b + 2 c i (2s-\nu)\sqrt{z}\right)^2}{c(2s-\nu)}}\; \Gamma\left(\frac{1}{2}(h+k+2), \frac{i \left(b + 2 c i (2s-\nu)\sqrt{z}\right)^2}{4c(2s-\nu)} \right) \right) \right) (i c (2s-\nu))^{-2n-2} + e^{\frac{i b^2}{4c(\nu-2s)}+e} (i c(\nu-2s))^{-2n-2} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, b^{-h-k+2n} \left(b + 2 c i (\nu-2s)\sqrt{z}\right)^{h+k} \left(\frac{i \left(b + 2 c i (\nu-2s)\sqrt{z}\right)^2}{c(\nu-2s)} \right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b \left(b + 2 c i (\nu-2s)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i \left(b + 2 c i (\nu-2s)\sqrt{z}\right)^2}{4c(\nu-2s)} \right) + 2 c i (\nu-2s) \sqrt{\frac{i \left(b + 2 c i (\nu-2s)\sqrt{z}\right)^2}{c(\nu-2s)}}\; \Gamma\left(\frac{1}{2}(h+k+2), \frac{i \left(b + 2 c i (\nu-2s)\sqrt{z}\right)^2}{4c(\nu-2s)} \right) \right) \right) - 2^{1-\nu} (-b)^{-2(n+1)} e^e \binom{\nu}{\frac{\nu}{2}} \Gamma\left(2(n+1), -b\sqrt{z}\right) (1 - \nu \bmod 2) \,/;\, n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n e^{b z^r + d z} \sin^\nu(c z)$

01.06.21.1479.01

$$\int z^n e^{b z^2+d z} \sin^{\nu}(c z)\, dz = -2^{-\nu-1} e^{-\frac{d^2}{4b}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)\, b^{-n-1} \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz)^{q+1} \left(-\frac{(d+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\!\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b}\right) - i^{-\nu} 2^{-\nu-1} b^{-n-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{(d+c i (\nu-2s))^2}{4b}} \sum_{q=0}^{n} \binom{n}{q} 2^{q-n} (-d+2ics-icv)^{n-q} (d-2ics+icv+2bz)^{q+1} \left(-\frac{(d-2ics+icv+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \Gamma\!\left(\frac{q+1}{2}, -\frac{(d-2ics+icv+2bz)^2}{4b}\right) + (-1)^{\nu} e^{-\frac{(d+2ics-icv)^2}{4b}} \sum_{q=0}^{n} \binom{n}{q} 2^{q-n} (ic(\nu-2s)-d)^{n-q} (d+2ics-icv+2bz)^{q+1} \left(-\frac{(d+2ics-icv+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \Gamma\!\left(\frac{q+1}{2}, -\frac{(d+2ics-icv+2bz)^2}{4b}\right) \right) /;\ n \in \mathbb{N} \wedge \nu \in \mathbb{N}^+$$

01.06.21.1480.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin^{\nu}(c z)\, dz = 2^{-2n-\nu-1} e^{-\frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b \left(b+2d\sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+2d\sqrt{z}\right)^2}{d}}\; d\, \Gamma\!\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) \right) \right) d^{-2n-2} + 2^{-2n-\nu-1} i^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu} e^{\frac{b^2}{-4d-8ics+4icv}} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d+2ics-icv)\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d+2ics-icv)\sqrt{z}\right)^2}{d+2ics-icv}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b \left(b+2(d+2ics-icv)\sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d+2ics-icv)\sqrt{z}\right)^2}{4(d+2ics-icv)}\right) + 2\sqrt{-\frac{\left(b+2(d+2ics-icv)\sqrt{z}\right)^2}{d+2ics-icv}} \right.\right.\right.$$

$$(d+2\,i\,c\,s-i\,c\,v)\,\Gamma\!\left(\frac{1}{2}(h+k+2),\,-\frac{\left(b+2\,(d+2\,i\,c\,s-i\,c\,v)\sqrt{z}\right)^2}{4\,(d+2\,i\,c\,s-i\,c\,v)}\right)\Bigg)\Bigg)(d+2\,i\,c\,s-i\,c\,v)^{-2(n+1)}+$$

$$e^{-\frac{b^2}{4(d+c\,i\,(v-2\,s))}}\,(d+c\,i\,(v-2\,s))^{-2(n+1)}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,b^{-h-k+2\,n}\left(b+2\,(d-2\,i\,c\,s+i\,c\,v)\sqrt{z}\right)^{h+k}$$

$$\left(-\frac{\left(b+2\,(d-2\,i\,c\,s+i\,c\,v)\sqrt{z}\right)^2}{d+c\,i\,(v-2\,s)}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}\Bigg(b\left(b+2\,(d-2\,i\,c\,s+i\,c\,v)\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+k+1),\,-\frac{\left(b+2\,(d-2\,i\,c\,s+i\,c\,v)\sqrt{z}\right)^2}{4\,(d+c\,i\,(v-2\,s))}\Bigg)+2\sqrt{-\frac{\left(b+2\,(d-2\,i\,c\,s+i\,c\,v)\sqrt{z}\right)^2}{d+c\,i\,(v-2\,s)}}$$

$$(d+c\,i\,(v-2\,s))\,\Gamma\!\left(\frac{1}{2}(h+k+2),\,-\frac{\left(b+2\,(d-2\,i\,c\,s+i\,c\,v)\sqrt{z}\right)^2}{4\,(d+c\,i\,(v-2\,s))}\right)\Bigg)\Bigg)\,/;\,n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n\,e^{b\,z^r+d\,z+e}\,\sin^v(c\,z)$

01.06.21.1481.01

$$\int z^n\,e^{b\,z^2+d\,z+e}\,\sin^v(c\,z)\,dz =$$

$$2^{-v-1}\,b^{-n-1}\,e^{-\frac{d^2}{4\,b}}\Bigg(e^e\binom{v}{\frac{v}{2}}(v\bmod 2-1)\sum_{q=0}^{n}2^{q-n}\,(-d)^{n-q}\,(d+2\,b\,z)^{q+1}\left(-\frac{(d+2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\!\left(\frac{q+1}{2},\,-\frac{(d+2\,b\,z)^2}{4\,b}\right)-$$

$$i^{-v}\,e^{\frac{d^2}{4\,b}+e}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg(e^{-\frac{(d-2\,i\,c\,s+i\,c\,v)^2}{4\,b}}\sum_{q=0}^{n}2^{q-n}\,(-d+2\,i\,c\,s-i\,c\,v)^{n-q}\,(d-2\,i\,c\,s+i\,c\,v+2\,b\,z)^{q+1}$$

$$\left(-\frac{(d-2\,i\,c\,s+i\,c\,v+2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\!\left(\frac{q+1}{2},\,-\frac{(d-2\,i\,c\,s+i\,c\,v+2\,b\,z)^2}{4\,b}\right)+$$

$$(-1)^v\,e^{-\frac{(d+2\,i\,c\,s-i\,c\,v)^2}{4\,b}}\sum_{q=0}^{n}2^{q-n}\,(-d-2\,i\,c\,s+i\,c\,v)^{n-q}\,(d+2\,i\,c\,s-i\,c\,v+2\,b\,z)^{q+1}$$

$$\left(-\frac{(d+2\,i\,c\,s-i\,c\,v+2\,b\,z)^2}{b}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\!\left(\frac{q+1}{2},\,-\frac{(d+2\,i\,c\,s-i\,c\,v+2\,b\,z)^2}{4\,b}\right)\Bigg)\Bigg)\,/;\,n\in\mathbb{N}\land v\in\mathbb{N}^+$$

01.06.21.1482.01

$$\int z^n e^{\sqrt{z}\, b+d z+e} \sin^{\nu}(c z)\, dz = 2^{-2n-\nu-1} e^{e-\frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+2d\sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right)\right)\right) d^{-2n-2} +$$

$$2^{-2n-\nu-1} i^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{e-\frac{b^2}{4(d+c i(\nu-2s))}} \left(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d+c i(\nu-2s))\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d+c i(\nu-2s))\sqrt{z}\right)^2}{d+c i(\nu-2s)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2(d+c i(\nu-2s))\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d+c i(\nu-2s))\sqrt{z}\right)^2}{4(d+c i(\nu-2s))}\right) + 2\sqrt{-\frac{\left(b+2(d+c i(\nu-2s))\sqrt{z}\right)^2}{d+c i(\nu-2s)}}\, (d+c i(\nu-2s))\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d+c i(\nu-2s))\sqrt{z}\right)^2}{4(d+c i(\nu-2s))}\right)\right)\right) (d+c i(\nu-2s))^{-2n-2} +$$

$$(-1)^{\nu} e^{e-\frac{b^2}{4(d-i c(\nu-2s))}} (d-i c(\nu-2s))^{-2n-2} \sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d-i c(\nu-2s))\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d-i c(\nu-2s))\sqrt{z}\right)^2}{d-i c(\nu-2s)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2(d-i c(\nu-2s))\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d-i c(\nu-2s))\sqrt{z}\right)^2}{4(d-i c(\nu-2s))}\right) + 2\sqrt{-\frac{\left(b+2(d-i c(\nu-2s))\sqrt{z}\right)^2}{d-i c(\nu-2s)}}\, (d-i c(\nu-2s))\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d-i c(\nu-2s))\sqrt{z}\right)^2}{4(d-i c(\nu-2s))}\right)\right)\right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n e^{b z^r} \sin^\nu(f z + g)$

01.06.21.1483.01

$$\int z^n e^{b z^2} \sin^\nu(f z + g)\, dz = -2^{-\nu-1} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1 - \nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} -$$
$$i^{-\nu} 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{-\frac{(2 i f s - i f \nu)^2}{4 b} + g i (2 s - \nu)} \left(\sum_{q=0}^{n} 2^{q-n} (i f \nu - 2 i f s)^{n-q} (2 i f s - i f \nu + 2 b z)^{q+1} \right.\right.$$
$$\left.\left. \left(-\frac{(2 i f s - i f \nu + 2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(2 i f s - i f \nu + 2 b z)^2}{4 b}\right)\right) b^{-n-1} +\right.$$
$$e^{-\frac{(i f \nu - 2 i f s)^2}{4 b} + g i (\nu - 2 s)} \left(\sum_{q=0}^{n} 2^{q-n} (2 i f s - i f \nu)^{n-q} (f i (\nu - 2 s) + 2 b z)^{q+1} \left(-\frac{(f i (\nu - 2 s) + 2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \right.$$
$$\left.\left. \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(f i (\nu - 2 s) + 2 b z)^2}{4 b}\right)\right) b^{-n-1} \right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1484.01

$$\int z^n e^{\sqrt{z}\, b} \sin^\nu(f z + g)\, dz ==$$

$$i^{-\nu} 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \Bigg((-1)^\nu e^{\frac{i b^2}{4 f (2s-\nu)} + g i (2s-\nu)} \Bigg(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b + 2 f i (2s-\nu) \sqrt{z}\right)^{h+k}$$

$$\left(\frac{i \left(b + 2 f i (2s-\nu)\sqrt{z}\right)^2}{f (2s-\nu)} \right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \Bigg(b \left(b + 2 f i (2s-\nu)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \right.$$

$$\left. \frac{i \left(b + 2 f i (2s-\nu)\sqrt{z}\right)^2}{4 f (2s-\nu)} \right) + 2 f i (2s-\nu) \sqrt{\frac{i \left(b + 2 f i (2s-\nu)\sqrt{z}\right)^2}{f (2s-\nu)}}\ \Gamma\left(\frac{1}{2}(h+k+2), \right.$$

$$\left. \left. \left. \frac{i \left(b + 2 f i (2s-\nu)\sqrt{z}\right)^2}{4 f (2s-\nu)} \right) \right) \right) (i f (2s-\nu))^{-2n-2} + e^{\frac{i b^2}{4 f (\nu-2s)} + g i (\nu-2s)} (i f (\nu-2s))^{-2n-2}$$

$$\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b + 2 f i (\nu-2s) \sqrt{z}\right)^{h+k} \left(\frac{i \left(b + 2 f i (\nu-2s)\sqrt{z}\right)^2}{f (\nu-2s)} \right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h} \binom{n}{k} \Bigg(b \left(b + 2 f i (\nu-2s)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i \left(b + 2 f i (\nu-2s)\sqrt{z}\right)^2}{4 f (\nu-2s)} \right) +$$

$$\left. \left. 2 f i (\nu-2s) \sqrt{\frac{i \left(b + 2 f i (\nu-2s)\sqrt{z}\right)^2}{f (\nu-2s)}}\ \Gamma\left(\frac{1}{2}(h+k+2), \frac{i \left(b + 2 f i (\nu-2s)\sqrt{z}\right)^2}{4 f (\nu-2s)} \right) \right) \right) -$$

$$2^{1-\nu} (-b)^{-2(n+1)} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(2(n+1), -b\sqrt{z}\right) (1 - \nu \bmod 2) \;/;\; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n e^{b z^r + e} \sin^\nu(f z + g)$

01.06.21.1485.01

$$\int z^n e^{b z^2+e} \sin^\nu(f z+g) \, dz = -2^{-\nu-1} e^e z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1-\nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} -$$
$$i^{-\nu} 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{-\frac{(2 i f s - i f \nu)^2}{4 b} + e + g i (2 s - \nu)} \left(\sum_{q=0}^n 2^{q-n} (i f \nu - 2 i f s)^{n-q} (2 i f s - i f \nu + 2 b z)^{q+1} \right.\right.$$
$$\left.\left(-\frac{(2 i f s - i f \nu + 2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(2 i f s - i f \nu + 2 b z)^2}{4 b}\right)\right) b^{-n-1} +$$
$$e^{-\frac{(i f \nu - 2 i f s)^2}{4 b} + e + g i (\nu - 2 s)} \left(\sum_{q=0}^n 2^{q-n} (2 i f s - i f \nu)^{n-q} (f i (\nu - 2 s) + 2 b z)^{q+1} \left(-\frac{(f i (\nu - 2 s) + 2 b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \right.$$
$$\left.\left.\binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(f i (\nu - 2 s) + 2 b z)^2}{4 b}\right)\right) b^{-n-1} \right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1486.01

$$\int z^n e^{\sqrt{z}\, b+e} \sin^\nu(f z+g)\, dz = i^{-\nu} 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \Bigg((-1)^\nu e^{\frac{i b^2}{4 f (2s-\nu)}+e+g i (2s-\nu)} \Bigg(\sum_{k=0}^n \sum_{h=0}^k (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2 f i (2s-\nu)\sqrt{z}\right)^{h+k} \left(\frac{i \left(b+2 f i (2s-\nu)\sqrt{z}\right)^2}{f (2s-\nu)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \Bigg(b \left(b+2 f i (2s-\nu)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i \left(b+2 f i (2s-\nu)\sqrt{z}\right)^2}{4 f (2s-\nu)}\right) + 2 f i (2s-\nu) \sqrt{\frac{i \left(b+2 f i (2s-\nu)\sqrt{z}\right)^2}{f (2s-\nu)}}\; \Gamma\left(\frac{1}{2}(h+k+2), \frac{i \left(b+2 f i (2s-\nu)\sqrt{z}\right)^2}{4 f (2s-\nu)}\right)\Bigg)\Bigg)\Bigg) (i f (2s-\nu))^{-2n-2} + e^{\frac{i b^2}{4 f (\nu-2s)}+e+g i (\nu-2s)} (i f (\nu-2s))^{-2n-2} \sum_{k=0}^n \sum_{h=0}^k (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2 f i (\nu-2s)\sqrt{z}\right)^{h+k} \left(\frac{i \left(b+2 f i (\nu-2s)\sqrt{z}\right)^2}{f (\nu-2s)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \Bigg(b \left(b+2 f i (\nu-2s)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i \left(b+2 f i (\nu-2s)\sqrt{z}\right)^2}{4 f (\nu-2s)}\right) + 2 f i (\nu-2s) \sqrt{\frac{i \left(b+2 f i (\nu-2s)\sqrt{z}\right)^2}{f (\nu-2s)}}\; \Gamma\left(\frac{1}{2}(h+k+2), \frac{i \left(b+2 f i (\nu-2s)\sqrt{z}\right)^2}{4 f (\nu-2s)}\right)\Bigg)\Bigg) - 2^{1-\nu} (-b)^{-2(n+1)} e^e \binom{\nu}{\frac{\nu}{2}} \Gamma\left(2(n+1), -b\sqrt{z}\right) (1-\nu \bmod 2) \;/;\; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n e^{b z^r + d z} \sin^\nu(f z+g)$

01.06.21.1487.01

$$\int z^n e^{b z^2+d z} \sin^\nu(f z+g)\, dz = 2^{-\nu-1} b^{-n-1} e^{-\frac{d^2}{4b}} \left(\binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2-1) \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz)^{q+1} \left(-\frac{(d+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b}\right) - i^{-\nu} b^{n+1} e^{\frac{d^2}{4b}} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{-\frac{(d+2 i f s-i f \nu)^2}{4b}+g i (2s-\nu)} \left(\sum_{q=0}^{n} 2^{q-n} (-d-2 i f s+i f \nu)^{n-q} (d+2 i f s-i f \nu+2bz)^{q+1} \left(-\frac{(d+2 i f s-i f \nu+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2 i f s-i f \nu+2bz)^2}{4b}\right)\right) b^{-n-1} + e^{-\frac{(d-2 i f s+i f \nu)^2}{4b}+g i (\nu-2s)} \left(\sum_{q=0}^{n} 2^{q-n} (-d+2 i f s-i f \nu)^{n-q} (d+f i(\nu-2s)+2bz)^{q+1} \left(-\frac{(d+f i(\nu-2s)+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+f i(\nu-2s)+2bz)^2}{4b}\right)\right) b^{-n-1} \right)\right) /;\, n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1488.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin^\nu(f z+g)\, dz = 2^{-2n-\nu-1} e^{-\frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b\left(b+2d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+2d\sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right)\right)\right) d^{-2n-2} + 2^{-2n-\nu-1} i^{-\nu} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{-\frac{b^2}{4(d+f i(2s-\nu))}+g i(2s-\nu)} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d+f i(2s-\nu))\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d+f i(2s-\nu))\sqrt{z}\right)^2}{d+f i(2s-\nu)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b\left(b+2(d+f i(2s-\nu))\sqrt{z}\right) \right.\right.\right.$$

$$\Gamma\!\left(\frac{1}{2}(h+k+1),\, -\frac{\left(b+2\,(d+f\,i\,(2\,s-v))\,\sqrt{z}\right)^2}{4\,(d+f\,i\,(2\,s-v))}\right)+2\,\sqrt{-\frac{\left(b+2\,(d+f\,i\,(2\,s-v))\,\sqrt{z}\right)^2}{d+f\,i\,(2\,s-v)}}$$

$$(d+f\,i\,(2\,s-v))\,\Gamma\!\left(\frac{1}{2}(h+k+2),\, -\frac{\left(b+2\,(d+f\,i\,(2\,s-v))\,\sqrt{z}\right)^2}{4\,(d+f\,i\,(2\,s-v))}\right)\Bigg)\Bigg)\Bigg)\,(d+f\,i\,(2\,s-v))^{-2\,n-2}+$$

$$e^{-\frac{b^2}{4\,(d+f\,i\,(v-2\,s))}+g\,i\,(v-2\,s)}\,(d+f\,i\,(v-2\,s))^{-2\,n-2}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,b^{-h-k+2\,n}\left(b+2\,(d+f\,i\,(v-2\,s))\,\sqrt{z}\right)^{h+k}$$

$$\left(-\frac{\left(b+2\,(d+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2}{d+f\,i\,(v-2\,s)}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}\Bigg(b\left(b+2\,(d+f\,i\,(v-2\,s))\,\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+k+1),\, -\frac{\left(b+2\,(d+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2\,s))}\Bigg)+2\,\sqrt{-\frac{\left(b+2\,(d+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2}{d+f\,i\,(v-2\,s)}}$$

$$(d+f\,i\,(v-2\,s))\,\Gamma\!\left(\frac{1}{2}(h+k+2),\, -\frac{\left(b+2\,(d+f\,i\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2\,s))}\right)\Bigg)\Bigg)\,/;\, n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n\, e^{b\,z^r+d\,z+e}\,\sin^v(f\,z+g)$

01.06.21.1489.01

$$\int z^n e^{b z^2+d z+e} \sin^{\nu}(f z+g)\, dz = 2^{-\nu-1} b^{-n-1} e^{-\frac{d^2}{4b}} \left(e^e \binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2 - 1) \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz)^{q+1} \left(-\frac{(d+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b}\right) - i^{-\nu} b^{n+1} e^{\frac{d^2}{4b}} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu} e^{-\frac{(d+2 i f s - i f \nu)^2}{4b}+e+g i (2s-\nu)} \left(\sum_{q=0}^{n} 2^{q-n} (-d-2 i f s + i f \nu)^{n-q} (d+2 i f s - i f \nu + 2bz)^{q+1} \left(-\frac{(d+2 i f s - i f \nu+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2 i f s - i f \nu + 2bz)^2}{4b}\right)\right) b^{-n-1} + e^{-\frac{(d-2 i f s + i f \nu)^2}{4b}+e+g i (\nu-2s)} \left(\sum_{q=0}^{n} 2^{q-n} (-d+2 i f s - i f \nu)^{n-q} (d+f i (\nu-2s)+2bz)^{q+1} \left(-\frac{(d+f i (\nu-2s)+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+f i (\nu-2s)+2bz)^2}{4b}\right)\right) b^{-n-1} \right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1490.01

$$\int z^n e^{\sqrt{z}\, b+d z+e} \sin^{\nu}(f z+g)\, dz = 2^{-2n-\nu-1} e^{e-\frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b\left(b+2d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+2d\sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right)\right)\right) d^{-2n-2} + 2^{-2n-\nu-1} i^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu} e^{-\frac{b^2}{4(d+f i (2s-\nu))}+e+g i (2s-\nu)} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2(d+f i (2s-\nu))\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2(d+f i (2s-\nu))\sqrt{z}\right)^2}{d+f i (2s-\nu)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b\left(b+2(d+f i (2s-\nu))\sqrt{z}\right) \right.\right.\right.$$

$$\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{4(d+f\,i\,(2s-v))}\right)+2\sqrt{-\frac{\left(b+2(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{d+f\,i\,(2s-v)}}$$

$$(d+f\,i\,(2s-v))\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{4(d+f\,i\,(2s-v))}\right)\Bigg)\Bigg)\,(d+f\,i\,(2s-v))^{-2n-2}+$$

$$e^{-\frac{b^2}{4(d+f\,i\,(v-2s))}+e+g\,i\,(v-2s)}\,(d+f\,i\,(v-2s))^{-2n-2}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,b^{-h-k+2n}\left(b+2(d+f\,i\,(v-2s))\sqrt{z}\right)^{h+k}$$

$$\left(-\frac{\left(b+2(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}\Bigg(b\left(b+2(d+f\,i\,(v-2s))\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+k+1), -\frac{\left(b+2(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4(d+f\,i\,(v-2s))}\Bigg)+2\sqrt{-\frac{\left(b+2(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}}$$

$$(d+f\,i\,(v-2s))\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4(d+f\,i\,(v-2s))}\right)\Bigg)\Bigg)\Bigg)\,/;\, n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n\, e^{b z} \sin^v(c\, z^r)$

01.06.21.1491.01

$$\int z^n\, e^{b z}\sin^v\left(c\, z^2\right)dz = 2^{-v}\left((-b)^{-n-1}\binom{v}{\frac{v}{2}}\Gamma(n+1, -b\, z)\,(v \bmod 2-1)-\right.$$

$$\frac{1}{2}\, i^{-v}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left((-1)^v\, e^{\frac{b^2}{4 i c v-8 i c s}}\,(i\, c\,(2s-v))^{-n-1}\sum_{q=0}^{n}2^{q-n}\,(-b)^{n-q}\,(b+4\, i\, c\, s\, z-2\, i\, c\, v\, z)^{q+1}\right.$$

$$\left(-\frac{i\,(b+4\,i\,c\,s\,z-2\,i\,c\,v\,z)^2}{c\,(v-2s)}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2}, -\frac{i\,(b+4\,i\,c\,s\,z-2\,i\,c\,v\,z)^2}{4\,c\,(v-2s)}\right)+$$

$$e^{\frac{b^2}{8 i c s-4 i c v}}\,(i\, c\,(v-2s))^{-n-1}\sum_{q=0}^{n}2^{q-n}\,(-b)^{n-q}\,(b+2\,c\,i\,(v-2s)\,z)^{q+1}\left(\frac{i\,(b+2\,c\,i\,(v-2s)\,z)^2}{c\,(v-2s)}\right)^{\frac{1}{2}(-q-1)}$$

$$\left.\left.\binom{n}{q}\Gamma\left(\frac{q+1}{2}, -\frac{i\,(b+2\,c\,i\,(v-2s)\,z)^2}{c\,(8s-4v)}\right)\right)\right)\,/;\, n\in\mathbb{N}\land v\in\mathbb{N}^+$$

01.06.21.1492.01

$$\int z^n e^{b z} \sin^\nu\left(c \sqrt{z}\right) dz = i^{-\nu}\, 2^{-2 n-\nu-1}\, b^{-2 n-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s\, e^{\frac{c^2 (\nu-2 s)^2}{4 b}} \binom{\nu}{s}$$

$$\left((-1)^\nu \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, (-i\, c\, (\nu-2 s))^{-h-k+2 n} \left(2 b \sqrt{z} - i\, c\, (\nu-2 s)\right)^{h+k} \left(-\frac{\left(2 b \sqrt{z} - i\, c\, (\nu-2 s)\right)^2}{b}\right)^{\frac{1}{2} (-h-k-1)}\right.$$

$$\binom{k}{h} \binom{n}{k} \left(2 b \sqrt{-\frac{\left(2 b \sqrt{z} - i\, c\, (\nu-2 s)\right)^2}{b}}\ \Gamma\left(\frac{1}{2} (h+k+2), -\frac{\left(2 b \sqrt{z} - i\, c\, (\nu-2 s)\right)^2}{4 b}\right) - \right.$$

$$\left.\left. i\, c\, (\nu-2 s) \left(2 b \sqrt{z} - i\, c\, (\nu-2 s)\right) \Gamma\left(\frac{1}{2} (h+k+1), -\frac{\left(2 b \sqrt{z} - i\, c\, (\nu-2 s)\right)^2}{4 b}\right)\right)\right) +$$

$$\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, (i\, c\, (\nu-2 s))^{-h-k+2 n} \left(2 \sqrt{z}\, b + c\, i\, (\nu-2 s)\right)^{h+k} \left(-\frac{\left(2 \sqrt{z}\, b + c\, i\, (\nu-2 s)\right)^2}{b}\right)^{\frac{1}{2} (-h-k-1)}$$

$$\binom{k}{h} \binom{n}{k} \left(c\, i\, (\nu-2 s) \left(2 \sqrt{z}\, b + c\, i\, (\nu-2 s)\right) \Gamma\left(\frac{1}{2} (h+k+1), -\frac{\left(2 \sqrt{z}\, b + c\, i\, (\nu-2 s)\right)^2}{4 b}\right) + \right.$$

$$\left.\left. 2 \sqrt{-\frac{\left(2 \sqrt{z}\, b + c\, i\, (\nu-2 s)\right)^2}{b}}\ b\, \Gamma\left(\frac{1}{2} (h+k+2), -\frac{\left(2 \sqrt{z}\, b + c\, i\, (\nu-2 s)\right)^2}{4 b}\right)\right)\right) -$$

$$2^{-\nu} (-b)^{-n-1} \binom{\nu}{\frac{\nu}{2}} \Gamma(n+1, -b z)\, (1 - \nu \bmod 2) \;/;\; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n e^{b z+e} \sin^\nu\left(c z^r\right)$

01.06.21.1493.01

$$\int z^n e^{bz+e}\sin^\nu(cz^2)\,dz = -2^{-\nu} e^e \binom{\nu}{\frac{\nu}{2}}\Gamma(n+1,-bz)(1-\nu \bmod 2)(-b)^{-n-1} - 2^{-\nu-1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{1}{\sqrt{i c(\nu-2k)}}\left(e^{\frac{i b^2}{4c(\nu-2k)}+e-\frac{i\pi\nu}{2}}\sum_{q=0}^{n}2^{q-n}(-b)^{n-q}(i c(\nu-2k))^{-n-\frac{1}{2}}(b+2ci(\nu-2k)z)^{q+1}\left(\frac{i(b+2ci(\nu-2k)z)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},\frac{i(b+2ci(\nu-2k)z)^2}{4c(\nu-2k)}\right)\right)+\frac{1}{\sqrt{-i c(\nu-2k)}}\left(e^{-\frac{i b^2}{4c(\nu-2k)}+e+\frac{i\pi\nu}{2}}\sum_{q=0}^{n}2^{q-n}(-b)^{n-q}(-i c(\nu-2k))^{-n-\frac{1}{2}}(b-2ic(\nu-2k)z)^{q+1}\left(-\frac{i(b-2ic(\nu-2k)z)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},-\frac{i(b-2ic(\nu-2k)z)^2}{4c(\nu-2k)}\right)\right)\right)\;/;\; n\in\mathbb{N}\bigwedge \nu\in\mathbb{N}^+$$

01.06.21.1494.01

$$\int z^n e^{b z+e} \sin^\nu\left(c\sqrt{z}\right) dz = i^{-\nu} 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{\frac{c^2(2s-\nu)^2}{4b}+e} \left(\sum_{k=0}^{n}\sum_{h=0}^{k} (-1)^{k-h} 4^k (i c (2s-\nu))^{-h-k+2n} \left(2\sqrt{z}\, b + c\, i\,(2s-\nu)\right)^{h+k} \left(-\frac{\left(2\sqrt{z}\, b + c\, i\,(2s-\nu)\right)^2}{b}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(c\, i\,(2s-\nu)\left(2\sqrt{z}\, b + c\, i\,(2s-\nu)\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2\sqrt{z}\, b + c\, i\,(2s-\nu)\right)^2}{4b}\right) + 2\sqrt{-\frac{\left(2\sqrt{z}\, b + c\, i\,(2s-\nu)\right)^2}{b}}\; b\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2\sqrt{z}\, b + c\, i\,(2s-\nu)\right)^2}{4b}\right)\right)\right) b^{-2n-2} + e^{\frac{c^2(\nu-2s)^2}{4b}+e} \left(\sum_{k=0}^{n}\sum_{h=0}^{k} (-1)^{k-h} 4^k (i c (\nu-2s))^{-h-k+2n} \left(2\sqrt{z}\, b + c\, i\,(\nu-2s)\right)^{h+k} \left(-\frac{\left(2\sqrt{z}\, b + c\, i\,(\nu-2s)\right)^2}{b}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(c\, i\,(\nu-2s)\left(2\sqrt{z}\, b + c\, i\,(\nu-2s)\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2\sqrt{z}\, b + c\, i\,(\nu-2s)\right)^2}{4b}\right) + 2\sqrt{-\frac{\left(2\sqrt{z}\, b + c\, i\,(\nu-2s)\right)^2}{b}}\; b\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2\sqrt{z}\, b + c\, i\,(\nu-2s)\right)^2}{4b}\right)\right)\right) b^{-2n-2}\right) - 2^{-\nu} (-b)^{-n-1} e^e \binom{\nu}{\frac{\nu}{2}} \Gamma(n+1, -b z)\,(1-\nu \bmod 2) \;/;\; n\in\mathbb{N} \land \nu\in\mathbb{N}^+$$

Involving $z^{\alpha-1} e^{b z^r} \sin^\nu\left(c z^r\right)$

01.06.21.1495.01

$$\int z^{\alpha-1} e^{b z^r} \sin^\nu(c z^r) \, dz = -\frac{2^{-\nu} z^\alpha (-b z^r)^{-\frac{\alpha}{r}} (1 - \nu \bmod 2)}{r} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{\alpha}{r}, -b z^r\right) - \frac{(2 i)^{-\nu} z^\alpha}{r} \sum_{i=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^i \binom{\nu}{i} \left((-1)^\nu \Gamma\left(\frac{\alpha}{r}, (i c (\nu - 2 i) - b) z^r\right) ((i c (\nu - 2 i) - b) z^r)^{-\frac{\alpha}{r}} + ((-b - i c (\nu - 2 i)) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b - i c (\nu - 2 i)) z^r\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1496.01

$$\int z^n e^{b z^2} \sin^\nu\left(c z^2\right) dz = -2^{-\nu-1} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1 - \nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} - i^{-\nu} 2^{-\nu-1} z^{n+1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu \Gamma\left(\frac{n+1}{2}, (-b - 2 i c s + i c \nu) z^2\right) \left((-b - 2 i c s + i c \nu) z^2\right)^{\frac{1}{2}(-n-1)} + \left((-b - i c (\nu - 2 s)) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (-b - i c (\nu - 2 s)) z^2\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1497.01

$$\int z^n e^{b \sqrt{z}} \sin^\nu\left(c \sqrt{z}\right) dz = -2^{1-\nu} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(2 (n+1), -b \sqrt{z}\right) (1 - \nu \bmod 2) (-b)^{-2(n+1)} - i^{-\nu} 2^{1-\nu} z^{n+1} \sum_{i=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^i \binom{\nu}{i} \left((-1)^\nu \Gamma\left(2 (n+1), (i c (\nu - 2 i) - b) \sqrt{z}\right) \left((i c (\nu - 2 i) - b) \sqrt{z}\right)^{-2(n+1)} + \left((-b - i c (\nu - 2 i)) \sqrt{z}\right)^{-2(n+1)} \Gamma\left(2 (n+1), (-b - i c (\nu - 2 i)) \sqrt{z}\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^{\alpha-1} e^{b z^r + e} \sin^\nu(c z^r)$

01.06.21.1498.01

$$\int z^{\alpha-1} e^{b z^r + e} \sin^\nu(c z^r) \, dz = -\frac{2^{-\nu} e^e (1 - \nu \bmod 2)}{r} z^\alpha (-b z^r)^{-\frac{\alpha}{r}} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{\alpha}{r}, -b z^r\right) - \frac{2^{-\nu} z^\alpha}{r} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{e + \frac{i \pi \nu}{2}} \Gamma\left(\frac{\alpha}{r}, (i c (\nu - 2 k) - b) z^r\right) ((i c (\nu - 2 k) - b) z^r)^{-\frac{\alpha}{r}} + e^{e - \frac{i \pi \nu}{2}} ((-b - i c (\nu - 2 k)) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b - i c (\nu - 2 k)) z^r\right)\right) /; \nu \in \mathbb{N}^+$$

01.06.21.1499.01

$$\int z^n e^{b z^2 + e} \sin^\nu\left(c z^2\right) dz = -2^{-\nu-1} e^e z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1 - \nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} - 2^{-\nu-1} z^{n+1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{e + \frac{i \pi \nu}{2}} \Gamma\left(\frac{n+1}{2}, (i c (\nu - 2 k) - b) z^2\right) \left((i c (\nu - 2 k) - b) z^2\right)^{\frac{1}{2}(-n-1)} + e^{e - \frac{i \pi \nu}{2}} \left((-b - i c (\nu - 2 k)) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (-b - i c (\nu - 2 k)) z^2\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1500.01

$$\int z^n e^{\sqrt{z}\, b+e} \sin^\nu\left(c\sqrt{z}\right) dz = -2^{1-\nu} e^e \binom{\nu}{\frac{\nu}{2}} \Gamma\left(2(n+1), -b\sqrt{z}\right)(1-\nu \bmod 2)(-b)^{-2(n+1)} - 2^{1-\nu} z^{n+1} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{e+\frac{i\pi\nu}{2}} \Gamma\left(2(n+1), (i c(\nu-2k)-b)\sqrt{z}\right)\left((i c(\nu-2k)-b)\sqrt{z}\right)^{-2(n+1)} + e^{e-\frac{i\pi\nu}{2}} \left((-b-i c(\nu-2k))\sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (-b-i c(\nu-2k))\sqrt{z}\right)\right) /; n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

Involving $z^n e^{b z^r + d z} \sin^\nu(c z^r)$

01.06.21.1501.01

$$\int z^n e^{b z^2+d z} \sin^\nu(c z^2)\, dz = -2^{-\nu-1} e^{-\frac{d^2}{4b}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)\, b^{-n-1} \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz)^{q+1} \left(-\frac{(d+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b}\right) - 2^{-1-\nu} i^{-\nu} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(\frac{1}{\sqrt{b+2ics-ic\nu}} \left((-1)^\nu e^{\frac{d^2}{-4b-8ics+4ic\nu}} \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (b+2ics-ic\nu)^{-n-\frac{1}{2}} (d+2(b+2ics-ic\nu)z)^{q+1} \left(-\frac{(d+2(b+2ics-ic\nu)z)^2}{b+2ics-ic\nu}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2(b+2ics-ic\nu)z)^2}{4(b+2ics-ic\nu)}\right)\right) + \frac{1}{\sqrt{b+ci(\nu-2s)}} \left(e^{-\frac{d^2}{4(b+ci(\nu-2s))}} \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (b+ci(\nu-2s))^{-n-\frac{1}{2}} (d+2(b-2ics+ic\nu)z)^{q+1} \left(-\frac{(d+2(b-2ics+ic\nu)z)^2}{b+ci(\nu-2s)}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2(b-2ics+ic\nu)z)^2}{4(b+ci(\nu-2s))}\right)\right)\right) /; n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

01.06.21.1502.01

$$\int z^n e^{\sqrt{z}\, b+d\, z} \sin^\nu\left(c\sqrt{z}\right) dz = 2^{-2n-\nu-1} e^{-\frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)\, d^{-2n-2} \sum_{k=0}^{n}\sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(b\left(b+2d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+2d\sqrt{z}\right)^2}{d}}\, d\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right)\right) +$$

$$2^{-2n-\nu-1} i^{-\nu} d^{-2n-2} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{-\frac{(b+c\,i\,(2s-\nu))^2}{4d}} \sum_{k=0}^{n}\sum_{h=0}^{k} (-1)^{k-h} 4^k (b+c\,i\,(2s-\nu))^{-h-k+2n} \left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b+c\,i\,(2s-\nu))\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)^2}{d}}\, d\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)^2}{4d}\right)\right) + e^{-\frac{(b+c\,i\,(\nu-2s))^2}{4d}} \sum_{k=0}^{n}\sum_{h=0}^{k} (-1)^{k-h} 4^k (b+c\,i\,(\nu-2s))^{-h-k+2n} \left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b+c\,i\,(\nu-2s))\left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)^2}{d}}\, d\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)^2}{4d}\right)\right)\right) /;\ n\in\mathbb{N} \land \nu\in\mathbb{N}^+$$

Involving $z^n e^{b z^r + d z + e} \sin^v(c z^r)$

01.06.21.1503.01

$$\int z^n e^{b z^2 + d z + e} \sin^v(c z^2)\, dz =$$

$$2^{-v-1} b^{-n-1} e^{-\frac{d^2}{4b}} \left(e^e \binom{v}{\frac{v}{2}} (v \bmod 2 - 1) \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d + 2 b z)^{q+1} \left(-\frac{(d+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b}\right) - \right.$$

$$i^{-v} b^{n+1} e^{\frac{d^2}{4b}} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(e^{e - \frac{d^2}{4(b - 2 i c s + i c v)}} (b - 2 i c s + i c v)^{-n-1} \right.$$

$$\sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d + 2(b - 2 i c s + i c v) z)^{q+1} \left(-\frac{(d + 2(b - 2 i c s + i c v) z)^2}{b - 2 i c s + i c v}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q}$$

$$\Gamma\left(\frac{q+1}{2}, -\frac{(d + 2(b - 2 i c s + i c v) z)^2}{4(b - 2 i c s + i c v)}\right) + (-1)^v e^{e - \frac{d^2}{4(b + 2 i c s - i c v)}} (b + 2 i c s - i c v)^{-n-1}$$

$$\sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d + 2 b z + 4 i c s z - 2 i c v z)^{q+1} \left(-\frac{(d + 2 b z + 4 i c s z - 2 i c v z)^2}{b + 2 i c s - i c v}\right)^{\frac{1}{2}(-q-1)}$$

$$\left.\left. \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d + 2 b z + 4 i c s z - 2 i c v z)^2}{4(b + 2 i c s - i c v)}\right) \right) \right) /;\ n \in \mathbb{N} \land v \in \mathbb{N}^+$$

01.06.21.1504.01

$$\int z^n e^{\sqrt{z}\, b+d\, z+e} \sin^{\nu}\left(c \sqrt{z}\right) dz = 2^{-2 n-\nu-1} e^{e-\frac{b^2}{4 d}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)\, d^{-2 n-2} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2 n} \left(b+2 d \sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2 d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b \left(b+2 d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2 d \sqrt{z}\right)^2}{4 d}\right)+2 \sqrt{-\frac{\left(b+2 d \sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2 d \sqrt{z}\right)^2}{4 d}\right)\right)+ 2^{-2 n-\nu-1} i^{-\nu} d^{-2 n-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu} e^{e-\frac{(b+c\, i\, (2 s-\nu))^2}{4 d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+c\, i\, (2 s-\nu))^{-h-k+2 n} \left(b+c\, i\, (2 s-\nu)+2 d \sqrt{z}\right)^{h+k} \left(-\frac{\left(b+c\, i\, (2 s-\nu)+2 d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b+c\, i\, (2 s-\nu)) \left(b+c\, i\, (2 s-\nu)+2 d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+c\, i\, (2 s-\nu)+2 d \sqrt{z}\right)^2}{4 d}\right)+ 2 \sqrt{-\frac{\left(b+c\, i\, (2 s-\nu)+2 d \sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+c\, i\, (2 s-\nu)+2 d \sqrt{z}\right)^2}{4 d}\right)\right)+ e^{e-\frac{(b+c\, i\, (\nu-2 s))^2}{4 d}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+c\, i\, (\nu-2 s))^{-h-k+2 n} \left(b+c\, i\, (\nu-2 s)+2 d \sqrt{z}\right)^{h+k} \left(-\frac{\left(b+c\, i\, (\nu-2 s)+2 d \sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b+c\, i\, (\nu-2 s)) \left(b+c\, i\, (\nu-2 s)+2 d \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+c\, i\, (\nu-2 s)+2 d \sqrt{z}\right)^2}{4 d}\right)+2 \sqrt{-\frac{\left(b+c\, i\, (\nu-2 s)+2 d \sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+c\, i\, (\nu-2 s)+2 d \sqrt{z}\right)^2}{4 d}\right)\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n e^{d z} \sin^\nu(c z^r + g)$

01.06.21.1505.01

$$\int z^n e^{d z} \sin^\nu(c z^2 + g)\, dz = -2^{-\nu} \binom{\nu}{\frac{\nu}{2}} \Gamma(n+1, -d z)\, (1 - \nu \bmod 2)\, (-d)^{-n-1} -$$
$$2^{-\nu-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{1}{\sqrt{i\, c\, (\nu - 2k)}} \left(e^{\frac{i d^2}{4 c (\nu-2k)} + g\, i\, (\nu-2k) - \frac{i \pi \nu}{2}} \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (i\, c\, (\nu - 2k))^{-n-\frac{1}{2}} (d + 2\, c\, i\, (\nu - 2k)\, z)^{q+1} \right.\right.$$
$$\left. \left(\frac{i\, (d + 2\, c\, i\, (\nu - 2k)\, z)^2}{c\, (\nu - 2k)} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{i\, (d + 2\, c\, i\, (\nu - 2k)\, z)^2}{4\, c\, (\nu - 2k)} \right) \right) +$$
$$\frac{1}{\sqrt{-i\, c\, (\nu - 2k)}} \left(e^{-\frac{i d^2}{4 c (\nu-2k)} + \frac{i \pi \nu}{2} - i\, g\, (\nu-2k)} \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (-i\, c\, (\nu - 2k))^{-n-\frac{1}{2}} (d - 2\, i\, c\, (\nu - 2k)\, z)^{q+1} \right.$$
$$\left.\left. \left(-\frac{i\, (d - 2\, i\, c\, (\nu - 2k)\, z)^2}{c\, (\nu - 2k)} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{i\, (d - 2\, i\, c\, (\nu - 2k)\, z)^2}{4\, c\, (\nu - 2k)} \right) \right) \right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1506.01

$$\int z^n e^{d z} \sin^\nu\left(\sqrt{z}\, c + g\right) dz = i^{-\nu} 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{\frac{c^2 (2s-\nu)^2}{4d} + g i (2s-\nu)} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i c (2s-\nu))^{-h-k+2n} \left(2\sqrt{z}\, d + c i (2s-\nu)\right)^{h+k} \left(-\frac{\left(2\sqrt{z}\, d + c i (2s-\nu)\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(c i (2s-\nu) \left(2\sqrt{z}\, d + c i (2s-\nu)\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2\sqrt{z}\, d + c i (2s-\nu)\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(2\sqrt{z}\, d + c i (2s-\nu)\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2\sqrt{z}\, d + c i (2s-\nu)\right)^2}{4d}\right)\right)\right) d^{-2n-2} + e^{\frac{c^2 (\nu-2s)^2}{4d} + g i (\nu-2s)} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i c (\nu-2s))^{-h-k+2n} \left(2\sqrt{z}\, d + c i (\nu-2s)\right)^{h+k} \left(-\frac{\left(2\sqrt{z}\, d + c i (\nu-2s)\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(c i (\nu-2s) \left(2\sqrt{z}\, d + c i (\nu-2s)\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2\sqrt{z}\, d + c i (\nu-2s)\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(2\sqrt{z}\, d + c i (\nu-2s)\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2\sqrt{z}\, d + c i (\nu-2s)\right)^2}{4d}\right)\right)\right) d^{-2n-2} \right) - 2^{-\nu} (-d)^{-n-1} \binom{\nu}{\frac{\nu}{2}} \Gamma(n+1, -d z)\, (1 - \nu \bmod 2) \;/;\; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n e^{d z+e} \sin^\nu\left(c z^r + g\right)$

01.06.21.1507.01

$$\int z^n e^{dz+e} \sin^\nu(c z^2+g)\,dz = -2^{-\nu} e^e \binom{\nu}{\frac{\nu}{2}} \Gamma(n+1, -d z)\,(1-\nu \bmod 2)\,(-d)^{-n-1} - 2^{-\nu-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{1}{\sqrt{i c (\nu-2k)}} \left(e^{\frac{i d^2}{4 c (\nu-2k)}+e+g i (\nu-2k)-\frac{i \pi \nu}{2}} \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (i c (\nu-2k))^{-n-\frac{1}{2}} (d+2 c i (\nu-2k) z)^{q+1} \left(\frac{i (d+2 c i (\nu-2k) z)^2}{c (\nu-2k)} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{i (d+2 c i (\nu-2k) z)^2}{4 c (\nu-2k)} \right) \right) + \frac{1}{\sqrt{-i c (\nu-2k)}} \left(e^{-\frac{i d^2}{4 c (\nu-2k)}+e+\frac{i \pi \nu}{2}-i g (\nu-2k)} \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (-i c (\nu-2k))^{-n-\frac{1}{2}} (d-2 i c (\nu-2k) z)^{q+1} \left(-\frac{i (d-2 i c (\nu-2k) z)^2}{c (\nu-2k)} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{i (d-2 i c (\nu-2k) z)^2}{4 c (\nu-2k)} \right) \right) \right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1508.01

$$\int z^n e^{d z+e} \sin^\nu\left(\sqrt{z}\, c+g\right) dz = i^{-\nu} 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{\frac{c^2 (2s-\nu)^2}{4d} + g i (2s-\nu)+e} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i c (2s-\nu))^{-h-k+2n} \left(2\sqrt{z}\, d + c i (2s-\nu)\right)^{h+k} \left(-\frac{\left(2\sqrt{z}\, d + c i (2s-\nu)\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(c i (2s-\nu) \left(2\sqrt{z}\, d + c i (2s-\nu)\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2\sqrt{z}\, d + c i (2s-\nu)\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(2\sqrt{z}\, d + c i (2s-\nu)\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2\sqrt{z}\, d + c i (2s-\nu)\right)^2}{4d}\right) \right) \right) d^{-2n-2} + e^{\frac{c^2 (\nu-2s)^2}{4d} + g i (\nu-2s)+e} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i c (\nu-2s))^{-h-k+2n} \left(2\sqrt{z}\, d + c i (\nu-2s)\right)^{h+k} \left(-\frac{\left(2\sqrt{z}\, d + c i (\nu-2s)\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(c i (\nu-2s) \left(2\sqrt{z}\, d + c i (\nu-2s)\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2\sqrt{z}\, d + c i (\nu-2s)\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(2\sqrt{z}\, d + c i (\nu-2s)\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(2\sqrt{z}\, d + c i (\nu-2s)\right)^2}{4d}\right) \right) \right) d^{-2n-2} \right) - 2^{-\nu} (-d)^{-n-1} e^e \binom{\nu}{\frac{\nu}{2}} \Gamma(n+1, -d z) (1 - \nu \bmod 2) \;/;\; n \in \mathbb{N} \wedge \nu \in \mathbb{N}^+$$

Involving $z^{\alpha-1} e^{b z^r} \sin^\nu(c z^r + g)$

01.06.21.1509.01

$$\int z^{\alpha-1} e^{b z^r} \sin^\nu(c z^r + g)\, dz = -\frac{2^{-\nu}(1-\nu \bmod 2)}{r} z^\alpha (-b z^r)^{-\frac{\alpha}{r}} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{\alpha}{r}, -b z^r\right) - \frac{2^{-\nu} z^\alpha}{r} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{\frac{i\pi\nu}{2} - i g(\nu-2k)} \Gamma\left(\frac{\alpha}{r}, (i c(\nu-2k)-b) z^r\right) ((i c(\nu-2k)-b) z^r)^{-\frac{\alpha}{r}} + e^{g i(\nu-2k) - \frac{i\pi\nu}{2}} ((-b - i c(\nu-2k)) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b - i c(\nu-2k)) z^r\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1510.01

$$\int z^n e^{b z^2} \sin^\nu(c z^2 + g)\, dz = -2^{-\nu-1} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1-\nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} - 2^{-\nu-1} z^{n+1} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{\frac{i\pi\nu}{2} - i g(\nu-2k)} \Gamma\left(\frac{n+1}{2}, (i c(\nu-2k)-b) z^2\right) \left((i c(\nu-2k)-b) z^2\right)^{\frac{1}{2}(-n-1)} + e^{g i(\nu-2k) - \frac{i\pi\nu}{2}} \left((-b - i c(\nu-2k)) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (-b - i c(\nu-2k)) z^2\right)\right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1511.01

$$\int z^n e^{\sqrt{z}\, b} \sin^\nu\left(\sqrt{z}\, c + g\right) dz = -2^{1-\nu} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(2(n+1), -b\sqrt{z}\right) (1-\nu \bmod 2) (-b)^{-2(n+1)} - 2^{1-\nu} z^{n+1} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{\frac{i\pi\nu}{2} - i g(\nu-2k)} \Gamma\left(2(n+1), (i c(\nu-2k)-b)\sqrt{z}\right) \left((i c(\nu-2k)-b)\sqrt{z}\right)^{-2(n+1)} + e^{g i(\nu-2k) - \frac{i\pi\nu}{2}} \left((-b - i c(\nu-2k))\sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (-b - i c(\nu-2k))\sqrt{z}\right)\right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^{\alpha-1} e^{b z^r + e} \sin^\nu(c z^r + g)$

01.06.21.1512.01

$$\int z^{\alpha-1} e^{b z^r + e} \sin^\nu(c z^r + g)\, dz = -\frac{2^{-\nu} e^e (1-\nu \bmod 2)}{r} z^\alpha (-b z^r)^{-\frac{\alpha}{r}} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{\alpha}{r}, -b z^r\right) - \frac{2^{-\nu} z^\alpha}{r} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{e + \frac{i\pi\nu}{2} - i g(\nu-2k)} \Gamma\left(\frac{\alpha}{r}, (i c(\nu-2k)-b) z^r\right) ((i c(\nu-2k)-b) z^r)^{-\frac{\alpha}{r}} + e^{e + g i(\nu-2k) - \frac{i\pi\nu}{2}} ((-b - i c(\nu-2k)) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b - i c(\nu-2k)) z^r\right)\right) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1513.01

$$\int z^n e^{b z^2 + e} \sin^\nu(c z^2 + g)\, dz = -2^{-\nu-1} e^e z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1-\nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} - 2^{-\nu-1} z^{n+1} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{e + \frac{i\pi\nu}{2} - i g(\nu-2k)} \Gamma\left(\frac{n+1}{2}, (i c(\nu-2k)-b) z^2\right) \left((i c(\nu-2k)-b) z^2\right)^{\frac{1}{2}(-n-1)} + e^{e + g i(\nu-2k) - \frac{i\pi\nu}{2}} \left((-b - i c(\nu-2k)) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (-b - i c(\nu-2k)) z^2\right)\right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1514.01

$$\int z^n e^{\sqrt{z}\, b+e} \sin^\nu\left(\sqrt{z}\, c+g\right) dz = -2^{1-\nu} e^e \binom{\nu}{\frac{\nu}{2}} \Gamma\left(2(n+1), -b\sqrt{z}\right)(1-\nu \bmod 2)(-b)^{-2(n+1)} - 2^{1-\nu} z^{n+1} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{e+\frac{i\pi\nu}{2}-i g(\nu-2k)} \Gamma\left(2(n+1), (i c(\nu-2k)-b)\sqrt{z}\right)\left((i c(\nu-2k)-b)\sqrt{z}\right)^{-2(n+1)} + e^{e+g i(\nu-2k)-\frac{i\pi\nu}{2}} \left((-b-i c(\nu-2k))\sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (-b-i c(\nu-2k))\sqrt{z}\right)\right) /; n\in\mathbb{N} \land \nu\in\mathbb{N}^+$$

Involving $z^n e^{b z^r+d z} \sin^\nu(c z^r+g)$

01.06.21.1515.01

$$\int z^n e^{b z^2+d z} \sin^\nu(c z^2+g)\, dz = 2^{-\nu-1} b^{-n-1} e^{-\frac{d^2}{4b}} \left(\binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2-1) \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz)^{q+1} \left(-\frac{(d+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b}\right) - i^{-\nu} b^{n+1} e^{\frac{d^2}{4b}} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{i g(\nu-2s)-\frac{d^2}{4(b-2ics+ic\nu)}} \left(\sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2(b-2ics+ic\nu)z)^{q+1} \left(-\frac{(d+2(b-2ics+ic\nu)z)^2}{b-2ics+ic\nu}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2(b-2ics+ic\nu)z)^2}{4(b-2ics+ic\nu)}\right)\right) (b-2ics+ic\nu)^{-n-1} + (-1)^\nu e^{i g(2s-\nu)-\frac{d^2}{4(b+2ics-ic\nu)}} (b+2ics-ic\nu)^{-n-1} \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz+4icsz-2ic\nu z)^{q+1} \left(-\frac{(d+2bz+4icsz-2ic\nu z)^2}{b+2ics-ic\nu}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz+4icsz-2ic\nu z)^2}{4(b+2ics-ic\nu)}\right)\right)\right) /; n\in\mathbb{N} \land \nu\in\mathbb{N}^+$$

01.06.21.1516.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin^\nu\left(\sqrt{z}\, c+g\right) dz = 2^{-2n-\nu-1} e^{-\frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b\left(b+2d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+2d\sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right)\right)\right) d^{-2n-2} +$$

$$2^{-2n-\nu-1}\, i^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \Bigg((-1)^\nu e^{-\frac{(b+c\,i\,(2s-\nu))^2}{4d}+g\,i\,(2s-\nu)} \Bigg(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, (b+c\,i\,(2s-\nu))^{-h-k+2n}$$

$$\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k}$$

$$\Bigg((b+c\,i\,(2s-\nu))\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right) \Gamma\!\left(\frac{1}{2}(h+k+1), -\frac{\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)^2}{4d}\right) + 2$$

$$\sqrt{-\frac{\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)^2}{d}}\; d\,\Gamma\!\left(\frac{1}{2}(h+k+2), -\frac{\left(b+c\,i\,(2s-\nu)+2d\sqrt{z}\right)^2}{4d}\right)\Bigg)\Bigg) d^{-2n-2} +$$

$$e^{-\frac{(b+c\,i\,(\nu-2s))^2}{4d}+g\,i\,(\nu-2s)} \Bigg(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, (b+c\,i\,(\nu-2s))^{-h-k+2n} \left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)^{h+k}$$

$$\left(-\frac{\left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \Bigg((b+c\,i\,(\nu-2s))\left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}(h+k+1), -\frac{\left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)^2}{d}}$$

$$d\,\Gamma\!\left(\frac{1}{2}(h+k+2), -\frac{\left(b+c\,i\,(\nu-2s)+2d\sqrt{z}\right)^2}{4d}\right)\Bigg)\Bigg) d^{-2n-2} \Bigg) /;\; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n\, e^{b z^r + d z + e} \sin^\nu(c z^r + g)$

01.06.21.1517.01

$$\int z^n e^{b z^2+d z+e} \sin^\nu(c z^2+g)\,dz = 2^{-\nu-1} b^{-n-1} e^{-\frac{d^2}{4b}} \left(e^e \binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2 - 1) \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz)^{q+1} \left(-\frac{(d+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b}\right) - \right.$$

$$i^{-\nu} b^{n+1} e^{\frac{d^2}{4b}} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{d^2}{4(b-2ics+icv)}+e+gi(\nu-2s)} \left(\sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2(b-2ics+icv)z)^{q+1} \right.\right.$$

$$\left. \left(-\frac{(d+2(b-2ics+icv)z)^2}{b-2ics+icv}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2(b-2ics+icv)z)^2}{4(b-2ics+icv)}\right)\right)$$

$$(b-2ics+icv)^{-n-1} + (-1)^\nu e^{-\frac{d^2}{4(b+2ics-icv)}+e+gi(2s-\nu)} (b+2ics-icv)^{-n-1}$$

$$\sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz+4icsz-2icvz)^{q+1} \left(-\frac{(d+2bz+4icsz-2icvz)^2}{b+2ics-icv}\right)^{\frac{1}{2}(-q-1)}$$

$$\left.\left.\left. \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz+4icsz-2icvz)^2}{4(b+2ics-icv)}\right)\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1518.01

$$\int z^n e^{\sqrt{z}\, b+d z+e} \sin^\nu(\sqrt{z}\, c+g)\,dz = 2^{-2n-\nu-1} e^{e-\frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2)$$

$$\left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b\left(b+2d\sqrt{z}\right) \right.\right.$$

$$\left.\left. \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+2d\sqrt{z}\right)^2}{d}}\, d\,\Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right)\right)\right) d^{-2n-2} +$$

$$2^{-2n-\nu-1} i^{-\nu} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{-\frac{(b+ci(2s-\nu))^2}{4d}+e+gi(2s-\nu)} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b+ci(2s-\nu))^{-h-k+2n} \right.\right.$$

$$\left(b+ci(2s-\nu)+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+ci(2s-\nu)+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k}$$

$$\left((b+c\,i\,(2s-v))\left(b+c\,i\,(2s-v)+2d\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1),-\frac{\left(b+c\,i\,(2s-v)+2d\sqrt{z}\right)^2}{4d}\right)+2\right.$$

$$\left.\left.\sqrt{-\frac{\left(b+c\,i\,(2s-v)+2d\sqrt{z}\right)^2}{d}}\;d\,\Gamma\left(\frac{1}{2}(h+k+2),-\frac{\left(b+c\,i\,(2s-v)+2d\sqrt{z}\right)^2}{4d}\right)\right)\right)d^{-2n-2}+$$

$$e^{-\frac{(b+c\,i\,(v-2s))^2}{4d}+e+g\,i\,(v-2s)}\left(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(b+c\,i\,(v-2s))^{-h-k+2n}\left(b+c\,i\,(v-2s)+2d\sqrt{z}\right)^{h+k}\right.$$

$$\left(-\frac{\left(b+c\,i\,(v-2s)+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}\left((b+c\,i\,(v-2s))\left(b+c\,i\,(v-2s)+2d\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+k+1),-\frac{\left(b+c\,i\,(v-2s)+2d\sqrt{z}\right)^2}{4d}\right)+2\sqrt{-\frac{\left(b+c\,i\,(v-2s)+2d\sqrt{z}\right)^2}{d}}$$

$$\left.\left.\left.d\,\Gamma\left(\frac{1}{2}(h+k+2),-\frac{\left(b+c\,i\,(v-2s)+2d\sqrt{z}\right)^2}{4d}\right)\right)\right)d^{-2n-2}\right)\;/;\;n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n\,e^{d\,z}\sin^v\left(c\,z^r+f\,z\right)$

01.06.21.1519.01

$$\int z^n e^{dz}\sin^{\nu}(c z^2+f z)\,dz = -2^{-\nu}\binom{\nu}{\frac{\nu}{2}}\Gamma(n+1,-d z)(1-\nu \bmod 2)(-d)^{-n-1}-2^{-\nu-1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{1}{\sqrt{i c(\nu-2k)}}\left(e^{\frac{i(d+f i(\nu-2k))^2}{4c(\nu-2k)}-\frac{i\pi\nu}{2}}\sum_{q=0}^{n}2^{q-n}(i c(\nu-2k))^{-n-\frac{1}{2}}(-d-i f(\nu-2k))^{n-q}(d+f i(\nu-2k)+2 c i(\nu-2k)z)^{q+1}\left(\frac{i(d+f i(\nu-2k)+2ci(\nu-2k)z)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},\frac{i(d+f i(\nu-2k)+2ci(\nu-2k)z)^2}{4c(\nu-2k)}\right)\right)+\frac{1}{\sqrt{-i c(\nu-2k)}}\left(e^{-\frac{i(d-i f(\nu-2k))^2}{4c(\nu-2k)}+\frac{i\pi\nu}{2}}\sum_{q=0}^{n}2^{q-n}(-i c(\nu-2k))^{-n-\frac{1}{2}}(i f(\nu-2k)-d)^{n-q}(d-i f(\nu-2k)-2 i c(\nu-2k)z)^{q+1}\left(-\frac{i(d-i f(\nu-2k)-2ic(\nu-2k)z)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-q-1)}\binom{n}{q}\Gamma\left(\frac{q+1}{2},-\frac{i(d-i f(\nu-2k)-2ic(\nu-2k)z)^2}{4c(\nu-2k)}\right)\right)\right) /; n\in\mathbb{N}\land\nu\in\mathbb{N}^+$$

01.06.21.1520.01

$$\int z^n e^{dz}\sin^{\nu}(\sqrt{z}\,c+f z)\,dz = i^{-\nu}2^{-2n-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^{\nu}e^{\frac{c^2(2s-\nu)^2}{4(d+f i(2s-\nu))}}\left(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}4^k(i c(2s-\nu))^{-h-k+2n}\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)^{h+k}\left(-\frac{\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)^2}{d+f i(2s-\nu)}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}\left(c i(2s-\nu)\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)\Gamma\left(\frac{1}{2}(h+k+1),-\frac{\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)^2}{4(d+f i(2s-\nu))}\right)+2\sqrt{-\frac{\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)^2}{d+f i(2s-\nu)}}\right.\right.\right.$$

$$(d + f\,i\,(2\,s - v))\,\Gamma\!\left(\frac{1}{2}\,(h + k + 2),\, -\frac{\left(2\,\sqrt{z}\,\,(d + f\,i\,(2\,s - v)) + c\,i\,(2\,s - v)\right)^2}{4\,(d + f\,i\,(2\,s - v))}\right)\Bigg)\Bigg)$$

$$(d + f\,i\,(2\,s - v))^{-2\,n-2} + e^{\frac{c^2\,(v-2\,s)^2}{4\,(d+f\,i\,(v-2\,s))}}\,(d + f\,i\,(v - 2\,s))^{-2\,n-2}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(i\,c\,(v - 2\,s))^{-h-k+2\,n}$$

$$\left(c\,i\,(v - 2\,s) + 2\,(d + f\,i\,(v - 2\,s))\,\sqrt{z}\right)^{h+k}\left(-\frac{\left(c\,i\,(v - 2\,s) + 2\,(d + f\,i\,(v - 2\,s))\,\sqrt{z}\right)^2}{d + f\,i\,(v - 2\,s)}\right)^{\frac{1}{2}\,(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\Bigg(c\,i\,(v - 2\,s)\left(c\,i\,(v - 2\,s) + 2\,(d + f\,i\,(v - 2\,s))\,\sqrt{z}\right)\Gamma\!\Bigg(\frac{1}{2}\,(h + k + 1),$$

$$-\frac{\left(c\,i\,(v - 2\,s) + 2\,(d + f\,i\,(v - 2\,s))\,\sqrt{z}\right)^2}{4\,(d + f\,i\,(v - 2\,s))}\Bigg) + 2\,\sqrt{-\frac{\left(c\,i\,(v - 2\,s) + 2\,(d + f\,i\,(v - 2\,s))\,\sqrt{z}\right)^2}{d + f\,i\,(v - 2\,s)}}$$

$$(d + f\,i\,(v - 2\,s))\,\Gamma\!\left(\frac{1}{2}\,(h + k + 2),\, -\frac{\left(c\,i\,(v - 2\,s) + 2\,(d + f\,i\,(v - 2\,s))\,\sqrt{z}\right)^2}{4\,(d + f\,i\,(v - 2\,s))}\right)\Bigg)\Bigg) -$$

$$2^{-v}\,(-d)^{-n-1}\binom{v}{\frac{v}{2}}\,\Gamma(n + 1,\, -d\,z)\,(1 - v \bmod 2)\ /;\ n \in \mathbb{N} \land v \in \mathbb{N}^+$$

Involving $z^n\,e^{d\,z+e}\,\sin^v\!\left(c\,z^r + f\,z\right)$

01.06.21.1521.01

$$\int z^n e^{d z+e} \sin^\nu\left(c z^2+f z\right) dz = -2^{-\nu} e^e \binom{\nu}{\frac{\nu}{2}} \Gamma(n+1, -d z)(1-\nu \bmod 2)(-d)^{-n-1} - 2^{-\nu-1} \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{1}{\sqrt{i c(\nu-2k)}} \left(e^{\frac{i(d+f i(\nu-2k))^2}{4c(\nu-2k)}+e-\frac{i\pi\nu}{2}} \sum_{q=0}^{n} 2^{q-n} (i c(\nu-2k))^{-n-\frac{1}{2}} (-d-i f(\nu-2k))^{n-q} (d+f i(\nu-2k)+2 c i(\nu-2k) z)^{q+1} \left(\frac{i(d+f i(\nu-2k)+2 c i(\nu-2k) z)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{i(d+f i(\nu-2k)+2 c i(\nu-2k) z)^2}{4c(\nu-2k)}\right)\right) + \frac{1}{\sqrt{-i c(\nu-2k)}} \left(e^{-\frac{i(d-i f(\nu-2k))^2}{4c(\nu-2k)}+e+\frac{i\pi\nu}{2}} \sum_{q=0}^{n} 2^{q-n} (-i c(\nu-2k))^{-n-\frac{1}{2}} (i f(\nu-2k)-d)^{n-q} (d-i f(\nu-2k)-2 i c(\nu-2k) z)^{q+1} \left(-\frac{i(d-i f(\nu-2k)-2 i c(\nu-2k) z)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{i(d-i f(\nu-2k)-2 i c(\nu-2k) z)^2}{4c(\nu-2k)}\right)\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1522.01

$$\int z^n e^{d z+e} \sin^\nu\left(\sqrt{z}\, c+f z\right) dz = i^{-\nu} 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{\frac{c^2(2s-\nu)^2}{4(d+f i(2s-\nu))}+e} \left(\sum_{k=0}^{n}\sum_{h=0}^{k} (-1)^{k-h} 4^k (i c(2s-\nu))^{-h-k+2n} \left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)^{h+k} \left(-\frac{\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)^2}{d+f i(2s-\nu)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(c i(2s-\nu)\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)^2}{4(d+f i(2s-\nu))}\right) + 2\sqrt{-\frac{\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)^2}{d+f i(2s-\nu)}}\right.\right.\right.$$

$$(d + f\,i\,(2s - v))\,\Gamma\!\left(\frac{1}{2}(h+k+2),\, -\frac{\left(2\sqrt{z}\,(d + f\,i\,(2s-v)) + c\,i\,(2s-v)\right)^2}{4\,(d + f\,i\,(2s-v))}\right)\Bigg)\Bigg)$$

$$(d + f\,i\,(2s - v))^{-2n-2} + e^{\frac{c^2 (v-2s)^2}{4 (d + f\,i\,(v-2s))} + e}\,(d + f\,i\,(v-2s))^{-2n-2} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, (i\,c\,(v-2s))^{-h-k+2n}$$

$$\left(c\,i\,(v-2s) + 2\,(d + f\,i\,(v-2s))\sqrt{z}\right)^{h+k} \left(-\frac{\left(c\,i\,(v-2s) + 2\,(d + f\,i\,(v-2s))\sqrt{z}\right)^2}{d + f\,i\,(v-2s)}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\Bigg(c\,i\,(v-2s)\left(c\,i\,(v-2s) + 2\,(d + f\,i\,(v-2s))\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+k+1),\right.$$

$$\left.-\frac{\left(c\,i\,(v-2s) + 2\,(d + f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d + f\,i\,(v-2s))}\right) + 2\sqrt{-\frac{\left(c\,i\,(v-2s) + 2\,(d + f\,i\,(v-2s))\sqrt{z}\right)^2}{d + f\,i\,(v-2s)}}$$

$$(d + f\,i\,(v-2s))\,\Gamma\!\left(\frac{1}{2}(h+k+2),\, -\frac{\left(c\,i\,(v-2s) + 2\,(d + f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d + f\,i\,(v-2s))}\right)\Bigg)\Bigg) -$$

$$2^{-v}\,(-d)^{-n-1}\,e^{e}\binom{v}{\frac{v}{2}}\Gamma(n+1,\, -d\,z)\,(1 - v \bmod 2)\ /;\ n \in \mathbb{N} \land v \in \mathbb{N}^+$$

Involving $z^n\, e^{b z^r} \sin^v(c\, z^r + f\, z)$

01.06.21.1523.01

$$\int z^n e^{b z^2} \sin^\nu(c z^2 + f z)\, dz = -2^{-\nu-1} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1 - \nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} - i^{-\nu} 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{(i f \nu - 2 i f s)^2}{4 (b - 2 i c s + i c \nu)}} \left(\sum_{q=0}^{n} 2^{q-n} (2 i f s - i f \nu)^{n-q} (f i (\nu - 2 s) + 2 (b - 2 i c s + i c \nu) z)^{q+1} \left(-\frac{(f i (\nu - 2 s) + 2 (b - 2 i c s + i c \nu) z)^2}{b - 2 i c s + i c \nu} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(f i (\nu - 2 s) + 2 (b - 2 i c s + i c \nu) z)^2}{4 (b - 2 i c s + i c \nu)} \right) \right) (b - 2 i c s + i c \nu)^{-n-1} + (-1)^\nu e^{-\frac{(2 i f s - i f \nu)^2}{4 (b + 2 i c s - i c \nu)}} (b + 2 i c s - i c \nu)^{-n-1} \sum_{q=0}^{n} 2^{q-n} (i f \nu - 2 i f s)^{n-q} (2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^{q+1} \left(-\frac{(2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^2}{b + 2 i c s - i c \nu} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^2}{4 (b + 2 i c s - i c \nu)} \right) \right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1524.01

$$\int z^n e^{\sqrt{z}\, b} \sin^\nu\left(\sqrt{z}\, c + f z\right) dz = i^{-\nu} 2^{-2 n - \nu - 1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{\frac{i (b + c i (2 s - \nu))^2}{4 f (2 s - \nu)}} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b + c i (2 s - \nu))^{-h-k+2 n} \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right)^{h+k} \left(\frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right)^2}{f (2 s - \nu)} \right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b + c i (2 s - \nu)) \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h + k + 1), \frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right)^2}{4 f (2 s - \nu)} \right) + 2 f i (2 s - \nu) \sqrt{\frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right)^2}{f (2 s - \nu)}}\ \Gamma\left(\frac{1}{2} (h + k + 2), \frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right)^2}{4 f (2 s - \nu)} \right) \right) \right) (i f (2 s - \nu))^{-2 n - 2} + e^{\frac{i (b + c i (\nu - 2 s))^2}{4 f (\nu - 2 s)}}$$

$$(i\, f\, (v-2\,s))^{-2\,n-2} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, (b+c\,i\,(v-2\,s))^{-h-k+2\,n} \left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^{h+k}$$

$$\left(\frac{i\left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k}\Bigg((b+c\,i\,(v-2\,s))$$

$$\left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+k+1),\, \frac{i\left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+$$

$$2\,f\,i\,(v-2\,s)\sqrt{\frac{i\left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\!\left(\frac{1}{2}(h+k+2),\right.$$

$$\left.\left.\left.\frac{i\left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)\right)-$$

$$2^{1-v}\,(-b)^{-2\,(n+1)}\binom{v}{\frac{v}{2}}\Gamma\!\left(2\,(n+1),\, -b\sqrt{z}\right)(1-v \bmod 2)\ /;\ n\in \mathbb{N}\land v\in \mathbb{N}^+$$

Involving $z^n\, e^{b\,z^r+e}\, \sin^v\!\left(c\,z^r+f\,z\right)$

01.06.21.1525.01

$$\int z^n e^{b z^2+e} \sin^\nu\left(c z^2 + f z\right) dz = -2^{-\nu-1} e^e z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1 - \nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} -$$

$$i^{-\nu} 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{e-\frac{(i f \nu - 2 i f s)^2}{4 (b - 2 i c s + i c \nu)}} \left(\sum_{q=0}^{n} 2^{q-n} (2 i f s - i f \nu)^{n-q} (f i (\nu - 2 s) + 2 (b - 2 i c s + i c \nu) z)^{q+1} \right.\right.$$

$$\left.\left(-\frac{(f i (\nu - 2 s) + 2 (b - 2 i c s + i c \nu) z)^2}{b - 2 i c s + i c \nu}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(f i (\nu - 2 s) + 2 (b - 2 i c s + i c \nu) z)^2}{4 (b - 2 i c s + i c \nu)}\right)\right)$$

$$(b - 2 i c s + i c \nu)^{-n-1} + (-1)^\nu e^{e-\frac{(2 i f s - i f \nu)^2}{4 (b + 2 i c s - i c \nu)}} (b + 2 i c s - i c \nu)^{-n-1} \sum_{q=0}^{n} 2^{q-n} (i f \nu - 2 i f s)^{n-q}$$

$$(2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^{q+1} \left(-\frac{(2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^2}{b + 2 i c s - i c \nu}\right)^{\frac{1}{2}(-q-1)}$$

$$\left.\binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^2}{4 (b + 2 i c s - i c \nu)}\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1526.01

$$\int z^n e^{\sqrt{z}\, b + e} \sin^\nu\left(\sqrt{z}\, c + f z\right) dz = i^{-\nu} 2^{-2 n - \nu - 1}$$

$$\sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{\frac{i (b + c i (2 s - \nu))^2}{4 f (2 s - \nu)} + e} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b + c i (2 s - \nu))^{-h-k+2 n} \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right)^{h+k} \right.\right.$$

$$\left(\frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right)^2}{f (2 s - \nu)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b + c i (2 s - \nu)) \right.$$

$$\left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h + k + 1), \frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right)^2}{4 f (2 s - \nu)}\right) +$$

$$2 f i (2 s - \nu) \sqrt{\frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right)^2}{f (2 s - \nu)}}\; \Gamma\left(\frac{1}{2} (h + k + 2), \right.$$

$$\left.\left.\left.\frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z}\right)^2}{4 f (2 s - \nu)}\right)\right)\right) (i f (2 s - \nu))^{-2 n - 2} + e^{\frac{i (b + c i (\nu - 2 s))^2}{4 f (\nu - 2 s)} + e}$$

$$(i\, f\,(v-2\,s))^{-2\,n-2} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h}\, 4^k\, (b+c\,i\,(v-2\,s))^{-h-k+2\,n} \left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^{h+k}$$

$$\left(\frac{i\left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k}\Bigg((b+c\,i\,(v-2\,s))$$

$$\left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}\,(h+k+1),\, \frac{i\left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)+$$

$$2\,f\,i\,(v-2\,s)\,\sqrt{\frac{i\left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2}{f\,(v-2\,s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+k+2),\right.$$

$$\left.\left.\left.\frac{i\left(b+c\,i\,(v-2\,s)+2\,f\,i\,(v-2\,s)\,\sqrt{z}\right)^2}{4\,f\,(v-2\,s)}\right)\right)\right)-$$

$$2^{1-v}\,(-b)^{-2\,(n+1)}\,e^e \binom{v}{\frac{v}{2}} \Gamma\!\left(2\,(n+1),\, -b\,\sqrt{z}\right)(1-v \bmod 2)\;/;\; n\in \mathbb{N} \land v\in \mathbb{N}^+$$

Involving $z^n\, e^{b\,z^r+d\,z+e}\, \sin^v\!\left(c\,z^r+f\,z\right)$

01.06.21.1527.01

$$\int z^n e^{b z^2+d z} \sin^\nu(c z^2 + f z)\, dz = 2^{-\nu-1} b^{-n-1} e^{-\frac{d^2}{4b}} \left(\binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2 - 1) \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz)^{q+1} \left(-\frac{(d+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b}\right) - i^{-\nu} b^{n+1} e^{\frac{d^2}{4b}} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{(d-2ifs+ifv)^2}{4(b-2ics+icv)}} \left(\sum_{q=0}^{n} 2^{q-n} (-d+2ifs-ifv)^{n-q} (d+fi(v-2s)+2(b-2ics+icv)z)^{q+1} \left(-\frac{(d+fi(v-2s)+2(b-2ics+icv)z)^2}{b-2ics+icv}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+fi(v-2s)+2(b-2ics+icv)z)^2}{4(b-2ics+icv)}\right) \right) (b-2ics+icv)^{-n-1} + (-1)^\nu e^{-\frac{(d+2ifs-ifv)^2}{4(b+2ics-icv)}} (b+2ics-icv)^{-n-1} \sum_{q=0}^{n} 2^{q-n} (-d-2ifs+ifv)^{n-q} (d+2ifs-ifv+2bz+4icsz-2icvz)^{q+1} \left(-\frac{(d+2ifs-ifv+2bz+4icsz-2icvz)^2}{b+2ics-icv}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2ifs-ifv+2bz+4icsz-2icvz)^2}{4(b+2ics-icv)}\right) \right) \right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1528.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin^\nu(\sqrt{z}\, c + f z)\, dz = 2^{-2n-\nu-1} e^{-\frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b + 2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b\left(b+2d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+2d\sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) \right) \right) d^{-2n-2} + 2^{-2n-\nu-1} i^{-\nu} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s}$$

$$\left((-1)^v e^{-\frac{(b+c i (2 s-v))^2}{4 (d+f i (2 s-v))}} \left(\sum_{k=0}^n \sum_{h=0}^k (-1)^{k-h} 4^k (b+c i (2 s-v))^{-h-k+2 n} \left(b+c i (2 s-v)+2 (d+f i (2 s-v)) \sqrt{z}\right)^{h+k}\right.\right.$$

$$\left(-\frac{\left(b+c i (2 s-v)+2 (d+f i (2 s-v)) \sqrt{z}\right)^2}{d+f i (2 s-v)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b+c i (2 s-v)) \left(b+c i (2 s-v)+\right.\right.$$

$$\left.2 (d+f i (2 s-v)) \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h+k+1), -\frac{\left(b+c i (2 s-v)+2 (d+f i (2 s-v)) \sqrt{z}\right)^2}{4 (d+f i (2 s-v))}\right)+2$$

$$\sqrt{-\frac{\left(b+c i (2 s-v)+2 (d+f i (2 s-v)) \sqrt{z}\right)^2}{d+f i (2 s-v)}} \, (d+f i (2 s-v)) \Gamma\left(\frac{1}{2} (h+k+2),\right.$$

$$\left.\left.\left.-\frac{\left(b+c i (2 s-v)+2 (d+f i (2 s-v)) \sqrt{z}\right)^2}{4 (d+f i (2 s-v))}\right)\right)\right) (d+f i (2 s-v))^{-2 n-2} + e^{-\frac{(b+c i (v-2 s))^2}{4 (d+f i (v-2 s))}}$$

$$(d+f i (v-2 s))^{-2 n-2} \sum_{k=0}^n \sum_{h=0}^k (-1)^{k-h} 4^k (b+c i (v-2 s))^{-h-k+2 n} \left(b+c i (v-2 s)+2 (d+f i (v-2 s)) \sqrt{z}\right)^{h+k}$$

$$\left(-\frac{\left(b+c i (v-2 s)+2 (d+f i (v-2 s)) \sqrt{z}\right)^2}{d+f i (v-2 s)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left((b+c i (v-2 s)) \left(b+c i (v-2 s)+\right.\right.$$

$$\left.2 (d+f i (v-2 s)) \sqrt{z}\right) \Gamma\left(\frac{1}{2} (h+k+1), -\frac{\left(b+c i (v-2 s)+2 (d+f i (v-2 s)) \sqrt{z}\right)^2}{4 (d+f i (v-2 s))}\right)+$$

$$2 \sqrt{-\frac{\left(b+c i (v-2 s)+2 (d+f i (v-2 s)) \sqrt{z}\right)^2}{d+f i (v-2 s)}} \, (d+f i (v-2 s)) \Gamma\left(\frac{1}{2} (h+k+2),\right.$$

$$\left.\left.\left.-\frac{\left(b+c i (v-2 s)+2 (d+f i (v-2 s)) \sqrt{z}\right)^2}{4 (d+f i (v-2 s))}\right)\right)\right) /; n \in \mathbb{N} \land v \in \mathbb{N}^+$$

Involving $z^n e^{b z^r + d z + e} \sin^v(c z^r + f z)$

01.06.21.1529.01

$$\int z^n e^{b z^2+d z+e} \sin^\nu(c z^2 + f z)\, dz = 2^{-\nu-1} b^{-n-1} e^{-\frac{d^2}{4b}} \left(e^e \binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2 - 1) \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz)^{q+1} \left(-\frac{(d+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b}\right) - i^{-\nu} b^{n+1} e^{\frac{d^2}{4b}} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{e-\frac{(d-2ifs+ifv)^2}{4(b-2ics+icv)}} \left(\sum_{q=0}^{n} 2^{q-n} (-d+2ifs-ifv)^{n-q} (d+fi(v-2s)+2(b-2ics+icv)z)^{q+1} \left(-\frac{(d+fi(v-2s)+2(b-2ics+icv)z)^2}{b-2ics+icv}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+fi(v-2s)+2(b-2ics+icv)z)^2}{4(b-2ics+icv)}\right) \right) (b-2ics+icv)^{-n-1} + (-1)^\nu e^{e-\frac{(d+2ifs-ifv)^2}{4(b+2ics-icv)}} (b+2ics-icv)^{-n-1} \sum_{q=0}^{n} 2^{q-n} (-d-2ifs+ifv)^{n-q} (d+2ifs-ifv+2bz+4icsz-2icvz)^{q+1} \left(-\frac{(d+2ifs-ifv+2bz+4icsz-2icvz)^2}{b+2ics-icv}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2ifs-ifv+2bz+4icsz-2icvz)^2}{4(b+2ics-icv)}\right) \right) \right) /; n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

01.06.21.1530.01

$$\int z^n e^{\sqrt{z}\, b+d z+e} \sin^\nu(\sqrt{z}\, c + f z)\, dz = 2^{-2n-\nu-1} e^{e-\frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b\left(b+2d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+2d\sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) \right) \right) d^{-2n-2} + 2^{-2n-\nu-1} i^{-\nu} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s}$$

$$\left((-1)^v e^{e^{-\frac{(b+c\,i\,(2s-v))^2}{4(d+f\,i\,(2s-v))}}} \left(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(b+c\,i\,(2s-v))^{-h-k+2n}\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^{h+k}\right.\right.$$

$$\left(-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{d+f\,i\,(2s-v)}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}\left((b+c\,i\,(2s-v))\left(b+c\,i\,(2s-v)+\right.\right.$$

$$\left.2\,(d+f\,i\,(2s-v))\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1),\,-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{4\,(d+f\,i\,(2s-v))}\right)+2$$

$$\sqrt{-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{d+f\,i\,(2s-v)}}\;(d+f\,i\,(2s-v))\,\Gamma\left(\frac{1}{2}(h+k+2),\right.$$

$$\left.\left.\left.-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{4\,(d+f\,i\,(2s-v))}\right)\right)\right)(d+f\,i\,(2s-v))^{-2n-2}+e^{e^{-\frac{(b+c\,i\,(v-2s))^2}{4(d+f\,i\,(v-2s))}}}$$

$$(d+f\,i\,(v-2s))^{-2n-2}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(b+c\,i\,(v-2s))^{-h-k+2n}\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^{h+k}$$

$$\left(-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}\right)^{\frac{1}{2}(-h-k-1)}\binom{k}{h}\binom{n}{k}\left((b+c\,i\,(v-2s))\left(b+c\,i\,(v-2s)+\right.\right.$$

$$\left.2\,(d+f\,i\,(v-2s))\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1),\,-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2s))}\right)+$$

$$2\sqrt{-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}}\;(d+f\,i\,(v-2s))\,\Gamma\left(\frac{1}{2}(h+k+2),\right.$$

$$\left.\left.\left.-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2s))}\right)\right)\right)\;/;\;n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n\, e^{d\,z} \sin^v\left(c\,z^r+f\,z+g\right)$

01.06.21.1531.01

$$\int z^n e^{dz}\sin^\nu(c z^2+f z+g)\,dz = -2^{-\nu}\binom{\nu}{\frac{\nu}{2}}\Gamma(n+1,-d z)(1-\nu \bmod 2)(-d)^{-n-1} - 2^{-\nu-1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(\frac{1}{\sqrt{-i c(\nu-2k)}}\left(e^{-\frac{i(d-i f(\nu-2k))^2}{4c(\nu-2k)}+\frac{i\pi\nu}{2}-i g(\nu-2k)}\sum_{q=0}^{n}2^{q-n}(-i c(\nu-2k))^{-n-\frac{1}{2}}(i f(\nu-2k)-d)^{n-q}\right.\right.$$

$$(d-i f(\nu-2k)-2 i c(\nu-2k)z)^{q+1}\left(-\frac{i(d-i f(\nu-2k)-2 i c(\nu-2k)z)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-q-1)}$$

$$\left.\binom{n}{q}\Gamma\left(\frac{q+1}{2},-\frac{i(d-i f(\nu-2k)-2 i c(\nu-2k)z)^2}{4c(\nu-2k)}\right)\right)+$$

$$\frac{1}{\sqrt{i c(\nu-2k)}}\left(e^{\frac{i(d+f i(\nu-2k))^2}{4c(\nu-2k)}+g i(\nu-2k)-\frac{i\pi\nu}{2}}\sum_{q=0}^{n}2^{q-n}(i c(\nu-2k))^{-n-\frac{1}{2}}(-d-i f(\nu-2k))^{n-q}\right.$$

$$(d+f i(\nu-2k)+2 c i(\nu-2k)z)^{q+1}\left(\frac{i(d+f i(\nu-2k)+2 c i(\nu-2k)z)^2}{c(\nu-2k)}\right)^{\frac{1}{2}(-q-1)}$$

$$\left.\left.\binom{n}{q}\Gamma\left(\frac{q+1}{2},\frac{i(d+f i(\nu-2k)+2 c i(\nu-2k)z)^2}{4c(\nu-2k)}\right)\right)\right)\ /;\ n\in\mathbb{N}\land\nu\in\mathbb{N}^+$$

01.06.21.1532.01

$$\int z^n e^{dz}\sin^\nu\left(\sqrt{z}\,c+f z+g\right)dz =$$

$$i^{-\nu}2^{-2n-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^\nu e^{\frac{c^2(2s-\nu)^2}{4(d+f i(2s-\nu))}+g i(2s-\nu)}\left(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}4^k(i c(2s-\nu))^{-h-k+2n}\left(2\sqrt{z}\,(d+f i(2s-\nu))+\right.\right.\right.$$

$$\left.c i(2s-\nu)\right)^{h+k}\left(-\frac{\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)^2}{d+f i(2s-\nu)}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\left(c i(2s-\nu)\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)\Gamma\left(\frac{1}{2}(h+k+1),\right.\right.$$

$$\left.-\frac{\left(2\sqrt{z}\,(d+f i(2s-\nu))+c i(2s-\nu)\right)^2}{4(d+f i(2s-\nu))}\right)+2(d+f i(2s-\nu))\,\Gamma\left(\frac{1}{2}(h+k+2),\right.$$

$$-\frac{\left(2\sqrt{z}\,(d+f\,i\,(2s-v))+c\,i\,(2s-v)\right)^2}{4\,(d+f\,i\,(2s-v))}\Bigg)\sqrt{-\frac{\left(2\sqrt{z}\,(d+f\,i\,(2s-v))+c\,i\,(2s-v)\right)^2}{d+f\,i\,(2s-v)}}\Bigg)\Bigg)$$

$$(d+f\,i\,(2s-v))^{-2n-2}+e^{\frac{c^2(v-2s)^2}{4(d+f\,i\,(v-2s))}+g\,i\,(v-2s)}\,(d+f\,i\,(v-2s))^{-2n-2}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(i\,c\,(v-2s))^{-h-k+2n}$$

$$\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^{h+k}\left(-\frac{\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\Bigg(c\,i\,(v-2s)\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}(h+k+1),$$

$$-\frac{\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2s))}\Bigg)+2\,(d+f\,i\,(v-2s))\,\Gamma\Bigg(\frac{1}{2}(h+k+2),$$

$$-\frac{\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2s))}\Bigg)\sqrt{-\frac{\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}}\Bigg)\Bigg)-$$

$$2^{-v}\,(-d)^{-n-1}\binom{v}{\frac{v}{2}}\Gamma(n+1,\,-d\,z)\,(1-v\bmod 2)\;/;\;n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n\,e^{d\,z+e}\,\sin^v\!\left(c\,z^r+f\,z+g\right)$

01.06.21.1533.01

$$\int z^n e^{d z+e} \sin^\nu\left(c z^2 + f z + g\right) dz = -2^{-\nu} e^e \binom{\nu}{\frac{\nu}{2}} \Gamma(n+1, -d z) (1 - \nu \bmod 2) (-d)^{-n-1} - 2^{-\nu-1} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{1}{\sqrt{-i c (\nu - 2k)}} \left(e^{-\frac{i (d - i f (\nu-2k))^2}{4 c (\nu-2k)} + e + \frac{i \pi \nu}{2} - i g (\nu - 2k)} \sum_{q=0}^{n} 2^{q-n} (-i c (\nu - 2k))^{-n-\frac{1}{2}} (i f (\nu - 2k) - d)^{n-q} (d - i f (\nu - 2k) - 2 i c (\nu - 2k) z)^{q+1} \left(-\frac{i (d - i f (\nu - 2k) - 2 i c (\nu - 2k) z)^2}{c (\nu - 2k)} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{i (d - i f (\nu - 2k) - 2 i c (\nu - 2k) z)^2}{4 c (\nu - 2k)} \right) \right) + \frac{1}{\sqrt{i c (\nu - 2k)}} \left(e^{\frac{i (d + f i (\nu-2k))^2}{4 c (\nu-2k)} + e + g i (\nu - 2k) - \frac{i \pi \nu}{2}} \sum_{q=0}^{n} 2^{q-n} (i c (\nu - 2k))^{-n-\frac{1}{2}} (-d - i f (\nu - 2k))^{n-q} (d + f i (\nu - 2k) + 2 c i (\nu - 2k) z)^{q+1} \left(\frac{i (d + f i (\nu - 2k) + 2 c i (\nu - 2k) z)^2}{c (\nu - 2k)} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{i (d + f i (\nu - 2k) + 2 c i (\nu - 2k) z)^2}{4 c (\nu - 2k)} \right) \right) \right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1534.01

$$\int z^n e^{d z+e} \sin^\nu\left(\sqrt{z}\, c + f z + g\right) dz = i^{-\nu} 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{\frac{c^2 (2s-\nu)^2}{4 (d + f i (2s-\nu))} + g i (2s-\nu) + e} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i c (2s - \nu))^{-h-k+2n} \left(2 \sqrt{z} (d + f i (2s - \nu)) + c i (2s - \nu)\right)^{h+k} \left(-\frac{\left(2 \sqrt{z} (d + f i (2s - \nu)) + c i (2s - \nu)\right)^2}{d + f i (2s - \nu)} \right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(c i (2s - \nu) \left(2 \sqrt{z} (d + f i (2s - \nu)) + c i (2s - \nu)\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(2 \sqrt{z} (d + f i (2s - \nu)) + c i (2s - \nu)\right)^2}{4 (d + f i (2s - \nu))} \right) + 2 (d + f i (2s - \nu)) \Gamma\left(\frac{1}{2}(h+k+2), \right. \right. \right. \right.$$

$$-\frac{\left(2\sqrt{z}\,(d+f\,i\,(2s-v))+c\,i\,(2s-v)\right)^2}{4\,(d+f\,i\,(2s-v))}\Bigg)\sqrt{-\frac{\left(2\sqrt{z}\,(d+f\,i\,(2s-v))+c\,i\,(2s-v)\right)^2}{d+f\,i\,(2s-v)}}\Bigg)\Bigg)$$

$$(d+f\,i\,(2s-v))^{-2n-2}+e^{\frac{c^2\,(v-2s)^2}{4\,(d+f\,i\,(v-2s))}+g\,i\,(v-2s)+e}\,(d+f\,i\,(v-2s))^{-2n-2}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(i\,c\,(v-2s))^{-h-k+2n}$$

$$\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^{h+k}\left(-\frac{\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\Bigg(c\,i\,(v-2s)\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}\,(h+k+1),$$

$$-\frac{\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2s))}\Bigg)+2\,(d+f\,i\,(v-2s))\,\Gamma\Bigg(\frac{1}{2}\,(h+k+2),$$

$$-\frac{\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2s))}\Bigg)\sqrt{-\frac{\left(c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}}\Bigg)\Bigg)-$$

$$2^{-v}\,(-d)^{-n-1}\,e^{e}\binom{v}{\frac{v}{2}}\Gamma(n+1,\,-d\,z)\,(1-v\bmod 2)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n\, e^{b\,z^r}\,\sin^v\left(c\,z^r+f\,z+g\right)$

01.06.21.1535.01

$$\int z^n e^{b z^2} \sin^\nu(c z^2 + f z + g)\, dz = -2^{-\nu-1} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1 - \nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} -$$

$$i^{-\nu} 2^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{(i f \nu - 2 i f s)^2}{4 (b - 2 i c s + i c \nu)} + g i (\nu - 2 s)} \left(\sum_{q=0}^{n} 2^{q-n} (2 i f s - i f \nu)^{n-q} (f i (\nu - 2 s) + 2 (b - 2 i c s + i c \nu) z)^{q+1} \right.\right.$$

$$\left(-\frac{(f i (\nu - 2 s) + 2 (b - 2 i c s + i c \nu) z)^2}{b - 2 i c s + i c \nu} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(f i (\nu - 2 s) + 2 (b - 2 i c s + i c \nu) z)^2}{4 (b - 2 i c s + i c \nu)} \right) \Bigg)$$

$$(b - 2 i c s + i c \nu)^{-n-1} + (-1)^\nu e^{-\frac{(2 i f s - i f \nu)^2}{4 (b + 2 i c s - i c \nu)} + g i (2 s - \nu)} (b + 2 i c s - i c \nu)^{-n-1} \sum_{q=0}^{n} 2^{q-n} (i f \nu - 2 i f s)^{n-q}$$

$$(2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^{q+1} \left(-\frac{(2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^2}{b + 2 i c s - i c \nu} \right)^{\frac{1}{2}(-q-1)}$$

$$\left.\left. \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^2}{4 (b + 2 i c s - i c \nu)} \right) \right) \right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1536.01

$$\int z^n e^{\sqrt{z}\, b} \sin^\nu\left(\sqrt{z}\, c + f z + g\right) dz =$$

$$i^{-\nu} 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{\frac{i (b + c i (2 s - \nu))^2}{4 f (2 s - \nu)} + g i (2 s - \nu)} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b + c i (2 s - \nu))^{-h-k+2n} \right.\right.$$

$$\left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z} \right)^{h+k} \left(\frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z} \right)^2}{f (2 s - \nu)} \right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h} \binom{n}{k} \left((b + c i (2 s - \nu)) \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z} \right) \right.$$

$$\Gamma\left(\frac{1}{2} (h + k + 1), \frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z} \right)^2}{4 f (2 s - \nu)} \right) + 2$$

$$f i (2 s - \nu) \sqrt{\frac{i \left(b + c i (2 s - \nu) + 2 f i (2 s - \nu) \sqrt{z} \right)^2}{f (2 s - \nu)}}$$

$$\Gamma\left(\frac{1}{2}(h+k+2),\ \frac{i\left(b+c\,i\,(2s-v)+2\,f\,i\,(2s-v)\sqrt{z}\right)^2}{4\,f\,(2s-v)}\right)\Bigg)\Bigg)(i\,f\,(2s-v))^{-2n-2}+$$

$$e^{\frac{i(b+c\,i\,(v-2s))^2}{4\,f\,(v-2s)}+g\,i\,(v-2s)}\,(i\,f\,(v-2s))^{-2n-2}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(b+c\,i\,(v-2s))^{-h-k+2n}$$

$$\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^{h+k}\left(\frac{i\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{f\,(v-2s)}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\Bigg(\Big((b+c\,i\,(v-2s))\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}(h+k+1),$$

$$\frac{i\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{4\,f\,(v-2s)}\Bigg)+2\,f\,i\,(v-2s)\,\Gamma\Bigg(\frac{1}{2}(h+k+2),$$

$$\frac{i\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{4\,f\,(v-2s)}\Bigg)\sqrt{\frac{i\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{f\,(v-2s)}}\Bigg)\Bigg)-$$

$$2^{1-v}\,(-b)^{-2(n+1)}\binom{v}{\frac{v}{2}}\Gamma\left(2\,(n+1),\,-b\sqrt{z}\right)(1-v \bmod 2)\ /;\ n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n\, e^{b\,z^r+e}\sin^v\left(c\,z^r+f\,z+g\right)$

01.06.21.1537.01

$$\int z^n e^{b z^2+e} \sin^\nu(c z^2 + f z + g)\, dz = -2^{-\nu-1} e^e z^{n+1} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{n+1}{2}, -b z^2\right) (1 - \nu \bmod 2) \left(-b z^2\right)^{\frac{1}{2}(-n-1)} - i^{-\nu} 2^{-\nu-1} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{(i f \nu - 2 i f s)^2}{4(b-2 i c s+i c \nu)}+e+g i(\nu-2 s)} \left(\sum_{q=0}^{n} 2^{q-n} (2 i f s - i f \nu)^{n-q} (f i(\nu-2 s) + 2(b - 2 i c s + i c \nu) z)^{q+1} \left(-\frac{(f i(\nu-2 s)+2(b-2 i c s+i c \nu) z)^2}{b-2 i c s+i c \nu}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(f i(\nu-2 s)+2(b-2 i c s+i c \nu) z)^2}{4(b-2 i c s+i c \nu)}\right)\right) (b-2 i c s+i c \nu)^{-n-1} + (-1)^\nu e^{-\frac{(2 i f s - i f \nu)^2}{4(b+2 i c s - i c \nu)}+e+g i(2 s-\nu)} (b+2 i c s - i c \nu)^{-n-1} \sum_{q=0}^{n} 2^{q-n} (i f \nu - 2 i f s)^{n-q} (2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^{q+1} \left(-\frac{(2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^2}{b+2 i c s - i c \nu}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(2 i f s + 4 i c z s - i f \nu + 2 b z - 2 i c \nu z)^2}{4(b+2 i c s - i c \nu)}\right)\right) /;\ n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1538.01

$$\int z^n e^{\sqrt{z}\, b+e} \sin^\nu(\sqrt{z}\, c + f z + g)\, dz = i^{-\nu} 2^{-2n-\nu-1} \sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{\frac{i(b+c i(2 s-\nu))^2}{4 f(2 s-\nu)}+e+g i(2 s-\nu)} \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (b + c i(2 s-\nu))^{-h-k+2n} \left(b + c i(2 s-\nu) + 2 f i(2 s-\nu)\sqrt{z}\right)^{h+k} \left(\frac{i\left(b + c i(2 s-\nu) + 2 f i(2 s-\nu)\sqrt{z}\right)^2}{f(2 s-\nu)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left((b + c i(2 s-\nu)) \left(b + c i(2 s-\nu) + 2 f i(2 s-\nu)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i\left(b + c i(2 s-\nu) + 2 f i(2 s-\nu)\sqrt{z}\right)^2}{4 f(2 s-\nu)}\right) + 2 f i(2 s-\nu) \sqrt{\frac{i\left(b + c i(2 s-\nu) + 2 f i(2 s-\nu)\sqrt{z}\right)^2}{f(2 s-\nu)}}\right.\right.\right.$$

$$\Gamma\left(\frac{1}{2}(h+k+2), \frac{i\left(b+c\,i\,(2s-v)+2\,f\,i\,(2s-v)\sqrt{z}\right)^2}{4\,f\,(2s-v)}\right)\Bigg)\Bigg)(i\,f\,(2s-v))^{-2n-2}+$$

$$e^{\frac{i\,(b+c\,i\,(v-2s))^2}{4\,f\,(v-2s)}+e+g\,i\,(v-2s)}\,(i\,f\,(v-2s))^{-2n-2}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(b+c\,i\,(v-2s))^{-h-k+2n}$$

$$\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^{h+k}\left(\frac{i\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{f\,(v-2s)}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\Bigg((b+c\,i\,(v-2s))\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}(h+k+1),$$

$$\frac{i\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{4\,f\,(v-2s)}\Bigg)+2\,f\,i\,(v-2s)\,\Gamma\Bigg(\frac{1}{2}(h+k+2),$$

$$\frac{i\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{4\,f\,(v-2s)}\Bigg)\sqrt{\frac{i\left(b+c\,i\,(v-2s)+2\,f\,i\,(v-2s)\sqrt{z}\right)^2}{f\,(v-2s)}}\Bigg)\Bigg)-$$

$$2^{1-v}\,(-b)^{-2(n+1)}\,e^{e}\binom{v}{\frac{v}{2}}\Gamma\left(2\,(n+1), -b\sqrt{z}\right)(1-v \bmod 2)\,/;\,n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n\,e^{b\,z^r+d\,z}\,\sin^v\left(c\,z^r+f\,z+g\right)$

01.06.21.1539.01

$$\int z^n e^{b z^2+d z} \sin^\nu(c z^2 + f z + g)\, dz = 2^{-\nu-1} b^{-n-1} e^{-\frac{d^2}{4b}} \left(\binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2 - 1) \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d+2bz)^{q+1} \left(-\frac{(d+2bz)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b}\right) - i^{-\nu} b^{n+1} e^{\frac{d^2}{4b}} \sum_{s=0}^{\lfloor \frac{\nu-1}{2} \rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{(d-2ifs+if\nu)^2}{4(b-2ics+ic\nu)}+g i(\nu-2s)} \left(\sum_{q=0}^{n} 2^{q-n} (-d+2ifs-if\nu)^{n-q} (d+fi(\nu-2s)+2(b-2ics+ic\nu)z)^{q+1} \left(-\frac{(d+fi(\nu-2s)+2(b-2ics+ic\nu)z)^2}{b-2ics+ic\nu}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+fi(\nu-2s)+2(b-2ics+ic\nu)z)^2}{4(b-2ics+ic\nu)}\right)\right) (b-2ics+ic\nu)^{-n-1} + (-1)^\nu e^{-\frac{(d+2ifs-if\nu)^2}{4(b+2ics-ic\nu)}+g i(2s-\nu)} (b+2ics-ic\nu)^{-n-1} \sum_{q=0}^{n} 2^{q-n} (-d-2ifs+if\nu)^{n-q} (d+2ifs-if\nu+2bz+4icsz-2ic\nu z)^{q+1} \left(-\frac{(d+2ifs-if\nu+2bz+4icsz-2ic\nu z)^2}{b+2ics-ic\nu}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2ifs-if\nu+2bz+4icsz-2ic\nu z)^2}{4(b+2ics-ic\nu)}\right)\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1540.01

$$\int z^n e^{\sqrt{z}\, b+d z} \sin^\nu(\sqrt{z}\, c + f z + g)\, dz = 2^{-2n-\nu-1} e^{-\frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b+2d\sqrt{z}\right)^{h+k} \left(-\frac{\left(b+2d\sqrt{z}\right)^2}{d}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b\left(b+2d\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right) + 2\sqrt{-\frac{\left(b+2d\sqrt{z}\right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b+2d\sqrt{z}\right)^2}{4d}\right)\right)\right) d^{-2n-2} + 2^{-2n-\nu-1} i^{-\nu} \sum_{s=0}^{\lfloor \frac{\nu-1}{2} \rfloor} (-1)^s \binom{\nu}{s}$$

$$\Bigg((-1)^v e^{-\frac{(b+c\,i\,(2s-v))^2}{4(d+f\,i\,(2s-v))}+g\,i\,(2s-v)} \Bigg(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(b+c\,i\,(2s-v))^{-h-k+2n}\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^{h+k}$$

$$\left(-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{d+f\,i\,(2s-v)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k}\Bigg((b+c\,i\,(2s-v))\left(b+c\,i\,(2s-v)+\right.$$

$$\left.2\,(d+f\,i\,(2s-v))\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+k+1),\,-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{4\,(d+f\,i\,(2s-v))}\right)+2$$

$$\sqrt{-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{d+f\,i\,(2s-v)}}\;(d+f\,i\,(2s-v))$$

$$\Gamma\!\left(\frac{1}{2}(h+k+2),\,-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{4\,(d+f\,i\,(2s-v))}\right)\Bigg)\Bigg)(d+f\,i\,(2s-v))^{-2n-2}+$$

$$e^{-\frac{(b+c\,i\,(v-2s))^2}{4(d+f\,i\,(v-2s))}+g\,i\,(v-2s)}\,(d+f\,i\,(v-2s))^{-2n-2}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(b+c\,i\,(v-2s))^{-h-k+2n}$$

$$\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^{h+k}\left(-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\Bigg((b+c\,i\,(v-2s))\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+k+1),\,-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2s))}\Bigg)+$$

$$2\sqrt{-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}}\;(d+f\,i\,(v-2s))\,\Gamma\Bigg(\frac{1}{2}(h+k+2),$$

$$-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2s))}\Bigg)\Bigg)\Bigg)\;/;\;n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n e^{b z^r + d z + e} \sin^\nu(c z^r + f z + g)$

01.06.21.1541.01

$$\int z^n e^{b z^2 + d z + e} \sin^\nu(c z^2 + f z + g) \, dz = 2^{-\nu-1} b^{-n-1} e^{-\frac{d^2}{4b}} \left(e^e \binom{\nu}{\frac{\nu}{2}} (\nu \bmod 2 - 1) \sum_{q=0}^{n} 2^{q-n} (-d)^{n-q} (d + 2 b z)^{q+1} \left(-\frac{(d+2bz)^2}{b} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d+2bz)^2}{4b} \right) - i^{-\nu} b^{n+1} e^{\frac{d^2}{4b}} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left(e^{-\frac{(d-2 i f s + i f \nu)^2}{4(b - 2 i c s + i c \nu)} + e + g i (\nu - 2s)} \left(\sum_{q=0}^{n} 2^{q-n} (-d + 2 i f s - i f \nu)^{n-q} (d + f i (\nu - 2s) + 2(b - 2 i c s + i c \nu) z)^{q+1} \left(-\frac{(d + f i (\nu - 2s) + 2(b - 2 i c s + i c \nu) z)^2}{b - 2 i c s + i c \nu} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d + f i (\nu - 2s) + 2(b - 2 i c s + i c \nu) z)^2}{4(b - 2 i c s + i c \nu)} \right) \right) (b - 2 i c s + i c \nu)^{-n-1} + (-1)^\nu e^{-\frac{(d + 2 i f s - i f \nu)^2}{4(b + 2 i c s - i c \nu)} + e + g i (2s - \nu)} (b + 2 i c s - i c \nu)^{-n-1} \sum_{q=0}^{n} 2^{q-n} (-d - 2 i f s + i f \nu)^{n-q} (d + 2 i f s - i f \nu + 2 b z + 4 i c s z - 2 i c \nu z)^{q+1} \left(-\frac{(d + 2 i f s - i f \nu + 2 b z + 4 i c s z - 2 i c \nu z)^2}{b + 2 i c s - i c \nu} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(d + 2 i f s - i f \nu + 2 b z + 4 i c s z - 2 i c \nu z)^2}{4(b + 2 i c s - i c \nu)} \right) \right) \right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1542.01

$$\int z^n e^{\sqrt{z}\, b + d z + e} \sin^\nu(\sqrt{z}\, c + f z + g) \, dz = 2^{-2n-\nu-1} e^{e - \frac{b^2}{4d}} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k b^{-h-k+2n} \left(b + 2 d \sqrt{z} \right)^{h+k} \left(-\frac{\left(b + 2 d \sqrt{z} \right)^2}{d} \right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \left(b \left(b + 2 d \sqrt{z} \right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(b + 2 d \sqrt{z} \right)^2}{4d} \right) + 2 \sqrt{-\frac{\left(b + 2 d \sqrt{z} \right)^2}{d}}\, d\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(b + 2 d \sqrt{z} \right)^2}{4d} \right) \right) \right) d^{-2n-2} + 2^{-2n-\nu-1} i^{-\nu} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s}$$

$$\left((-1)^{v} e^{-\frac{(b+c\,i\,(2s-v))^2}{4(d+f\,i\,(2s-v))}+e+g\,i\,(2s-v)} \left(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\, 4^k\,(b+c\,i\,(2s-v))^{-h-k+2n}\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^{h+k}\right.\right.$$

$$\left(-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{d+f\,i\,(2s-v)}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k}\left((b+c\,i\,(2s-v))\left(b+c\,i\,(2s-v)+\right.\right.$$

$$\left.2\,(d+f\,i\,(2s-v))\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1),\,-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{4\,(d+f\,i\,(2s-v))}\right)+2$$

$$\sqrt{-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{d+f\,i\,(2s-v)}}\;(d+f\,i\,(2s-v))$$

$$\left.\left.\left.\Gamma\left(\frac{1}{2}(h+k+2),\,-\frac{\left(b+c\,i\,(2s-v)+2\,(d+f\,i\,(2s-v))\sqrt{z}\right)^2}{4\,(d+f\,i\,(2s-v))}\right)\right)\right)(d+f\,i\,(2s-v))^{-2n-2}+$$

$$e^{-\frac{(b+c\,i\,(v-2s))^2}{4(d+f\,i\,(v-2s))}+e+g\,i\,(v-2s)}\,(d+f\,i\,(v-2s))^{-2n-2}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(b+c\,i\,(v-2s))^{-h-k+2n}$$

$$\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^{h+k}\left(-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\left((b+c\,i\,(v-2s))\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)\Gamma\left(\right.\right.$$

$$\left.\frac{1}{2}(h+k+1),\,-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2s))}\right)+$$

$$2\sqrt{-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{d+f\,i\,(v-2s)}}\;(d+f\,i\,(v-2s))\,\Gamma\left(\frac{1}{2}(h+k+2),\right.$$

$$\left.\left.\left.-\frac{\left(b+c\,i\,(v-2s)+2\,(d+f\,i\,(v-2s))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2s))}\right)\right)\right)\;/;\; n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving products of the direct functions, exponential and a power functions

Involving products of two direct functions, exponential and a power functions

Involving $z^{\alpha-1} e^{p z} \sin(c z) \sin(a z)$

01.06.21.1543.01

$$\int z^{\alpha-1} e^{p z} \sin(c z) \sin(a z) \, dz = -\frac{1}{4} z^{\alpha} \left(\Gamma(\alpha, (-i a + i c - p) z) ((-i a + i c - p) z)^{-\alpha} - ((i a + i c - p) z)^{-\alpha} \Gamma(\alpha, (i a + i c - p) z) - ((-i a - i c - p) z)^{-\alpha} \Gamma(\alpha, (-i a - i c - p) z) + ((i a - i c - p) z)^{-\alpha} \Gamma(\alpha, (i a - i c - p) z)\right)$$

Involving $z^{\alpha-1} e^{p z} \sin(c z) \sin(a z + b)$

01.06.21.1544.01

$$\int z^{\alpha-1} e^{p z} \sin(c z) \sin(a z + b) \, dz = -\frac{1}{4} e^{-i b} z^{\alpha} \left(e^{2 i b} \Gamma(\alpha, (-i a + i c - p) z) ((-i a + i c - p) z)^{-\alpha} - ((i a + i c - p) z)^{-\alpha} \Gamma(\alpha, (i a + i c - p) z) - e^{2 i b} ((-i a - i c - p) z)^{-\alpha} \Gamma(\alpha, (-i a - i c - p) z) + ((i a - i c - p) z)^{-\alpha} \Gamma(\alpha, (i a - i c - p) z)\right)$$

Involving $z^{\alpha-1} e^{p z} \sin(c z + d) \sin(a z + b)$

01.06.21.1545.01

$$\int z^{\alpha-1} e^{p z} \sin(d + c z) \sin(b + a z) \, dz = -\frac{1}{4} e^{-i b - i d} z^{\alpha} \left(e^{2 i b} \Gamma(\alpha, (-i a + i c - p) z) ((-i a + i c - p) z)^{-\alpha} - ((i a + i c - p) z)^{-\alpha} \Gamma(\alpha, (i a + i c - p) z) + e^{2 i d} \left(((i a - i c - p) z)^{-\alpha} \Gamma(\alpha, (i a - i c - p) z) - e^{2 i b} ((-i a - i c - p) z)^{-\alpha} \Gamma(\alpha, (-i a - i c - p) z)\right)\right)$$

Involving $z^{n} e^{p z^{r}} \sin(b z) \sin(c z)$

01.06.21.1546.01

$$\int z^n e^{p z^2} \sin(b z)\sin(c z)\,dz = \frac{1}{8} e^{-\frac{-b^2-c^2}{2p}} p^{-n-1} \left(-e^{\frac{(i b+i c)^2}{4p}} \sum_{q=0}^{n} 2^{q-n} (i b - i c)^{n-q} (-i b + i c + 2 p z)^{q+1} \left(-\frac{(-i b + i c + 2 p z)^2}{p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(-i b + i c + 2 p z)^2}{4p}\right) + e^{\frac{(-i b+i c)^2}{4p}} \sum_{q=0}^{n} 2^{q-n} (-i b - i c)^{n-q} (i b + i c + 2 p z)^{q+1} \left(-\frac{(i b + i c + 2 p z)^2}{p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(i b + i c + 2 p z)^2}{4p}\right) - e^{\frac{(i b+i c)^2}{4p}} \sum_{q=0}^{n} 2^{q-n} (-i b + i c)^{n-q} (i b - i c + 2 p z)^{q+1} \left(-\frac{(i b - i c + 2 p z)^2}{p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(i b - i c + 2 p z)^2}{4p}\right) + e^{\frac{(-i b+i c)^2}{4p}} \sum_{q=0}^{n} 2^{q-n} (i b + i c)^{n-q} \left(-\frac{(i b + i c - 2 p z)^2}{p}\right)^{\frac{1}{2}(-q-1)} (-i b - i c + 2 p z)^{q+1} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(i b + i c - 2 p z)^2}{4p}\right)\right) /; n \in \mathbb{N}$$

01.06.21.1547.01

$$\int z^n e^{p\sqrt{z}} \sin(b z)\sin(c z)\,dz = 2^{-2n-3} \left(e^{\frac{p^2}{4 i b - 4 i c}} \left(\sum_{k=0}^{n}\sum_{h=0}^{k} (-1)^{k-h} 4^k p^{-h-k+2n} \left(2\sqrt{z}(-i b + i c) + p\right)^{h+k} \left(\frac{\left(2\sqrt{z}(-i b + i c) + p\right)^2}{i b - i c}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(p\left(2\sqrt{z}(-i b + i c) + p\right)\Gamma\left(\frac{1}{2}(h+k+1), \frac{\left(2\sqrt{z}(-i b + i c) + p\right)^2}{4 i b - 4 i c}\right) + 2(-i b + i c)\sqrt{\frac{\left(2\sqrt{z}(-i b + i c) + p\right)^2}{i b - i c}}\, \Gamma\left(\frac{1}{2}(h+k+2), \frac{\left(2\sqrt{z}(-i b + i c) + p\right)^2}{4 i b - 4 i c}\right)\right)\right)\right.$$

$$(-i b + i c)^{-2(n+1)} - (-i b - i c)^{-2(n+1)} e^{\frac{p^2}{4 i b + 4 i c}} \sum_{k=0}^{n}\sum_{h=0}^{k} (-1)^{k-h} 4^k p^{-h-k+2n} \left(p - 2(i b + i c)\sqrt{z}\right)^{h+k} \left(\frac{\left(p - 2(i b + i c)\sqrt{z}\right)^2}{i b + i c}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \left(p\left(p - 2(i b + i c)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1), \frac{\left(p - 2(i b + i c)\sqrt{z}\right)^2}{4(i b + i c)}\right) - \right.$$

$$2\,(i\,b+i\,c)\sqrt{\frac{\left(p-2\,(i\,b+i\,c)\sqrt{z}\right)^2}{i\,b+i\,c}}\;\Gamma\!\left(\frac{1}{2}\,(h+k+2),\,\frac{\left(p-2\,(i\,b+i\,c)\sqrt{z}\right)^2}{4\,(i\,b+i\,c)}\right)\Bigg)\Bigg)-$$

$$(i\,b+i\,c)^{-2\,(n+1)}\,e^{\frac{p^2}{-4\,i\,b-4\,i\,c}}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,p^{-h-k+2\,n}\left(2\sqrt{z}\,(i\,b+i\,c)+p\right)^{h+k}\left(-\frac{\left(2\sqrt{z}\,(i\,b+i\,c)+p\right)^2}{i\,b+i\,c}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\Bigg(p\left(2\sqrt{z}\,(i\,b+i\,c)+p\right)\Gamma\!\left(\frac{1}{2}\,(h+k+1),\,-\frac{\left(2\sqrt{z}\,(i\,b+i\,c)+p\right)^2}{4\,(i\,b+i\,c)}\right)+$$

$$2\sqrt{-\frac{\left(2\sqrt{z}\,(i\,b+i\,c)+p\right)^2}{i\,b+i\,c}}\;(i\,b+i\,c)\,\Gamma\!\left(\frac{1}{2}\,(h+k+2),\,-\frac{\left(2\sqrt{z}\,(i\,b+i\,c)+p\right)^2}{4\,(i\,b+i\,c)}\right)\Bigg)+$$

$$(i\,b-i\,c)^{-2\,(n+1)}\,e^{\frac{p^2}{-4\,i\,b+4\,i\,c}}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,p^{-h-k+2\,n}\left(2\sqrt{z}\,(i\,b-i\,c)+p\right)^{h+k}\left(-\frac{\left(2\sqrt{z}\,(i\,b-i\,c)+p\right)^2}{i\,b-i\,c}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\Bigg(p\left(2\sqrt{z}\,(i\,b-i\,c)+p\right)\Gamma\!\left(\frac{1}{2}\,(h+k+1),\,-\frac{\left(2\sqrt{z}\,(i\,b-i\,c)+p\right)^2}{4\,i\,b-4\,i\,c}\right)+$$

$$2\sqrt{-\frac{\left(2\sqrt{z}\,(i\,b-i\,c)+p\right)^2}{i\,b-i\,c}}\;(i\,b-i\,c)\,\Gamma\!\left(\frac{1}{2}\,(h+k+2),\,-\frac{\left(2\sqrt{z}\,(i\,b-i\,c)+p\right)^2}{4\,i\,b-4\,i\,c}\right)\Bigg)\Bigg)\Bigg)\;/;\;n\in\mathbb{N}$$

Involving $z^n\,e^{p\,z}\sin\left(b\,z^r\right)\sin(c\,z)$

01.06.21.1548.01

$$\int z^n e^{p z} \sin(b z^2) \sin(c z)\, dz = -\frac{1}{8} (i b)^{-n-1} e^{\frac{3 i (i c+p)^2}{4 b}} \Bigg(e^{-\frac{i(-c^2+4 i p c+p^2)}{2 b}} \sum_{q=0}^{n} 2^{q-n} (i c-p)^{n-q} (-i c+p+2 i b z)^{q+1} \left(\frac{i(-i c+p+2 i b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{i(-i c+p+2 i b z)^2}{4 b}\right) - e^{-\frac{i (i c+p)^2}{2 b}} \sum_{q=0}^{n} 2^{q-n} (-i c-p)^{n-q} (i c+p+2 i b z)^{q+1} \left(\frac{i(i c+p+2 i b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{i(i c+p+2 i b z)^2}{4 b}\right) + (-1)^{n-1} \Bigg(e^{-\frac{i (i c+p)^2}{b}} \sum_{q=0}^{n} 2^{q-n} (-i c-p)^{n-q} (i c+p-2 i b z)^{q+1} \left(-\frac{i(i c+p-2 i b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{i(i c+p-2 i b z)^2}{4 b}\right) - e^{-\frac{i(-c^2+i p c+p^2)}{b}} \sum_{q=0}^{n} 2^{q-n} (i c-p)^{n-q} (-i c+p-2 i b z)^{q+1} \left(-\frac{i(i c-p+2 i b z)^2}{b}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{i(i c-p+2 i b z)^2}{4 b}\right)\Bigg)\Bigg) /; n \in \mathbb{N}$$

01.06.21.1549.01

$$\int z^n e^{p z} \sin\left(b \sqrt{z}\right) \sin(c z)\, dz = 2^{-2 n-3} \Bigg(e^{\frac{b^2}{4(-i c+p)}} \Bigg(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i b)^{-h-k+2 n} \left(i b+2(-i c+p)\sqrt{z}\right)^{h+k} \left(-\frac{\left(i b+2(-i c+p)\sqrt{z}\right)^2}{-i c+p}\right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h}\binom{n}{k} \Bigg(b\, i \left(i b+2(-i c+p)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), -\frac{\left(i b+2(-i c+p)\sqrt{z}\right)^2}{4(-i c+p)}\right) + 2\sqrt{-\frac{\left(i b+2(-i c+p)\sqrt{z}\right)^2}{-i c+p}} (-i c+p)\, \Gamma\left(\frac{1}{2}(h+k+2), -\frac{\left(i b+2(-i c+p)\sqrt{z}\right)^2}{4(-i c+p)}\right)\Bigg)\Bigg)(-i c+p)^{-2(n+1)} - e^{\frac{b^2}{4(-i c+p)}} \Bigg(\sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (-i b)^{-h-k+2 n} \left(-\frac{\left(i b-2(-i c+p)\sqrt{z}\right)^2}{-i c+p}\right)^{\frac{1}{2}(-h-k-1)} \left(-i b+2(-i c+p)\sqrt{z}\right)^{h+k}$$

$$\binom{k}{h}\binom{n}{k}\left(2(-i c+p)\sqrt{-\frac{\left(i b-2(-i c+p)\sqrt{z}\right)^2}{-i c+p}}\;\Gamma\left(\frac{1}{2}(h+k+2),-\frac{\left(i b-2(-i c+p)\sqrt{z}\right)^2}{4(-i c+p)}\right)-\right.$$

$$\left.\left.\left. i b\left(-i b+2(-i c+p)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1),-\frac{\left(i b-2(-i c+p)\sqrt{z}\right)^2}{4(-i c+p)}\right)\right)\right)(-i c+p)^{-2(n+1)}-$$

$$e^{\frac{b^2}{4(i c+p)}}(i c+p)^{-2(n+1)}\left(\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}4^k(i b)^{-h-k+2n}\left(i b+2(i c+p)\sqrt{z}\right)^{h+k}\left(-\frac{\left(i b+2(i c+p)\sqrt{z}\right)^2}{i c+p}\right)^{\frac{1}{2}(-h-k-1)}\right.$$

$$\binom{k}{h}\binom{n}{k}\left(b\,i\left(i b+2(i c+p)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1),-\frac{\left(i b+2(i c+p)\sqrt{z}\right)^2}{4(i c+p)}\right)+\right.$$

$$\left.\left.2\sqrt{-\frac{\left(i b+2(i c+p)\sqrt{z}\right)^2}{i c+p}}\;(i c+p)\,\Gamma\left(\frac{1}{2}(h+k+2),-\frac{\left(i b+2(i c+p)\sqrt{z}\right)^2}{4(i c+p)}\right)\right)-$$

$$\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}4^k(-i b)^{-h-k+2n}\left(-\frac{\left(i b-2(i c+p)\sqrt{z}\right)^2}{i c+p}\right)^{\frac{1}{2}(-h-k-1)}\left(-i b+2(i c+p)\sqrt{z}\right)^{h+k}$$

$$\binom{k}{h}\binom{n}{k}\left(2(i c+p)\sqrt{-\frac{\left(i b-2(i c+p)\sqrt{z}\right)^2}{i c+p}}\;\Gamma\left(\frac{1}{2}(h+k+2),-\frac{\left(i b-2(i c+p)\sqrt{z}\right)^2}{4(i c+p)}\right)-\right.$$

$$\left.\left.\left. i b\left(-i b+2(i c+p)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1),-\frac{\left(i b-2(i c+p)\sqrt{z}\right)^2}{4(i c+p)}\right)\right)\right)\right)\ /;\ n\in\mathbb{N}$$

Involving $z^n e^{p z^r} \sin(b z^r) \sin(c z)$

01.06.21.1550.01

$$\int z^n e^{p z^2} \sin(b z^2) \sin(c z) \, dz = \frac{1}{8} e^{-\frac{c^2 p}{-2 b^2 - 2 p^2}} (b^2 + p^2)^{-n-1} \Bigg(e^{-\frac{c^2}{4(i b + p)}} (i b + p)^{n+1} \Bigg(\sum_{q=0}^{n} 2^{q-n} (i c)^{n-q} \left(\frac{(i c + 2 (i b - p) z)^2}{i b - p} \right)^{\frac{1}{2}(-q-1)} (-i c - 2 i b z + 2 p z)^{q+1} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{(i c + 2 (i b - p) z)^2}{4 (i b - p)} \right) - \sum_{q=0}^{n} 2^{q-n} (-i c)^{n-q} (i c + 2 (-i b + p) z)^{q+1} \left(\frac{(i c + 2 (-i b + p) z)^2}{i b - p} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, \frac{(i c + 2 (-i b + p) z)^2}{4 (i b - p)} \right) \Bigg) - e^{-\frac{c^2}{-4 i b + 4 p}} (-i b + p)^{n+1} \Bigg(\sum_{q=0}^{n} 2^{q-n} (i c)^{n-q} \left(-\frac{(i c - 2 (i b + p) z)^2}{i b + p} \right)^{\frac{1}{2}(-q-1)} (-i c + 2 (i b + p) z)^{q+1} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(i c - 2 (i b + p) z)^2}{4 (i b + p)} \right) - \sum_{q=0}^{n} 2^{q-n} (-i c)^{n-q} (i c + 2 (i b + p) z)^{q+1} \left(-\frac{(i c + 2 (i b + p) z)^2}{i b + p} \right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(i c + 2 (i b + p) z)^2}{4 (i b + p)} \right) \Bigg) \Bigg) /; n \in \mathbb{N}$$

01.06.21.1551.01

$$\int z^n e^{p \sqrt{z}} \sin(b \sqrt{z}) \sin(c z) \, dz = 2^{-2n-3} (i c)^{-2(n+1)} e^{\frac{i(-3 b^2 + 2 i p b + 3 p^2)}{4 c}} \Bigg(e^{-\frac{i (i b + p)^2}{2 c}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (-i b + p)^{-h-k+2n} \left(-i b + p + 2 i c \sqrt{z}\right)^{h+k} \left(\frac{i \left(-i b + p + 2 i c \sqrt{z}\right)^2}{c} \right)^{\frac{1}{2}(-h-k-1)} \binom{k}{h} \binom{n}{k} \Bigg((-i b + p) \left(-i b + p + 2 i c \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+k+1), \frac{i \left(-i b + p + 2 i c \sqrt{z}\right)^2}{4 c} \right) + 2 \sqrt{\frac{i \left(-i b + p + 2 i c \sqrt{z}\right)^2}{c}} \, c \, i \, \Gamma\left(\frac{1}{2}(h+k+2), \frac{i \left(-i b + p + 2 i c \sqrt{z}\right)^2}{4 c} \right) \Bigg) - e^{-\frac{i(p^2 - b^2)}{2 c}} \sum_{k=0}^{n} \sum_{h=0}^{k} (-1)^{k-h} 4^k (i b + p)^{-h-k+2n} \left(i b + p + 2 i c \sqrt{z}\right)^{h+k} \left(\frac{i \left(i b + p + 2 i c \sqrt{z}\right)^2}{c} \right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\left((i\,b+p)\left(i\,b+p+2\,i\,c\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1),\ \frac{i\left(i\,b+p+2\,i\,c\sqrt{z}\right)^2}{4\,c}\right)+\right.$$

$$\left.2\sqrt{\frac{i\left(i\,b+p+2\,i\,c\sqrt{z}\right)^2}{c}}\ c\,i\,\Gamma\left(\frac{1}{2}(h+k+2),\ \frac{i\left(i\,b+p+2\,i\,c\sqrt{z}\right)^2}{4\,c}\right)\right)-$$

$$e^{-\frac{i\left(p^2-b^2\right)}{c}}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(-i\,b+p)^{-h-k+2\,n}\left(-i\,b+p-2\,i\,c\sqrt{z}\right)^{h+k}\left(-\frac{i\left(i\,b-p+2\,i\,c\sqrt{z}\right)^2}{c}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\left((i\,b-p)\left(i\,b-p+2\,i\,c\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1),\ -\frac{i\left(i\,b-p+2\,i\,c\sqrt{z}\right)^2}{4\,c}\right)-\right.$$

$$\left.2\,i\,c\sqrt{-\frac{i\left(i\,b-p+2\,i\,c\sqrt{z}\right)^2}{c}}\ \Gamma\left(\frac{1}{2}(h+k+2),\ -\frac{i\left(i\,b-p+2\,i\,c\sqrt{z}\right)^2}{4\,c}\right)\right)+$$

$$e^{-\frac{i\left(-b^2+i\,p\,b+p^2\right)}{c}}\sum_{k=0}^{n}\sum_{h=0}^{k}(-1)^{k-h}\,4^k\,(i\,b+p)^{-h-k+2\,n}\left(i\,b+p-2\,i\,c\sqrt{z}\right)^{h+k}\left(-\frac{i\left(i\,b+p-2\,i\,c\sqrt{z}\right)^2}{c}\right)^{\frac{1}{2}(-h-k-1)}$$

$$\binom{k}{h}\binom{n}{k}\left((i\,b+p)\left(i\,b+p-2\,i\,c\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+k+1),\ -\frac{i\left(i\,b+p-2\,i\,c\sqrt{z}\right)^2}{4\,c}\right)-\right.$$

$$\left.\left.2\,i\,c\sqrt{-\frac{i\left(i\,b+p-2\,i\,c\sqrt{z}\right)^2}{c}}\ \Gamma\left(\frac{1}{2}(h+k+2),\ -\frac{i\left(i\,b+p-2\,i\,c\sqrt{z}\right)^2}{4\,c}\right)\right)\right)\ /;\ n\in\mathbb{N}$$

Involving $z^n\, e^{p\,z} \sin(b\,z^r) \sin(c\,z^r)$

01.06.21.1552.01

$$\int z^n e^{p z} \sin(b z^2) \sin(c z^2) \, dz = \frac{1}{8} \left(-e^{-\frac{p^2}{4(-i b + i c)}} \left(\sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2(-i b + i c) z)^{j+1} \left(-\frac{(p + 2(-i b + i c) z)^2}{-i b + i c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2(-i b + i c) z)^2}{4(-i b + i c)} \right) \right) (-i b + i c)^{-n-1} + (i b + i c)^{-n-1} e^{-\frac{p^2}{4(i b + i c)}} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2(i b + i c) z)^{j+1} \left(-\frac{(p + 2(i b + i c) z)^2}{i b + i c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2(i b + i c) z)^2}{4(i b + i c)} \right) + (-i b - i c)^{-n-1} e^{-\frac{p^2}{4(-i b - i c)}} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2(-i b - i c) z)^{j+1} \left(-\frac{(p + 2(-i b - i c) z)^2}{-i b - i c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2(-i b - i c) z)^2}{4(-i b - i c)} \right) - (i b - i c)^{-n-1} e^{-\frac{p^2}{4(i b - i c)}} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2(i b - i c) z)^{j+1} \left(-\frac{(p + 2(i b - i c) z)^2}{i b - i c} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2(i b - i c) z)^2}{4(i b - i c)} \right) \right) /; n \in \mathbb{N}$$

01.06.21.1553.01

$$\int z^n e^{p z} \sin(b \sqrt{z}) \sin(c \sqrt{z}) \, dz = 2^{-2n-3} \left(e^{-\frac{(-i b + i c)^2}{4p}} \left(\sum_{i=0}^{n} \sum_{h=0}^{i} (-1)^{i-h} 4^i (-i b + i c)^{-h-i+2n} \left(-i b + i c + 2 p \sqrt{z}\right)^{h+i} \left(-\frac{\left(-i b + i c + 2 p \sqrt{z}\right)^2}{p} \right)^{\frac{1}{2}(-h-i-1)} \binom{i}{h} \binom{n}{i} \left((-i b + i c) \left(-i b + i c + 2 p \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+i+1), -\frac{\left(-i b + i c + 2 p \sqrt{z}\right)^2}{4p} \right) + 2 \sqrt{-\frac{\left(-i b + i c + 2 p \sqrt{z}\right)^2}{p}} \, p \, \Gamma\left(\frac{1}{2}(h+i+2), -\frac{\left(-i b + i c + 2 p \sqrt{z}\right)^2}{4p} \right) \right) \right) p^{-2n-2} - e^{-\frac{(i b + i c)^2}{4p}} \left(\sum_{i=0}^{n} \sum_{h=0}^{i} (-1)^{i-h} 4^i (i b + i c)^{-h-i+2n} \left(i b + i c + 2 p \sqrt{z}\right)^{h+i} \left(-\frac{\left(i b + i c + 2 p \sqrt{z}\right)^2}{p} \right)^{\frac{1}{2}(-h-i-1)} \right.$$

$$\binom{i}{h}\binom{n}{i}\left((i\,b+i\,c)\left(i\,b+i\,c+2\,p\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+i+1),-\frac{\left(i\,b+i\,c+2\,p\sqrt{z}\right)^2}{4\,p}\right)+\right.$$

$$\left.\left.2\sqrt{-\frac{\left(i\,b+i\,c+2\,p\sqrt{z}\right)^2}{p}}\;p\,\Gamma\left(\frac{1}{2}(h+i+2),-\frac{\left(i\,b+i\,c+2\,p\sqrt{z}\right)^2}{4\,p}\right)\right)\right)p^{-2\,n-2}-$$

$$e^{-\frac{(-i\,b-i\,c)^2}{4\,p}}\left(\sum_{i=0}^{n}\sum_{h=0}^{i}(-1)^{i-h}\,4^i\,(-i\,b-i\,c)^{-h-i+2\,n}\left(-i\,b-i\,c+2\,p\sqrt{z}\right)^{h+i}\left(-\frac{\left(-i\,b-i\,c+2\,p\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-i-1)}\right.$$

$$\binom{i}{h}\binom{n}{i}\left((-i\,b-i\,c)\left(-i\,b-i\,c+2\,p\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+i+1),-\frac{\left(-i\,b-i\,c+2\,p\sqrt{z}\right)^2}{4\,p}\right)+\right.$$

$$\left.\left.2\sqrt{-\frac{\left(-i\,b-i\,c+2\,p\sqrt{z}\right)^2}{p}}\;p\,\Gamma\left(\frac{1}{2}(h+i+2),-\frac{\left(-i\,b-i\,c+2\,p\sqrt{z}\right)^2}{4\,p}\right)\right)\right)p^{-2\,n-2}+$$

$$e^{-\frac{(i\,b-i\,c)^2}{4\,p}}\left(\sum_{i=0}^{n}\sum_{h=0}^{i}(-1)^{i-h}\,4^i\,(i\,b-i\,c)^{-h-i+2\,n}\left(i\,b-i\,c+2\,p\sqrt{z}\right)^{h+i}\left(-\frac{\left(i\,b-i\,c+2\,p\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-i-1)}\right.$$

$$\binom{i}{h}\binom{n}{i}\left((i\,b-i\,c)\left(i\,b-i\,c+2\,p\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+i+1),-\frac{\left(i\,b-i\,c+2\,p\sqrt{z}\right)^2}{4\,p}\right)+\right.$$

$$\left.\left.\left.2\sqrt{-\frac{\left(i\,b-i\,c+2\,p\sqrt{z}\right)^2}{p}}\;p\,\Gamma\left(\frac{1}{2}(h+i+2),-\frac{\left(i\,b-i\,c+2\,p\sqrt{z}\right)^2}{4\,p}\right)\right)\right)p^{-2\,n-2}\right)\;/;\;n\in\mathbb{N}$$

Involving $z^{\alpha-1}\,e^{p\,z^r}\,\sin\left(b\,z^r\right)\sin\left(c\,z^r\right)$

01.06.21.1554.01

$$\int z^{\alpha-1} e^{p z^r} \sin(b z^r) \sin(c z^r)\, dz = \frac{z^\alpha}{4 r} \left(-\Gamma\left(\frac{\alpha}{r}, (-i b + i c - p) z^r\right) ((-i b + i c - p) z^r)^{-\frac{\alpha}{r}} + ((i b + i c - p) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (i b + i c - p) z^r\right) + ((-i b - i c - p) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-i b - i c - p) z^r\right) - ((i b - i c - p) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (i b - i c - p) z^r\right)\right)$$

Involving $z^{\alpha-1} e^{b z^r + e} \sin(a z^r + q) \sin(c z^r + g)$

01.06.21.1555.01

$$\int z^{\alpha-1} e^{b z^r + e} \sin(a z^r + q) \sin(c z^r + g)\, dz = \frac{z^\alpha}{4 r} \left(-e^{e - i g + i q} \Gamma\left(\frac{\alpha}{r}, (-b - i a + i c) z^r\right) ((-b - i a + i c) z^r)^{-\frac{\alpha}{r}} + e^{e - i g - i q} ((-b + i a + i c) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b + i a + i c) z^r\right) + e^{e + i g + i q} ((-b - i c - i a) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b - i c - i a) z^r\right) - e^{e + i g - i q} ((-b - i c + i a) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b - i c + i a) z^r\right)\right)$$

Involving $z^n e^{b z^r + d z + e} \sin(a z^r + p z + q) \sin(c z^r + f z + g)$

01.06.21.1556.01

$$\int z^n e^{b z^2+d z+e} \sin(a z^2+p z+q) \sin(c z^2+f z+g) \, dz = \frac{1}{8} \Bigg(-e^{-\frac{(d+i f-i p)^2}{4(b-i a+i c)}+e+i g-i q} \Bigg(\sum_{j=0}^{n} 2^{j-n} (-d-i f+i p)^{n-j} (d+i f-i p+2(b-i a+i c) z)^{j+1} \left(-\frac{(d+i f-i p+2(b-i a+i c) z)^2}{b-i a+i c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(d+i f-i p+2(b-i a+i c) z)^2}{4(b-i a+i c)}\right) \Bigg) (b-i a+i c)^{-n-1} +$$
$$(b+i a+i c)^{-n-1} e^{-\frac{(d+i f+i p)^2}{4(b+i a+i c)}+e+i g+i q} \sum_{j=0}^{n} 2^{j-n} (-d-i f-i p)^{n-j} (d+i f+i p+2(b+i a+i c) z)^{j+1} \left(-\frac{(d+i f+i p+2(b+i a+i c) z)^2}{b+i a+i c}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(d+i f+i p+2(b+i a+i c) z)^2}{4(b+i a+i c)}\right) +$$
$$(b-i c-i a)^{-n-1} e^{-\frac{(d-i f-i p)^2}{4(b-i c-i a)}+e-i g-i q} \sum_{j=0}^{n} 2^{j-n} (-d+i f+i p)^{n-j} (d-i f-i p+2(b-i c-i a) z)^{j+1} \left(-\frac{(d-i f-i p+2(b-i c-i a) z)^2}{b-i c-i a}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(d-i f-i p+2(b-i c-i a) z)^2}{4(b-i c-i a)}\right) -$$
$$(b-i c+i a)^{-n-1} e^{-\frac{(d-i f+i p)^2}{4(b-i c+i a)}+e-i g+i q} \sum_{j=0}^{n} 2^{j-n} (-d+i f-i p)^{n-j} (d-i f+i p+2(b-i c+i a) z)^{j+1} \left(-\frac{(d-i f+i p+2(b-i c+i a) z)^2}{b-i c+i a}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(d-i f+i p+2(b-i c+i a) z)^2}{4(b-i c+i a)}\right) \Bigg) /; n \in \mathbb{N}$$

01.06.21.1557.01

$$\int z^n e^{\sqrt{z}\, b+d z+e} \sin(\sqrt{z}\, a+p z+q) \sin(\sqrt{z}\, c+f z+g) \, dz =$$
$$2^{-2n-3} \Bigg(-e^{-\frac{(b+i a+i c)^2}{4(d+i f+i p)}+e+i g+i q} \Bigg(\sum_{i=0}^{n} \sum_{h=0}^{i} (-1)^{i-h} 4^i (b+i a+i c)^{-h-i+2n}$$
$$\left(b+i a+i c+2(d+i f+i p)\sqrt{z}\right)^{h+i} \left(-\frac{\left(b+i a+i c+2(d+i f+i p)\sqrt{z}\right)^2}{d+i f+i p}\right)^{\frac{1}{2}(-h-i-1)}$$
$$\binom{i}{h} \binom{n}{i} \Bigg((b+i a+i c) \left(b+i a+i c+2(d+i f+i p)\sqrt{z}\right) \Gamma\Bigg(\frac{1}{2}(h+i+1),$$

$$-\frac{\left(b+i\,a+i\,c+2\,(d+i\,f+i\,p)\,\sqrt{z}\right)^2}{4\,(d+i\,f+i\,p)}\Bigg)+2\,\sqrt{-\frac{\left(b+i\,a+i\,c+2\,(d+i\,f+i\,p)\,\sqrt{z}\right)^2}{d+i\,f+i\,p}}$$

$$(d+i\,f+i\,p)\,\Gamma\!\left(\frac{1}{2}\,(h+i+2),\,-\frac{\left(b+i\,a+i\,c+2\,(d+i\,f+i\,p)\,\sqrt{z}\right)^2}{4\,(d+i\,f+i\,p)}\right)\Bigg)\Bigg)\,(d+i\,f+i\,p)^{-2\,n-2}+$$

$$e^{-\frac{(b-i\,c+i\,a)^2}{4\,(d-i\,f+i\,p)}+e-i\,g+i\,q}\,(d-i\,f+i\,p)^{-2\,n-2}\sum_{i=0}^{n}\sum_{h=0}^{i}(-1)^{i-h}\,4^i\,(b-i\,c+i\,a)^{-h-i+2\,n}\left(b-i\,c+i\,a+2\,(d-i\,f+i\,p)\,\sqrt{z}\right)^{h+i}$$

$$\left(-\frac{\left(b-i\,c+i\,a+2\,(d-i\,f+i\,p)\,\sqrt{z}\right)^2}{d-i\,f+i\,p}\right)^{\frac{1}{2}\,(-h-i-1)}\binom{i}{h}\binom{n}{i}\Bigg((b-i\,c+i\,a)\left(b-i\,c+i\,a+2\,(d-i\,f+i\,p)\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}\,(h+i+1),\,-\frac{\left(b-i\,c+i\,a+2\,(d-i\,f+i\,p)\,\sqrt{z}\right)^2}{4\,(d-i\,f+i\,p)}\right)+2\,\sqrt{-\frac{\left(b-i\,c+i\,a+2\,(d-i\,f+i\,p)\,\sqrt{z}\right)^2}{d-i\,f+i\,p}}$$

$$(d-i\,f+i\,p)\,\Gamma\!\left(\frac{1}{2}\,(h+i+2),\,-\frac{\left(b-i\,c+i\,a+2\,(d-i\,f+i\,p)\,\sqrt{z}\right)^2}{4\,(d-i\,f+i\,p)}\right)\Bigg)+$$

$$e^{-\frac{(b-i\,a+i\,c)^2}{4\,(d+i\,f-i\,p)}+e+i\,g-i\,q}\,(d+i\,f-i\,p)^{-2\,n-2}\sum_{i=0}^{n}\sum_{h=0}^{i}(-1)^{i-h}\,4^i\,(b-i\,a+i\,c)^{-h-i+2\,n}\left(b-i\,a+i\,c+2\,(d+i\,f-i\,p)\,\sqrt{z}\right)^{h+i}$$

$$\left(-\frac{\left(b-i\,a+i\,c+2\,(d+i\,f-i\,p)\,\sqrt{z}\right)^2}{d+i\,f-i\,p}\right)^{\frac{1}{2}\,(-h-i-1)}\binom{i}{h}\binom{n}{i}$$

$$\Bigg((b-i\,a+i\,c)\left(b-i\,a+i\,c+2\,(d+i\,f-i\,p)\,\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}\,(h+i+1),$$

$$-\frac{\left(b-i\,a+i\,c+2\,(d+i\,f-i\,p)\,\sqrt{z}\right)^2}{4\,(d+i\,f-i\,p)}\Bigg)+2\,\sqrt{-\frac{\left(b-i\,a+i\,c+2\,(d+i\,f-i\,p)\,\sqrt{z}\right)^2}{d+i\,f-i\,p}}$$

$$(d+i\,f-i\,p)\,\Gamma\!\left(\frac{1}{2}\,(h+i+2),\,-\frac{\left(b-i\,a+i\,c+2\,(d+i\,f-i\,p)\,\sqrt{z}\right)^2}{4\,(d+i\,f-i\,p)}\right)\Bigg)-$$

$$e^{-\frac{(b-i c-i a)^2}{4(d-i f-i p)}+e-i g-i q}\,(d-i f-i p)^{-2n-2}\sum_{i=0}^{n}\sum_{h=0}^{i}(-1)^{i-h}\,4^i\,(b-i c-i a)^{-h-i+2n}\left(b-i c-i a+2(d-i f-i p)\sqrt{z}\right)^{h+i}$$
$$\left(-\frac{\left(b-i c-i a+2(d-i f-i p)\sqrt{z}\right)^2}{d-i f-i p}\right)^{\frac{1}{2}(-h-i-1)}\binom{i}{h}\binom{n}{i}\left((b-i c-i a)\left(b-i c-i a+2(d-i f-i p)\sqrt{z}\right)\right.$$
$$\Gamma\left(\frac{1}{2}(h+i+1),\,-\frac{\left(b-i c-i a+2(d-i f-i p)\sqrt{z}\right)^2}{4(d-i f-i p)}\right)+2\sqrt{-\frac{\left(b-i c-i a+2(d-i f-i p)\sqrt{z}\right)^2}{d-i f-i p}}$$
$$\left.(d-i f-i p)\,\Gamma\left(\frac{1}{2}(h+i+2),\,-\frac{\left(b-i c-i a+2(d-i f-i p)\sqrt{z}\right)^2}{4(d-i f-i p)}\right)\right)\Bigg)\;/;\;n\in\mathbb{N}$$

Involving products of several direct functions, exponential and a power functions

Involving $z^{\alpha-1}\,e^{p z}\,\sin(a z)\sin(b z)\sin(c z)$

01.06.21.1558.01

$$\int z^{\alpha-1}\,e^{p z}\sin(a z)\sin(b z)\sin(c z)\,dz=$$
$$\frac{1}{8}\,i\,z^{\alpha}\left(-\Gamma(\alpha,\,-(i(a-b-c)+p)z)\,(-(i(a-b-c)+p)z)^{-\alpha}+(-(i(a+b-c)+p)z)^{-\alpha}\,\Gamma(\alpha,\,-(i(a+b-c)+p)z)+\right.$$
$$(-(i(a-b+c)+p)z)^{-\alpha}\,\Gamma(\alpha,\,-(i(a-b+c)+p)z)-(-(i(a+b+c)+p)z)^{-\alpha}\,\Gamma(\alpha,\,-(i(a+b+c)+p)z)+$$
$$(i(a-b-c+i p)z)^{-\alpha}\,\Gamma(\alpha,\,i(a-b-c+i p)z)-(i(a+b-c+i p)z)^{-\alpha}\,\Gamma(\alpha,\,i(a+b-c+i p)z)-$$
$$\left.(i(a-b+c+i p)z)^{-\alpha}\,\Gamma(\alpha,\,i(a-b+c+i p)z)+(i(a+b+c+i p)z)^{-\alpha}\,\Gamma(\alpha,\,i(a+b+c+i p)z)\right)$$

Involving $z^{\alpha-1}\,e^{p z}\prod_{k=1}^{n}\sin(a_k z)$

01.06.21.1559.01

$$\int z^{\alpha-1}\,e^{p z}\prod_{k=1}^{n}\sin(a_k z)\,dz=$$
$$(-2)^{-n-1}\,z^{\alpha}\sum_{\substack{k_1=-1\\ \Delta k_1=2}}^{1}\sum_{\substack{k_2=-1\\ \Delta k_2=2}}^{1}\cdots\sum_{\substack{k_n=-1\\ \Delta k_n=2}}^{1}\left(e^{\frac{1}{2}(-(\pi i))\sum_{j=1}^{n}k_j}\,\Gamma\left(\alpha,\left(i\sum_{j=1}^{n}(k_j a_j)-p\right)z\right)\left(\left(i\sum_{j=1}^{n}(k_j a_j)-p\right)z\right)^{-\alpha}+e^{\frac{1}{2}(\pi i)\sum_{j=1}^{n}k_j}\right.$$
$$\left.\Gamma\left(\alpha,\,-\left(i\sum_{j=1}^{n}(k_j a_j)+p\right)z\right)\left(-\left(i\sum_{j=1}^{n}(k_j a_j)+p\right)z\right)^{-\alpha}\right)$$

01.06.21.1560.01

$$\int\frac{1}{z}\,e^{p z}\prod_{k=1}^{n}\sin(a_k z)\,dz=\frac{(-1)^n}{2^{n+1}}\sum_{\substack{k_1=-1\\ \Delta k_1=2}}^{1}\sum_{\substack{k_2=-1\\ \Delta k_2=2}}^{1}\cdots\sum_{\substack{k_n=-1\\ \Delta k_n=2}}^{1}\left(e^{\frac{1}{2}(\pi i)\sum_{j=1}^{n}k_j}\,\mathrm{Ei}\left(\left(p+i\sum_{j=1}^{n}k_j a_j\right)z\right)+e^{\frac{1}{2}(-(\pi i))\sum_{j=1}^{n}k_j}\,\mathrm{Ei}\left(\left(p-i\sum_{j=1}^{n}k_j a_j\right)z\right)\right)$$

Involving products of powers of the direct function, exponential and a power functions

Involving product of power of the direct function, the direct function, exponential and a power functions

Involving $z^{\alpha-1} e^{b z} \sin(c z) \sin^{\nu}(a z)$

01.06.21.1561.01

$$\int z^{\alpha-1} e^{b z} \sin(c z) \sin^{\nu}(a z)\, dz = -2^{-1-\nu} i z^{\alpha} \Bigg(i^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \Big(-\Gamma(\alpha, -(b + i (c - 2 a k + a \nu)) z) (-(b + i (c - 2 a k + a \nu)) z)^{-\alpha} + (-1)^{\nu} (-(b - i (c - 2 a k + a \nu)) z)^{-\alpha} \Gamma(\alpha, -(b - i (c - 2 a k + a \nu)) z) - (-1)^{\nu} (-(b + i (c + 2 a k - a \nu)) z)^{-\alpha} \Gamma(\alpha, -(b + i (c + 2 a k - a \nu)) z) + (-(b - i (c + 2 a k - a \nu)) z)^{-\alpha} \Gamma(\alpha, -(b - i (c + 2 a k - a \nu)) z) \Big) + \binom{\nu}{\frac{\nu}{2}} \Big((-(b - i c) z)^{-\alpha} \Gamma(\alpha, i c z - b z) - (-(b + i c) z)^{-\alpha} \Gamma(\alpha, -(b + i c) z) \Big) (1 - \nu \bmod 2) \Bigg) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1562.01

$$\int z^{n} e^{b z} \sin(c z) \sin^{\nu}(a z)\, dz = -\frac{i}{2} \left(1 - e^{2 i a z}\right)^{-\nu} n! \sin^{\nu}(a z) \Bigg(e^{(b + i c) z} \sum_{p=0}^{n} \frac{(-1)^p z^{n-p} (b + i c - i a \nu)^{-p-1}}{(n-p)!} {}_{p+2}F_{p+1}\left(\frac{-i b + c - a \nu}{2 a}, \ldots, \frac{-i b + c - a \nu}{2 a}, -\nu; 1 + \frac{-i b + c - a \nu}{2 a}, \ldots, 1 + \frac{-i b + c - a \nu}{2 a}; e^{2 i a z} \right) - e^{(b - i c) z} \sum_{p=0}^{n} \frac{(-1)^p z^{n-p} (b - i c - i a \nu)^{-p-1}}{(n-p)!} {}_{p+2}F_{p+1}\left(-\frac{i b + c + a \nu}{2 a}, \ldots, -\frac{i b + c + a \nu}{2 a}, -\nu; 1 - \frac{i b + c + a \nu}{2 a}, \ldots, 1 - \frac{i b + c + a \nu}{2 a}; e^{2 i a z} \right) \Bigg) /;\ n \in \mathbb{N}$$

Involving $z^{n} e^{b z} \sin(c z + d) \sin^{\nu}(a z)$

01.06.21.1563.01

$$\int z^{\alpha-1} e^{b z} \sin(d + c z) \sin^{\nu}(a z)\, dz = -2^{-\nu-1} i z^{\alpha} \Bigg(e^{-i d} \binom{\nu}{\frac{\nu}{2}} \Big((i (c + i b) z)^{-\alpha} \Gamma(\alpha, i c z - b z) - e^{2 i d} ((-b - i c) z)^{-\alpha} \Gamma(\alpha, -b z - i c z) \Big) (1 - \nu \bmod 2) + i^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{-i d} \binom{\nu}{k} \Big(e^{i \pi \nu} \Gamma(\alpha, i (c + i b - 2 a k + a \nu) z) (i (c + i b - 2 a k + a \nu) z)^{-\alpha} - e^{2 i d} (-i (c - i b - 2 a k + a \nu) z)^{-\alpha} \Gamma(\alpha, -i (c - i b - 2 a k + a \nu) z) + (i (c + i b + 2 a k - a \nu) z)^{-\alpha} \Gamma(\alpha, i (c + i b + 2 a k - a \nu) z) - e^{i (2 d + \pi \nu)} (-i (c - i b + 2 a k - a \nu) z)^{-\alpha} \Gamma(\alpha, -i (c - i b + 2 a k - a \nu) z) \Big) \Bigg) /;\ \nu \in \mathbb{N}^+$$

01.06.21.1564.01

$$\int z^n e^{bz} \sin(cz+d)\sin^\nu(az)\,dz = -i\frac{1}{2}n!\sin^\nu(az)\left(1-e^{2iaz}\right)^{-\nu}\left(e^{id+(b+ic)z}\sum_{p=0}^{n}\frac{((-1)^p z^{n-p})}{(n-p)!\,(b+ic-ia\nu)^{p+1}}\,{}_{p+2}F_{p+1}\left(\frac{-ib+c-a\nu}{2a},\ldots,\frac{-ib+c-a\nu}{2a},-\nu;\frac{-ib+c-a\nu}{2a}+1,\ldots,\frac{-ib+c-a\nu}{2a}+1;e^{2iaz}\right)-e^{-id+(b-ic)z}\sum_{p=0}^{n}\frac{((-1)^p z^{n-p})}{(n-p)!\,(b-ic-ia\nu)^{p+1}}\,{}_{p+2}F_{p+1}\left(-\frac{ib+c+a\nu}{2a},\ldots,-\frac{ib+c+a\nu}{2a},-\nu;1-\frac{ib+c+a\nu}{2a},\ldots,1-\frac{ib+c+a\nu}{2a};e^{2iaz}\right)\right)\;/;\;n\in\mathbb{N}$$

Involving $z^{\alpha-1}e^{pz}\sin(cz)\sin^\nu(az+b)$

01.06.21.1565.01

$$\int z^{\alpha-1}e^{pz}\sin(cz)\sin^\nu(b+az)\,dz = -2^{-\nu-1}iz^\alpha\left(\binom{\nu}{\frac{\nu}{2}}\left(((i(c+ip)z)^{-\alpha}\Gamma(\alpha,icz-pz)-((-ic-p)z)^{-\alpha}\Gamma(\alpha,-icz-pz)\right)(1-\nu\bmod 2)+i^{-\nu}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k e^{-ib(2k+\nu)}\binom{\nu}{k}\left(e^{i(4bk+\pi\nu)}\Gamma(\alpha,i(c-2ak+ip+a\nu)z)(i(c-2ak+ip+a\nu)z)^{-\alpha}-e^{2ib\nu}(-i(c-2ak-ip+a\nu)z)^{-\alpha}\Gamma(\alpha,-i(c-2ak-ip+a\nu)z)+e^{2ib\nu}(i(c+2ak+ip-a\nu)z)^{-\alpha}\Gamma(\alpha,i(c+2ak+ip-a\nu)z)-e^{i(4bk+\pi\nu)}(-i(c+2ak-ip-a\nu)z)^{-\alpha}\Gamma(\alpha,-i(c+2ak-ip-a\nu)z)\right)\right)\;/;\;\nu\in\mathbb{N}^+$$

01.06.21.1566.01

$$\int z^n e^{pz}\sin(cz)\sin^\nu(b+az)\,dz = \frac{1}{2}i\left(1-e^{2i(b+az)}\right)^{-\nu}n!\sin^\nu(b+az)\left(e^{(-ic+p)z}\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(-ic+p-ia\nu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\left(-\frac{c+ip+a\nu}{2a},\ldots,-\frac{c+ip+a\nu}{2a},-\nu;1-\frac{c+ip+a\nu}{2a},\ldots,1-\frac{c+ip+a\nu}{2a};e^{2i(b+az)}\right)-e^{(ic+p)z}\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(ic+p-ia\nu)^{-j-1}}{(n-j)!}\,{}_{j+2}F_{j+1}\left(-\frac{-c+ip+a\nu}{2a},\ldots,-\frac{-c+ip+a\nu}{2a},-\nu;1-\frac{-c+ip+a\nu}{2a},\ldots,1-\frac{-c+ip+a\nu}{2a};e^{2i(b+az)}\right)\right)\;/;\;n\in\mathbb{N}$$

Involving $z^{\alpha-1}e^{pz}\sin(cz+d)\sin^\nu(az+b)$

01.06.21.1567.01

$$\int z^{\alpha-1} e^{p z} \sin(d + c z) \sin^{\nu}(b + a z) \, dz = -2^{-\nu-1} i z^{\alpha} \left(e^{-i d} \binom{\nu}{\frac{\nu}{2}} \left((i (c + i p) z)^{-\alpha} \Gamma(\alpha, i c z - p z) - e^{2 i d} ((-i c - p) z)^{-\alpha} \Gamma(\alpha, -i c z - p z) \right) (1 - \nu \bmod 2) + i^{-\nu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k e^{-i (d + b (2 k + \nu))} \binom{\nu}{k} \left(e^{i (4 b k + \pi \nu)} \Gamma(\alpha, i (c - 2 a k + i p + a \nu) z) (i (c - 2 a k + i p + a \nu) z)^{-\alpha} - e^{2 i (d + b \nu)} (-i (c - 2 a k - i p + a \nu) z)^{-\alpha} \Gamma(\alpha, -i (c - 2 a k - i p + a \nu) z) + e^{2 i b \nu} (i (c + 2 a k + i p - a \nu) z)^{-\alpha} \Gamma(\alpha, i (c + 2 a k + i p - a \nu) z) - e^{i (2 d + 4 b k + \pi \nu)} (-i (c + 2 a k - i p - a \nu) z)^{-\alpha} \Gamma(\alpha, -i (c + 2 a k - i p - a \nu) z) \right) \right) /; \nu \in \mathbb{N}^+$$

01.06.21.1568.01

$$\int z^n e^{p z} \sin(d + c z) \sin^{\nu}(b + a z) \, dz = \frac{1}{2} i \left(1 - e^{2 i (b + a z)}\right)^{-\nu} n! \sin^{\nu}(b + a z) \left(e^{-i d + (-i c + p) z} \sum_{j=0}^{n} \frac{(-1)^j z^{n-j} (-i c + p - i a \nu)^{-j-1}}{(n-j)!} \, {}_{j+2}F_{j+1}\left(-\frac{c + i p + a \nu}{2 a}, \ldots, -\frac{c + i p + a \nu}{2 a}, -\nu; 1 - \frac{c + i p + a \nu}{2 a}, \ldots, 1 - \frac{c + i p + a \nu}{2 a}; e^{2 i (b + a z)} \right) - e^{i d + (i c + p) z} \sum_{j=0}^{n} \frac{(-1)^j z^{n-j} (i c + p - i a \nu)^{-j-1}}{(n-j)!} \, {}_{j+2}F_{j+1}\left(-\frac{-c + i p + a \nu}{2 a}, \ldots, -\frac{-c + i p + a \nu}{2 a}, -\nu; 1 - \frac{-c + i p + a \nu}{2 a}, \ldots, 1 - \frac{-c + i p + a \nu}{2 a}; e^{2 i (b + a z)} \right) \right) /; n \in \mathbb{N}$$

Involving $z^n e^{p z^r} \sin(b z) \sin^{\nu}(c z)$

01.06.21.1569.01

$$\int z^n e^{p z^2} \sin(b z) \sin^\nu(c z) \, dz = i\, 2^{-\nu-2} p^{-n-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(e^{\frac{b^2}{4p}} \sum_{j=0}^{n} 2^{j-n} (-i b)^{n-j} (i b + 2 p z)^{j+1} \left(-\frac{(i b + 2 p z)^2}{p}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i b + 2 p z)^2}{4p}\right) - e^{\frac{b^2}{4p}} \sum_{j=0}^{n} 2^{j-n} (i b)^{n-j} (-i b + 2 p z)^{j+1} \left(-\frac{(-i b + 2 p z)^2}{p}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i b + 2 p z)^2}{4p}\right)\right) + i^{-\nu-1} 2^{-\nu-2} p^{-n-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{-\frac{(-i b + i c (2s-\nu))^2}{4p}} \sum_{j=0}^{n} 2^{j-n} (i b - i c (2s - \nu))^{n-j} (-i b + i c (2s - \nu) + 2 p z)^{j+1} \left(-\frac{(-i b + i c (2s - \nu) + 2 p z)^2}{p}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i b + i c (2s - \nu) + 2 p z)^2}{4p}\right) - (-1)^\nu e^{-\frac{(i b + i c (2s-\nu))^2}{4p}} \sum_{j=0}^{n} 2^{j-n} (-i b - i c (2s - \nu))^{n-j} (i b + i c (2s - \nu) + 2 p z)^{j+1} \left(-\frac{(i b + i c (2s - \nu) + 2 p z)^2}{p}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i b + i c (2s - \nu) + 2 p z)^2}{4p}\right) + e^{-\frac{(-i b + i c (\nu-2s))^2}{4p}} \sum_{j=0}^{n} 2^{j-n} (i b - i c (\nu - 2s))^{n-j} (-i b + i c (\nu - 2s) + 2 p z)^{j+1} \left(-\frac{(-i b + i c (\nu - 2s) + 2 p z)^2}{p}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i b + i c (\nu - 2s) + 2 p z)^2}{4p}\right) - e^{-\frac{(i b + i c (\nu-2s))^2}{4p}} \sum_{j=0}^{n} 2^{j-n} (-i b - i c (\nu - 2s))^{n-j} (i b + i c (\nu - 2s) + 2 p z)^{j+1} \left(-\frac{(i b + i c (\nu - 2s) + 2 p z)^2}{p}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i b + i c (\nu - 2s) + 2 p z)^2}{4p}\right)\right) /; n \in \mathbb{N} \bigwedge \nu \in \mathbb{N}^+$$

01.06.21.1570.01

$$\int z^n e^{p \sqrt{z}} \sin(b z) \sin^\nu(c z) \, dz = i\, 2^{-2n-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left((-i b)^{-2n-2} e^{-\frac{i p^2}{4b}} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j p^{-h-j+2n} \left(p - 2 i b \sqrt{z}\right)^{h+j} \left(-\frac{i \left(p - 2 i b \sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(p \left(p - 2 i b \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h + j + 1), -\frac{i \left(p - 2 i b \sqrt{z}\right)^2}{4b}\right) - \right.\right.$$

$$2\,i\,b\sqrt{-\frac{i\left(p-2\,i\,b\sqrt{z}\right)^2}{b}}\;\Gamma\left(\frac{1}{2}(h+j+2),-\frac{i\left(p-2\,i\,b\sqrt{z}\right)^2}{4\,b}\right)\Bigg)-$$

$$(i\,b)^{-2n-2}\,e^{\frac{i\,p^2}{4\,b}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2n}\left(p+2\,i\,b\sqrt{z}\right)^{h+j}\left(\frac{i\left(p+2\,i\,b\sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(p\left(p+2\,i\,b\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1),\frac{i\left(p+2\,i\,b\sqrt{z}\right)^2}{4\,b}\right)+2\sqrt{\frac{i\left(p+2\,i\,b\sqrt{z}\right)^2}{b}}\;b\,i\,\Gamma\left(\frac{1}{2}(h+j+2),\frac{i\left(p+2\,i\,b\sqrt{z}\right)^2}{4\,b}\right)\Bigg)\Bigg)\Bigg)+$$

$$2^{-2n-\nu-2}\,i^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\Bigg((-1)^{\nu+1}\,e^{-\frac{p^2}{4(-i\,b+i\,c\,(2s-\nu))}}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2n}\left(p+2\,(-i\,b+i\,c\,(2s-\nu))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(p+2\,(-i\,b+i\,c\,(2s-\nu))\sqrt{z}\right)^2}{-i\,b+i\,c\,(2s-\nu)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(p\left(p+2\,(-i\,b+i\,c\,(2s-\nu))\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1),-\frac{\left(p+2\,(-i\,b+i\,c\,(2s-\nu))\sqrt{z}\right)^2}{4\,(-i\,b+i\,c\,(2s-\nu))}\right)+2\sqrt{-\frac{\left(p+2\,(-i\,b+i\,c\,(2s-\nu))\sqrt{z}\right)^2}{-i\,b+i\,c\,(2s-\nu)}}$$

$$(-i\,b+i\,c\,(2s-\nu))\,\Gamma\left(\frac{1}{2}(h+j+2),-\frac{\left(p+2\,(-i\,b+i\,c\,(2s-\nu))\sqrt{z}\right)^2}{4\,(-i\,b+i\,c\,(2s-\nu))}\right)\Bigg)\Bigg)$$

$$(-i\,b+i\,c\,(2s-\nu))^{-2n-2}+(-1)^{\nu}\,e^{-\frac{p^2}{4(i\,b+i\,c\,(2s-\nu))}}\,(i\,b+i\,c\,(2s-\nu))^{-2n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2n}\left(p+2\,(i\,b+i\,c\,(2s-\nu))\sqrt{z}\right)^{h+j}\left(-\frac{\left(p+2\,(i\,b+i\,c\,(2s-\nu))\sqrt{z}\right)^2}{i\,b+i\,c\,(2s-\nu)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg(p\left(p+2\,(i\,b+i\,c\,(2s-\nu))\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),-\frac{\left(p+2\,(i\,b+i\,c\,(2s-\nu))\sqrt{z}\right)^2}{4\,(i\,b+i\,c\,(2s-\nu))}\right)+$$

$$2\sqrt{-\frac{\left(p+2\,(i\,b+i\,c\,(2\,s-v))\,\sqrt{z}\right)^2}{i\,b+i\,c\,(2\,s-v)}}\;(i\,b+i\,c\,(2\,s-v))\,\Gamma\Bigg(\frac{1}{2}\,(h+j+2),\,-\frac{\left(p+2\,(i\,b+i\,c\,(2\,s-v))\,\sqrt{z}\right)^2}{4\,(i\,b+i\,c\,(2\,s-v))}\Bigg)\Bigg)\Bigg)-$$

$$e^{-\frac{p^2}{4\,(-i\,b+i\,c\,(v-2\,s))}}\,(-i\,b+i\,c\,(v-2\,s))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2\,n}\left(p+2\,(-i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(p+2\,(-i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)^2}{-i\,b+i\,c\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(p\left(p+2\,(-i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}\,(h+j+1),\,-\frac{\left(p+2\,(-i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(-i\,b+i\,c\,(v-2\,s))}\Bigg)+2\sqrt{-\frac{\left(p+2\,(-i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)^2}{-i\,b+i\,c\,(v-2\,s)}}$$

$$(-i\,b+i\,c\,(v-2\,s))\,\Gamma\Bigg(\frac{1}{2}\,(h+j+2),\,-\frac{\left(p+2\,(-i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(-i\,b+i\,c\,(v-2\,s))}\Bigg)\Bigg)+$$

$$e^{-\frac{p^2}{4\,(i\,b+i\,c\,(v-2\,s))}}\,(i\,b+i\,c\,(v-2\,s))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2\,n}\left(p+2\,(i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(p+2\,(i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)^2}{i\,b+i\,c\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(p\left(p+2\,(i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}\,(h+j+1),\,-\frac{\left(p+2\,(i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(i\,b+i\,c\,(v-2\,s))}\Bigg)+2\sqrt{-\frac{\left(p+2\,(i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)^2}{i\,b+i\,c\,(v-2\,s)}}$$

$$(i\,b+i\,c\,(v-2\,s))\,\Gamma\Bigg(\frac{1}{2}\,(h+j+2),\,-\frac{\left(p+2\,(i\,b+i\,c\,(v-2\,s))\,\sqrt{z}\right)^2}{4\,(i\,b+i\,c\,(v-2\,s))}\Bigg)\Bigg)\Bigg)\;/;\;n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n\,e^{p\,z}\,\sin\left(b\,z^r\right)\sin^v(c\,z)$

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$$\int z^n e^{pz}\sin(bz^2)\sin^\nu(cz)\,dz = i\,2^{-\nu-2}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)$$
$$\left((i b)^{-n-1} e^{\frac{i p^2}{4b}}\sum_{j=0}^{n}2^{j-n}(-p)^{n-j}(p+2 i b z)^{j+1}\left(\frac{i(p+2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i(p+2 i b z)^2}{4b}\right)-\right.$$
$$\left.(-i b)^{-n-1} e^{-\frac{i p^2}{4b}}\sum_{j=0}^{n}2^{j-n}(-p)^{n-j}(p-2 i b z)^{j+1}\left(-\frac{i(p-2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i(p-2 i b z)^2}{4b}\right)\right)-$$
$$2^{-\nu-2} i^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^{\nu-1} e^{-\frac{i(p+c i(2s-\nu))^2}{4b}}(-i b)^{-n-1}\sum_{j=0}^{n}2^{j-n}(-p-i c(2s-\nu))^{n-j}(p+c i(2s-\nu)-2 i b z)^{j+1}\right.$$
$$\left(-\frac{i(p+c i(2s-\nu)-2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i(p+c i(2s-\nu)-2 i b z)^2}{4b}\right)-$$
$$e^{-\frac{i(p+c i(\nu-2s))^2}{4b}}(-i b)^{-n-1}\sum_{j=0}^{n}2^{j-n}(-p-i c(\nu-2s))^{n-j}(p+c i(\nu-2s)-2 i b z)^{j+1}$$
$$\left(-\frac{i(p+c i(\nu-2s)-2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},-\frac{i(p+c i(\nu-2s)-2 i b z)^2}{4b}\right)+$$
$$(-1)^\nu (i b)^{-n-1} e^{\frac{i(p+c i(2s-\nu))^2}{4b}}\sum_{j=0}^{n}2^{j-n}(-p-i c(2s-\nu))^{n-j}(p+c i(2s-\nu)+2 i b z)^{j+1}$$
$$\left(\frac{i(p+c i(2s-\nu)+2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i(p+c i(2s-\nu)+2 i b z)^2}{4b}\right)+$$
$$(i b)^{-n-1} e^{\frac{i(p+c i(\nu-2s))^2}{4b}}\sum_{j=0}^{n}2^{j-n}(-p-i c(\nu-2s))^{n-j}(p+c i(\nu-2s)+2 i b z)^{j+1}$$
$$\left.\left(\frac{i(p+c i(\nu-2s)+2 i b z)^2}{b}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2},\frac{i(p+c i(\nu-2s)+2 i b z)^2}{4b}\right)\right)\;/;\; n\in\mathbb{N}\land \nu\in\mathbb{N}^+$$

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$$\int z^n e^{pz}\sin\left(b\sqrt{z}\right)\sin^\nu(cz)\,dz = i^{-\nu-1}\,2^{-2n-\nu-2}\,e^{\frac{b^2}{4p}+\frac{i\pi\nu}{2}}\,p^{-2n-2}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)$$
$$\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j (i b)^{-h-j+2n}\left(i b+2p\sqrt{z}\right)^{h+j}\left(-\frac{\left(i b+2p\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(b\, i\left(i b+2p\sqrt{z}\right)\right.\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(i b+2 p \sqrt{z}\right)^2}{4 p}\right)+2 \sqrt{-\frac{\left(i b+2 p \sqrt{z}\right)^2}{p}}\; p\, \Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(i b+2 p \sqrt{z}\right)^2}{4 p}\right)\Bigg)\Bigg)-$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h} 4^j (-i b)^{-h-j+2 n}\left(-i b+2 p \sqrt{z}\right)^{h+j}\left(-\frac{\left(-i b+2 p \sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left(2 p \sqrt{-\frac{\left(-i b+2 p \sqrt{z}\right)^2}{p}}\; \Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(-i b+2 p \sqrt{z}\right)^2}{4 p}\right)-\right.$$

$$\left. i b\left(-i b+2 p \sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(-i b+2 p \sqrt{z}\right)^2}{4 p}\right)\right)\Bigg)\Bigg)+$$

$$2^{-2 n-\nu-2}\, i^{-\nu-1}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^{\nu+1} e^{\frac{b^2}{4(p+c\, i\,(2 s-\nu))}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h} 4^j (-i b)^{-h-j+2 n}\left(-i b+2(p+c\, i\,(2 s-\nu))\sqrt{z}\right)^{h+j}\right.\right.$$

$$\left(-\frac{\left(-i b+2(p+c\, i\,(2 s-\nu))\sqrt{z}\right)^2}{p+c\, i\,(2 s-\nu)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(2(p+c\, i\,(2 s-\nu))$$

$$\sqrt{-\frac{\left(-i b+2(p+c\, i\,(2 s-\nu))\sqrt{z}\right)^2}{p+c\, i\,(2 s-\nu)}}\; \Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(-i b+2(p+c\, i\,(2 s-\nu))\sqrt{z}\right)^2}{4(p+c\, i\,(2 s-\nu))}\right)-i$$

$$b\left(-i b+2(p+c\, i\,(2 s-\nu))\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(-i b+2(p+c\, i\,(2 s-\nu))\sqrt{z}\right)^2}{4(p+c\, i\,(2 s-\nu))}\right)\Bigg)\Bigg)$$

$$(p+c\, i\,(2 s-\nu))^{-2 n-2}+(-1)^{\nu} e^{\frac{b^2}{4(p+c\, i\,(2 s-\nu))}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h} 4^j (i b)^{-h-j+2 n}\left(i b+2(p+c\, i\,(2 s-\nu))\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{\left(i b+2(p+c\, i\,(2 s-\nu))\sqrt{z}\right)^2}{p+c\, i\,(2 s-\nu)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(b\, i\left(i b+2(p+c\, i\,(2 s-\nu))\sqrt{z}\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(i\,b+2\,(p+c\,i\,(2\,s-v))\sqrt{z}\right)^2}{4\,(p+c\,i\,(2\,s-v))}\right)+2\sqrt{-\frac{\left(i\,b+2\,(p+c\,i\,(2\,s-v))\sqrt{z}\right)^2}{p+c\,i\,(2\,s-v)}}$$

$$(p+c\,i\,(2\,s-v))\,\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(i\,b+2\,(p+c\,i\,(2\,s-v))\sqrt{z}\right)^2}{4\,(p+c\,i\,(2\,s-v))}\right)\Bigg)\Bigg)\,(p+c\,i\,(2\,s-v))^{-2\,n-2}-$$

$$e^{\frac{b^2}{4\,(p+c\,i\,(v-2\,s))}}\,(p+c\,i\,(v-2\,s))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b)^{-h-j+2\,n}\left(-i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(-i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)^2}{p+c\,i\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(2\,(p+c\,i\,(v-2\,s))$$

$$\sqrt{-\frac{\left(-i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)^2}{p+c\,i\,(v-2\,s)}}\;\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(-i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)^2}{4\,(p+c\,i\,(v-2\,s))}\right)-$$

$$i\,b\left(-i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(-i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)^2}{4\,(p+c\,i\,(v-2\,s))}\right)\Bigg)\Bigg)+$$

$$e^{\frac{b^2}{4\,(p+c\,i\,(v-2\,s))}}\,(p+c\,i\,(v-2\,s))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}\left(i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)^2}{p+c\,i\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(b\,i\left(i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1), -\frac{\left(i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)^2}{4\,(p+c\,i\,(v-2\,s))}\Bigg)+2\sqrt{-\frac{\left(i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)^2}{p+c\,i\,(v-2\,s)}}$$

$$(p+c\,i\,(v-2\,s))\,\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(i\,b+2\,(p+c\,i\,(v-2\,s))\sqrt{z}\right)^2}{4\,(p+c\,i\,(v-2\,s))}\right)\Bigg)\Bigg)\;/;\;n\in\mathbb{N}\land v\in\mathbb{N}^+$$

Involving $z^n\, e^{p\,z}\,\sin(b\,z)\,\sin^v\left(c\,z^r\right)$

01.06.21.1573.01

$$\int z^n e^{p z} \sin(b z) \sin^\nu\left(c z^2\right) dz = i\, 2^{-\nu-1} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \left(((-i b - p) z)^{-n-1} \Gamma(n+1, (-i b - p) z) - ((i b - p) z)^{-n-1} \Gamma(n+1, (i b - p) z)\right) (1 - \nu \bmod 2) - 2^{-\nu-2} i^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu+1} e^{\frac{i(-i b+p)^2}{4 c (2 s-\nu)}} \left(\sum_{j=0}^n 2^{j-n} (i b - p)^{n-j} (-i b + p + 2 i c (2 s - \nu) z)^{j+1} \left(\frac{i(-i b + p + 2 i c (2 s - \nu) z)^2}{c (2 s - \nu)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(-i b + p + 2 i c (2 s - \nu) z)^2}{4 c (2 s - \nu)}\right)\right) (i c (2 s - \nu))^{-n-1} + (-1)^\nu e^{\frac{i(i b+p)^2}{4 c (2 s-\nu)}} \left(\sum_{j=0}^n 2^{j-n} (-i b - p)^{n-j} (i b + p + 2 i c (2 s - \nu) z)^{j+1} \left(\frac{i(i b + p + 2 i c (2 s - \nu) z)^2}{c (2 s - \nu)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(i b + p + 2 i c (2 s - \nu) z)^2}{4 c (2 s - \nu)}\right)\right) (i c (2 s - \nu))^{-n-1} - e^{\frac{i(-i b+p)^2}{4 c (\nu-2 s)}} (i c (\nu - 2 s))^{-n-1} \sum_{j=0}^n 2^{j-n} (i b - p)^{n-j} (-i b + p + 2 i c (\nu - 2 s) z)^{j+1} \left(\frac{i(-i b + p + 2 i c (\nu - 2 s) z)^2}{c (\nu - 2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(-i b + p + 2 i c (\nu - 2 s) z)^2}{4 c (\nu - 2 s)}\right) + e^{\frac{i(i b+p)^2}{4 c (\nu-2 s)}} (i c (\nu - 2 s))^{-n-1} \sum_{j=0}^n 2^{j-n} (-i b - p)^{n-j} (i b + p + 2 i c (\nu - 2 s) z)^{j+1} \left(\frac{i(i b + p + 2 i c (\nu - 2 s) z)^2}{c (\nu - 2 s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i(i b + p + 2 i c (\nu - 2 s) z)^2}{4 c (\nu - 2 s)}\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

01.06.21.1574.01

$$\int z^n e^{p z} \sin(b z) \sin^\nu\left(c \sqrt{z}\right) dz = -2^{-\nu-1} i \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left((-(-i b + p))^{-n-1} \Gamma(n+1, -(-i b + p) z) - (-(i b + p))^{-n-1} \Gamma(n+1, -(i b + p) z)\right) + i^{-\nu-1} 2^{-2n-\nu-2} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu+1} e^{\frac{c^2 (2 s-\nu)^2}{4(-i b+p)}} \left(\sum_{j=0}^n \sum_{h=0}^j (-1)^{j-h} 4^j (i c (2 s - \nu))^{-h-j+2n} \left(2 \sqrt{z} (-i b + p) + c\, i (2 s - \nu)\right)^{h+j} \left(-\frac{\left(2 \sqrt{z} (-i b + p) + c\, i (2 s - \nu)\right)^2}{-i b + p}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(c\, i (2 s - \nu) \left(2 \sqrt{z} (-i b + p) + c\, i (2 s - \nu)\right)\right.\right.\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(2\sqrt{z}\,(-i b+p)+c\, i\,(2 s-v)\right)^2}{4(-i b+p)}\right)+2\sqrt{-\frac{\left(2\sqrt{z}\,(-i b+p)+c\, i\,(2 s-v)\right)^2}{-i b+p}}$$

$$(-i b+p)\,\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(2\sqrt{z}\,(-i b+p)+c\, i\,(2 s-v)\right)^2}{4(-i b+p)}\right)\Bigg)\Bigg)\Bigg)(-i b+p)^{-2n-2} -$$

$$e^{\frac{c^2 (v-2 s)^2}{4(-i b+p)}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(i\, c\,(v-2 s))^{-h-j+2n}\left(2\sqrt{z}\,(-i b+p)+c\, i\,(v-2 s)\right)^{h+j}\right.$$

$$\left(-\frac{\left(2\sqrt{z}\,(-i b+p)+c\, i\,(v-2 s)\right)^2}{-i b+p}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(c\, i\,(v-2 s)\left(2\sqrt{z}\,(-i b+p)+c\, i\,(v-2 s)\right)$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(2\sqrt{z}\,(-i b+p)+c\, i\,(v-2 s)\right)^2}{4(-i b+p)}\right)+2\sqrt{-\frac{\left(2\sqrt{z}\,(-i b+p)+c\, i\,(v-2 s)\right)^2}{-i b+p}}$$

$$(-i b+p)\,\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(2\sqrt{z}\,(-i b+p)+c\, i\,(v-2 s)\right)^2}{4(-i b+p)}\right)\Bigg)\Bigg)\Bigg)(-i b+p)^{-2n-2} +$$

$$(-1)^v\, e^{\frac{c^2 (2 s-v)^2}{4(i b+p)}}\,(i b+p)^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(i\, c\,(2 s-v))^{-h-j+2n}\left(2\sqrt{z}\,(i b+p)+c\, i\,(2 s-v)\right)^{h+j}$$

$$\left(-\frac{\left(2\sqrt{z}\,(i b+p)+c\, i\,(2 s-v)\right)^2}{i b+p}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg(c\, i\,(2 s-v)\left(2\sqrt{z}\,(i b+p)+c\, i\,(2 s-v)\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{\left(2\sqrt{z}\,(i b+p)+c\, i\,(2 s-v)\right)^2}{4(i b+p)}\right)+$$

$$2\sqrt{-\frac{\left(2\sqrt{z}\,(i b+p)+c\, i\,(2 s-v)\right)^2}{i b+p}}\,(i b+p)\,\Gamma\left(\frac{1}{2}(h+j+2), -\frac{\left(2\sqrt{z}\,(i b+p)+c\, i\,(2 s-v)\right)^2}{4(i b+p)}\right)\Bigg)+$$

$$e^{\frac{c^2 (v-2 s)^2}{4(i b+p)}}\,(i b+p)^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(i\, c\,(v-2 s))^{-h-j+2n}\left(2\sqrt{z}\,(i b+p)+c\, i\,(v-2 s)\right)^{h+j}$$

$$\left(-\frac{\left(2\sqrt{z}\,(i\,b+p)+c\,i\,(v-2\,s)\right)^2}{i\,b+p}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}\Bigg(c\,i\,(v-2\,s)\left(2\sqrt{z}\,(i\,b+p)+c\,i\,(v-2\,s)\right)\Gamma\Bigg($$

$$\frac{1}{2}(h+j+1),\, -\frac{\left(2\sqrt{z}\,(i\,b+p)+c\,i\,(v-2\,s)\right)^2}{4\,(i\,b+p)}\Bigg) + 2\sqrt{-\frac{\left(2\sqrt{z}\,(i\,b+p)+c\,i\,(v-2\,s)\right)^2}{i\,b+p}}$$

$$(i\,b+p)\,\Gamma\left(\frac{1}{2}(h+j+2),\, -\frac{\left(2\sqrt{z}\,(i\,b+p)+c\,i\,(v-2\,s)\right)^2}{4\,(i\,b+p)}\right)\Bigg)\Bigg) \;/;\; n\in\mathbb{N}\bigwedge v\in\mathbb{N}^+$$

Involving $z^n\, e^{p\,z} \sin(b\,z^r) \sin^v(c\,z^r)$

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$$\int z^n e^{p z} \sin\left(b z^2\right) \sin^{\nu}\left(c z^2\right) dz = i\, 2^{-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left((i b)^{-n-1} e^{\frac{i p^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2 i b z)^{j+1} \left(\frac{i (p + 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (p + 2 i b z)^2}{4 b} \right) - (-i b)^{-n-1} e^{-\frac{i p^2}{4 b}} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p - 2 i b z)^{j+1} \left(-\frac{i (p - 2 i b z)^2}{b} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (p - 2 i b z)^2}{4 b} \right) \right) - 2^{-\nu-2} i^{-\nu-1} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^{\nu+1} e^{-\frac{p^2}{4(-i b + i c (2 s - \nu))}} \left(\sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2 (-i b + i c (2 s - \nu)) z)^{j+1} \left(-\frac{(p + 2 (-i b + i c (2 s - \nu)) z)^2}{-i b + i c (2 s - \nu)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2 (-i b + i c (2 s - \nu)) z)^2}{4 (-i b + i c (2 s - \nu))} \right) \right) (-i b + i c (2 s - \nu))^{-n-1} + (-1)^{\nu} e^{-\frac{p^2}{4 (i b + i c (2 s - \nu))}} (i b + i c (2 s - \nu))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2 (i b + i c (2 s - \nu)) z)^{j+1} \left(-\frac{(p + 2 (i b + i c (2 s - \nu)) z)^2}{i b + i c (2 s - \nu)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2 (i b + i c (2 s - \nu)) z)^2}{4 (i b + i c (2 s - \nu))} \right) - e^{-\frac{p^2}{4(-i b + i c (\nu - 2 s))}} (-i b + i c (\nu - 2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2 (-i b + i c (\nu - 2 s)) z)^{j+1} \left(-\frac{(p + 2 (-i b + i c (\nu - 2 s)) z)^2}{-i b + i c (\nu - 2 s)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2 (-i b + i c (\nu - 2 s)) z)^2}{4 (-i b + i c (\nu - 2 s))} \right) + e^{-\frac{p^2}{4 (i b + i c (\nu - 2 s))}} (i b + i c (\nu - 2 s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2 (i b + i c (\nu - 2 s)) z)^{j+1} \left(-\frac{(p + 2 (i b + i c (\nu - 2 s)) z)^2}{i b + i c (\nu - 2 s)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2 (i b + i c (\nu - 2 s)) z)^2}{4 (i b + i c (\nu - 2 s))} \right) \right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

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$$\int z^n e^{p z} \sin\left(b \sqrt{z}\right) \sin^{\nu}\left(c \sqrt{z}\right) dz = i\, 2^{-2 n-\nu-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(e^{\frac{b^2}{4 p}} p^{-2 n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b)^{-h-j+2 n} \left(-i b + 2 p \sqrt{z}\right)^{h+j} \left(-\frac{\left(-i b + 2 p \sqrt{z}\right)^2}{p} \right)^{\frac{1}{2}(-h-j-1)} \right.$$

$$\binom{j}{h}\binom{n}{j}\left(2\,p\,\sqrt{-\frac{\left(-i\,b+2\,p\,\sqrt{z}\right)^2}{p}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{\left(-i\,b+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)-\right.$$

$$\left.\left.i\,b\left(-i\,b+2\,p\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{\left(-i\,b+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)\right)\right)-$$

$$e^{\frac{b^2}{4\,p}}\,p^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b)^{-h-j+2\,n}\left(i\,b+2\,p\,\sqrt{z}\right)^{h+j}\left(-\frac{\left(i\,b+2\,p\,\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(b\,i\left(i\,b+2\,p\,\sqrt{z}\right)\right.$$

$$\left.\left.\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{\left(i\,b+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)+2\,\sqrt{-\frac{\left(i\,b+2\,p\,\sqrt{z}\right)^2}{p}}\;p\,\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{\left(i\,b+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)\right)\right)+$$

$$i^{-\nu-1}\,2^{-2\,n-\nu-2}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^{\nu+1}\,e^{-\frac{(-i\,b+i\,c\,(2\,s-\nu))^2}{4\,p}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b+i\,c\,(2\,s-\nu))^{-h-j+2\,n}\right.\right.$$

$$\left(-i\,b+i\,c\,(2\,s-\nu)+2\,p\,\sqrt{z}\right)^{h+j}\left(-\frac{\left(-i\,b+i\,c\,(2\,s-\nu)+2\,p\,\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((-i\,b+i\,c\,(2\,s-\nu))\left(-i\,b+i\,c\,(2\,s-\nu)+2\,p\,\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{\left(-i\,b+i\,c\,(2\,s-\nu)+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)+\right.$$

$$\left.\left.2\,\sqrt{-\frac{\left(-i\,b+i\,c\,(2\,s-\nu)+2\,p\,\sqrt{z}\right)^2}{p}}\;p\,\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{\left(-i\,b+i\,c\,(2\,s-\nu)+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)\right)\right)$$

$$p^{-2\,n-2}+(-1)^{\nu}\,e^{-\frac{(i\,b+i\,c\,(2\,s-\nu))^2}{4\,p}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+i\,c\,(2\,s-\nu))^{-h-j+2\,n}\left(i\,b+i\,c\,(2\,s-\nu)+2\,p\,\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{\left(i\,b+i\,c\,(2\,s-\nu)+2\,p\,\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\,b + i\,c\,(2\,s - v))\left(i\,b + i\,c\,(2\,s - v) + 2\,p\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h + j + 1), -\frac{\left(i\,b + i\,c\,(2\,s - v) + 2\,p\,\sqrt{z}\right)^2}{4\,p}\right) + 2\right.$$

$$\left.\left.\sqrt{-\frac{\left(i\,b + i\,c\,(2\,s - v) + 2\,p\,\sqrt{z}\right)^2}{p}}\;p\,\Gamma\left(\frac{1}{2}\,(h + j + 2), -\frac{\left(i\,b + i\,c\,(2\,s - v) + 2\,p\,\sqrt{z}\right)^2}{4\,p}\right)\right)\right)p^{-2\,n-2} -$$

$$e^{-\frac{(-i\,b+i\,c\,(v-2\,s))^2}{4\,p}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b + i\,c\,(v - 2\,s))^{-h-j+2\,n}\left(-i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{\left(-i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((-i\,b + i\,c\,(v - 2\,s))\left(-i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}\,(h + j + 1), -\frac{\left(-i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)^2}{4\,p}\right) +\right.$$

$$\left.\left.2\,\sqrt{-\frac{\left(-i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)^2}{p}}\;p\,\Gamma\left(\frac{1}{2}\,(h + j + 2), -\frac{\left(-i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)^2}{4\,p}\right)\right)\right)$$

$$p^{-2\,n-2} + e^{-\frac{(i\,b+i\,c\,(v-2\,s))^2}{4\,p}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b + i\,c\,(v - 2\,s))^{-h-j+2\,n}\left(i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{\left(i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left((i\,b + i\,c\,(v - 2\,s))\left(i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}\,(h + j + 1), -\frac{\left(i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)^2}{4\,p}\right) + 2\,\sqrt{-\frac{\left(i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)^2}{p}}$$

$$\left.\left.\left.p\,\Gamma\left(\frac{1}{2}\,(h + j + 2), -\frac{\left(i\,b + i\,c\,(v - 2\,s) + 2\,p\,\sqrt{z}\right)^2}{4\,p}\right)\right)\right)p^{-2\,n-2}\right)\,/;\,n \in \mathbb{N} \land v \in \mathbb{N}^+$$

Involving $z^n e^{p z^r} \sin(b z) \sin^\nu(c z^r)$

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$$\int z^n e^{p z^2} \sin(b z) \sin^\nu(c z^2)\, dz = i\, 2^{-\nu-2} e^{\frac{b^2}{4p}} p^{-n-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \left(\sum_{j=0}^{n} 2^{j-n} (-i b)^{n-j} (i b + 2 p z)^{j+1} \left(-\frac{(i b + 2 p z)^2}{p} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i b + 2 p z)^2}{4 p} \right) - \sum_{j=0}^{n} 2^{j-n} (i b)^{n-j} (-i b + 2 p z)^{j+1} \left(-\frac{(-i b + 2 p z)^2}{p} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i b + 2 p z)^2}{4 p} \right) \right) - 2^{-\nu-2} i^{-\nu-1} \sum_{h=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^h \binom{\nu}{h} \left(-e^{\frac{b^2}{4(p + c i (\nu - 2h))}} \left(\sum_{j=0}^{n} 2^{j-n} (i b)^{n-j} (-i b + 2 (p + c i (\nu - 2h)) z)^{j+1} \left(-\frac{(-i b + 2 (p + c i (\nu - 2h)) z)^2}{p + c i (\nu - 2h)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i b + 2 (p + c i (\nu - 2h)) z)^2}{4 (p + c i (\nu - 2h))} \right) \right) (p + c i (\nu - 2h))^{-n-1} + e^{\frac{b^2}{4(p + c i (\nu - 2h))}} \left(\sum_{j=0}^{n} 2^{j-n} (-i b)^{n-j} (i b + 2 (p + c i (\nu - 2h)) z)^{j+1} \left(-\frac{(i b + 2 (p + c i (\nu - 2h)) z)^2}{p + c i (\nu - 2h)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i b + 2 (p + c i (\nu - 2h)) z)^2}{4 (p + c i (\nu - 2h))} \right) \right) (p + c i (\nu - 2h))^{-n-1} + (-1)^{\nu+1} e^{\frac{b^2}{4(p - i c (\nu - 2h))}} (p - i c (\nu - 2h))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (i b)^{n-j} (-i b + 2 (p - i c (\nu - 2h)) z)^{j+1} \left(-\frac{(-i b + 2 (p - i c (\nu - 2h)) z)^2}{p - i c (\nu - 2h)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(-i b + 2 (p - i c (\nu - 2h)) z)^2}{4 (p - i c (\nu - 2h))} \right) + (-1)^{\nu} e^{\frac{b^2}{4(p - i c (\nu - 2h))}} (p - i c (\nu - 2h))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-i b)^{n-j} (i b + 2 (p - i c (\nu - 2h)) z)^{j+1} \left(-\frac{(i b + 2 (p - i c (\nu - 2h)) z)^2}{p - i c (\nu - 2h)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(i b + 2 (p - i c (\nu - 2h)) z)^2}{4 (p - i c (\nu - 2h))} \right) \right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

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$$\int z^n e^{p\sqrt{z}} \sin(b\,z)\sin^{\nu}\!\left(c\sqrt{z}\right)dz = i\,2^{-2n-\nu-2}\binom{\nu}{\frac{\nu}{2}}(1-\nu \bmod 2)\Bigg((-i\,b)^{-2n-2}\,e^{-\frac{i\,p^2}{4b}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2n}\left(p-2\,i\,b\sqrt{z}\right)^{h+j}\left(-\frac{i\left(p-2\,i\,b\sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(p\left(p-2\,i\,b\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),-\frac{i\left(p-2\,i\,b\sqrt{z}\right)^2}{4b}\right)-\right.$$

$$\left.2\,i\,b\sqrt{-\frac{i\left(p-2\,i\,b\sqrt{z}\right)^2}{b}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),-\frac{i\left(p-2\,i\,b\sqrt{z}\right)^2}{4b}\right)\right)-$$

$$(i\,b)^{-2n-2}\,e^{\frac{i\,p^2}{4b}}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2n}\left(p+2\,i\,b\sqrt{z}\right)^{h+j}\left(\frac{i\left(p+2\,i\,b\sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg(p\left(p+2\,i\,b\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}(h+j+1),\frac{i\left(p+2\,i\,b\sqrt{z}\right)^2}{4b}\right)+2\sqrt{\frac{i\left(p+2\,i\,b\sqrt{z}\right)^2}{b}}\;b\,i\,\Gamma\!\left(\frac{1}{2}(h+j+2),\frac{i\left(p+2\,i\,b\sqrt{z}\right)^2}{4b}\right)\Bigg)\Bigg)+$$

$$i^{-\nu-1}\,2^{-2n-\nu-2}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\Bigg((-1)^{\nu+1}\,e^{-\frac{i\,(p+c\,i\,(2s-\nu))^2}{4b}}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(p+c\,i\,(2s-\nu))^{-h-j+2n}$$

$$\left(p+i\,c\,(2s-\nu)-2\,i\,b\sqrt{z}\right)^{h+j}\left(-\frac{i\left(p+i\,c\,(2s-\nu)-2\,i\,b\sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((p+c\,i\,(2s-\nu))\left(p+i\,c\,(2s-\nu)-2\,i\,b\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),-\frac{i\left(p+i\,c\,(2s-\nu)-2\,i\,b\sqrt{z}\right)^2}{4b}\right)-2\right.$$

$$\left.i\,b\sqrt{-\frac{i\left(p+i\,c\,(2s-\nu)-2\,i\,b\sqrt{z}\right)^2}{b}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),-\frac{i\left(p+i\,c\,(2s-\nu)-2\,i\,b\sqrt{z}\right)^2}{4b}\right)\right)\Bigg)\Bigg)$$

$$(-i\,b)^{-2n-2} - e^{-\frac{i\,(p+c\,i\,(v-2s))^2}{4b}} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (p+c\,i\,(v-2s))^{-h-j+2n} \left(p+i\,c\,(v-2s)-2\,i\,b\sqrt{z}\right)^{h+j} \right.$$

$$\left(-\frac{i\left(p+i\,c\,(v-2s)-2\,i\,b\sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}$$

$$\left((p+c\,i\,(v-2s))\left(p+i\,c\,(v-2s)-2\,i\,b\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(p+i\,c\,(v-2s)-2\,i\,b\sqrt{z}\right)^2}{4b}\right) - 2\right.$$

$$\left.\left. i\,b\sqrt{-\frac{i\left(p+i\,c\,(v-2s)-2\,i\,b\sqrt{z}\right)^2}{b}}\;\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(p+i\,c\,(v-2s)-2\,i\,b\sqrt{z}\right)^2}{4b}\right)\right)\right)$$

$$(-i\,b)^{-2n-2} + (-1)^v\,(i\,b)^{-2n-2}\, e^{\frac{i\,(p+c\,i\,(2s-v))^2}{4b}} \sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (p+c\,i\,(2s-v))^{-h-j+2n}$$

$$\left(p+i\,c\,(2s-v)+2\,i\,b\sqrt{z}\right)^{h+j} \left(\frac{i\left(p+i\,c\,(2s-v)+2\,i\,b\sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}$$

$$\left((p+c\,i\,(2s-v))\left(p+i\,c\,(2s-v)+2\,i\,b\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(p+i\,c\,(2s-v)+2\,i\,b\sqrt{z}\right)^2}{4b}\right) + \right.$$

$$\left. 2\sqrt{\frac{i\left(p+i\,c\,(2s-v)+2\,i\,b\sqrt{z}\right)^2}{b}}\; b\,i\,\Gamma\left(\frac{1}{2}(h+j+2), \frac{i\left(p+i\,c\,(2s-v)+2\,i\,b\sqrt{z}\right)^2}{4b}\right)\right) +$$

$$(i\,b)^{-2n-2}\, e^{\frac{i\,(p+c\,i\,(v-2s))^2}{4b}} \sum_{j=0}^{n}\sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (p+c\,i\,(v-2s))^{-h-j+2n} \left(p+i\,c\,(v-2s)+2\,i\,b\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(p+i\,c\,(v-2s)+2\,i\,b\sqrt{z}\right)^2}{b}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j} \left((p+c\,i\,(v-2s))\left(p+i\,c\,(v-2s)+2\,i\,b\sqrt{z}\right)\Gamma\left(\right.\right.$$

$$\left.\frac{1}{2}(h+j+1), \frac{i\left(p+i\,c\,(v-2s)+2\,i\,b\sqrt{z}\right)^2}{4b}\right) + 2\sqrt{\frac{i\left(p+i\,c\,(v-2s)+2\,i\,b\sqrt{z}\right)^2}{b}}\; b\,i\,\Gamma\left(\right.$$

Involving $z^n e^{p z^r} \sin(b z^r) \sin^\nu(c z)$

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$$\int z^n e^{p z^2} \sin(b z^2) \sin^\nu(c z)\, dz = i\, 2^{-\nu-2} z^{n+1} \binom{\nu}{\frac{\nu}{2}} \left(\left((-i b - p) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (-i b - p) z^2\right) - \left((i b - p) z^2\right)^{\frac{1}{2}(-n-1)} \Gamma\left(\frac{n+1}{2}, (i b - p) z^2\right)\right) (1 - \nu \bmod 2) + \frac{2^{-\nu-2} i^{-\nu-1}}{\sqrt{-i b + p} \sqrt{i b + p}} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s e^{\frac{c^2 p (\nu-2s)^2}{2(-i b+p)(i b+p)}} \binom{\nu}{s} \left((-1)^\nu e^{-\frac{c^2 (\nu-2s)^2}{4(i b+p)}} \sqrt{i b + p} \sum_{q=0}^n 2^{q-n} (-i b + p)^{-n-\frac{1}{2}} (i c (\nu - 2 s))^{n-q} (c i (2 s - \nu) + 2(-i b + p) z)^{q+1} \left(-\frac{(c i (2 s - \nu) + 2(-i b + p) z)^2}{-i b + p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(c i (2 s - \nu) + 2(-i b + p) z)^2}{4(-i b + p)}\right) + e^{-\frac{c^2 (\nu-2s)^2}{4(i b+p)}} \sqrt{i b + p} \sum_{q=0}^n (-i b + p)^{-n-\frac{1}{2}} \left(i c \left(s - \frac{\nu}{2}\right)\right)^{n-q} (c i (\nu - 2 s) + 2(-i b + p) z)^{q+1} \left(-\frac{(c i (\nu - 2 s) + 2(-i b + p) z)^2}{-i b + p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(c i (\nu - 2 s) + 2(-i b + p) z)^2}{4(-i b + p)}\right) - e^{-\frac{c^2 (\nu-2s)^2}{4(-i b+p)}} \sqrt{-i b + p} \left((-1)^\nu \sum_{q=0}^n 2^{q-n} (i b + p)^{-n-\frac{1}{2}} (i c (\nu - 2 s))^{n-q} (c i (2 s - \nu) + 2(i b + p) z)^{q+1} \left(-\frac{(c i (2 s - \nu) + 2(i b + p) z)^2}{i b + p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(c i (2 s - \nu) + 2(i b + p) z)^2}{4(i b + p)}\right) + \sum_{q=0}^n (i b + p)^{-n-\frac{1}{2}} \left(i c \left(s - \frac{\nu}{2}\right)\right)^{n-q} (c i (\nu - 2 s) + 2(i b + p) z)^{q+1} \left(-\frac{(c i (\nu - 2 s) + 2(i b + p) z)^2}{i b + p}\right)^{\frac{1}{2}(-q-1)} \binom{n}{q} \Gamma\left(\frac{q+1}{2}, -\frac{(c i (\nu - 2 s) + 2(i b + p) z)^2}{4(i b + p)}\right)\right)\right) /; \nu \in \mathbb{N}^+ \land n \in \mathbb{N}$$

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$$\int z^n e^{p \sqrt{z}} \sin(b \sqrt{z}) \sin^\nu(c z)\, dz = 2^{-\nu} i z^{n+1} \binom{\nu}{\frac{\nu}{2}} \left(\left((-i b - p) \sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (-i b - p) \sqrt{z}\right) - \left((i b - p) \sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (i b - p) \sqrt{z}\right)\right)$$

$$(1 - v \bmod 2) - i^{1-v}\, 2^{-2n-v-2} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \Bigg((-1)^{v-1}\, e^{-\frac{i(-i b+p)^2}{4 c (v-2 s)}} (-i c (v-2 s))^{-2n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i b+p)^{-h-j+2n}$$

$$\left(-i b+p-2 i c (v-2 s) \sqrt{z}\right)^{h+j} \left(-\frac{i \left(-i b+p-2 i c (v-2 s) \sqrt{z}\right)^2}{c (v-2 s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \Bigg((-i b+p)$$

$$\left(-i b+p-2 i c (v-2 s) \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(-i b+p-2 i c (v-2 s) \sqrt{z}\right)^2}{4 c (v-2 s)}\right) - 2 i c (v-2 s)$$

$$\sqrt{-\frac{i \left(-i b+p-2 i c (v-2 s) \sqrt{z}\right)^2}{c (v-2 s)}}\ \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i \left(-i b+p-2 i c (v-2 s) \sqrt{z}\right)^2}{4 c (v-2 s)}\right)\Bigg) +$$

$$(-1)^v\, e^{-\frac{i(i b+p)^2}{4 c (v-2 s)}} (-i c (v-2 s))^{-2n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (i b+p)^{-h-j+2n} \left(i b+p-2 i c (v-2 s) \sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i \left(i b+p-2 i c (v-2 s) \sqrt{z}\right)^2}{c (v-2 s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\Bigg((i b+p) \left(i b+p-2 i c (v-2 s) \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i \left(i b+p-2 i c (v-2 s) \sqrt{z}\right)^2}{4 c (v-2 s)}\right) - 2 i c (v-2 s)$$

$$\sqrt{-\frac{i \left(i b+p-2 i c (v-2 s) \sqrt{z}\right)^2}{c (v-2 s)}}\ \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i \left(i b+p-2 i c (v-2 s) \sqrt{z}\right)^2}{4 c (v-2 s)}\right)\Bigg) -$$

$$e^{\frac{i(-i b+p)^2}{4 c (v-2 s)}} (i c (v-2 s))^{-2n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (-i b+p)^{-h-j+2n} \left(-i b+p+2 i c (v-2 s) \sqrt{z}\right)^{h+j}$$

$$\left(\frac{i \left(-i b+p+2 i c (v-2 s) \sqrt{z}\right)^2}{c (v-2 s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\Bigg((-i b+p) \left(-i b+p+2 i c (v-2 s) \sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i \left(-i b+p+2 i c (v-2 s) \sqrt{z}\right)^2}{4 c (v-2 s)}\right) + 2 c\, i$$

$$(v-2s)\sqrt{\frac{i\left(-i\,b+p+2\,i\,c\,(v-2s)\sqrt{z}\right)^2}{c\,(v-2s)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,\frac{i\left(-i\,b+p+2\,i\,c\,(v-2s)\sqrt{z}\right)^2}{4\,c\,(v-2s)}\right)\Bigg)+$$

$$e^{\frac{i\,(i\,b+p)^2}{4\,c\,(v-2s)}}\,(i\,c\,(v-2s))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,b+p)^{-h-j+2n}\left(i\,b+p+2\,i\,c\,(v-2s)\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(i\,b+p+2\,i\,c\,(v-2s)\sqrt{z}\right)^2}{c\,(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((i\,b+p)\left(i\,b+p+2\,i\,c\,(v-2s)\sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}(h+j+1),$$

$$\frac{i\left(i\,b+p+2\,i\,c\,(v-2s)\sqrt{z}\right)^2}{4\,c\,(v-2s)}\Bigg)+2\,c\,i\,(v-2s)\sqrt{\frac{i\left(i\,b+p+2\,i\,c\,(v-2s)\sqrt{z}\right)^2}{c\,(v-2s)}}\;\Gamma\Bigg($$

$$\frac{1}{2}(h+j+2),\,\frac{i\left(i\,b+p+2\,i\,c\,(v-2s)\sqrt{z}\right)^2}{4\,c\,(v-2s)}\Bigg)\Bigg)\Bigg)\;/;\;n\in\mathbb{N}\wedge v\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\,e^{p\,z^r}\,\sin(b\,z^r)\,\sin^v(c\,z^r)$

01.06.21.1581.01

$$\int z^{\alpha-1}\,e^{p\,z^r}\,\sin(b\,z^r)\,\sin^v(c\,z^r)\,dz=$$

$$\frac{1}{r}\left(2^{-v-1}\,z^\alpha\,i\binom{v}{\frac{v}{2}}\left(((-i\,b-p)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(-i\,b-p)\,z^r\right)-((i\,b-p)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(i\,b-p)\,z^r\right)\right)(1-v\bmod 2)\right)+$$

$$\frac{2^{-v-1}\,z^\alpha\,i^{-v-1}}{r}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg((-1)^{v+1}\,\Gamma\!\left(\frac{\alpha}{r},\,(-i\,b-p-2\,i\,c\,s+i\,c\,v)\,z^r\right)((-i\,b-p-2\,i\,c\,s+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}+$$

$$(-1)^v\,((i\,b-p-2\,i\,c\,s+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(i\,b-p-2\,i\,c\,s+i\,c\,v)\,z^r\right)-((-i\,b-p+2\,i\,c\,s-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}$$

$$\Gamma\!\left(\frac{\alpha}{r},\,(-i\,b-p+2\,i\,c\,s-i\,c\,v)\,z^r\right)+((i\,b-p+2\,i\,c\,s-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(i\,b-p+2\,i\,c\,s-i\,c\,v)\,z^r\right)\Bigg)\;/;\;v\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\,e^{b\,z^r+e}\,\sin(a\,z^r+q)\,\sin^v(c\,z^r+g)$

01.06.21.1582.01

$$\int z^{\alpha-1} e^{b z^r+e} \sin(a z^r + q) \sin^v(c z^r + g) \, dz = \frac{i\, 2^{-v-1} z^\alpha}{r} \binom{v}{\frac{v}{2}} \left(e^{e+i q} ((-b - i a) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b - i a) z^r\right) - e^{e-i q} ((i a - b) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (i a - b) z^r\right)\right) (1 - v \bmod 2) + \frac{2^{-v-1} z^\alpha i^{-v-1}}{r} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left((-1)^{v+1} e^{e+i q+2 i g s-i g v} \Gamma\left(\frac{\alpha}{r}, (-b - i a - 2 i c s + i c v) z^r\right) ((-b - i a - 2 i c s + i c v) z^r)^{-\frac{\alpha}{r}} + (-1)^v e^{e-i q+2 i g s-i g v} ((-b + i a - 2 i c s + i c v) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b + i a - 2 i c s + i c v) z^r\right) - e^{e+i q-2 i g s+i g v} ((-b - i a + 2 i c s - i c v) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b - i a + 2 i c s - i c v) z^r\right) + e^{e-i q-2 i g s+i g v} ((-b + i a + 2 i c s - i c v) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b + i a + 2 i c s - i c v) z^r\right)\right) /; v \in \mathbb{N}^+$$

Involving $z^n e^{b z^r+d z+e} \sin(a z^r + p z + q) \sin^v(c z^r + f z + g)$

01.06.21.1583.01

$$\int z^n e^{b z^2+d z+e} \sin(a z^2 + p z + q) \sin^v(c z^2 + f z + g) \, dz = i\, 2^{-v-2} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \left((b + i a)^{-n-1} e^{-\frac{(d+i p)^2}{4 (b+i a)}+e+i q} \sum_{j=0}^{n} 2^{j-n} (-d - i p)^{n-j} (d + i p + 2 (b + i a) z)^{j+1} \left(-\frac{(d + i p + 2 (b + i a) z)^2}{b + i a}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(d + i p + 2 (b + i a) z)^2}{4 (b + i a)}\right) - (b - i a)^{-n-1} e^{-\frac{(d-i p)^2}{4 (b-i a)}+e-i q} \sum_{j=0}^{n} 2^{j-n} (i p - d)^{n-j} (d - i p + 2 (b - i a) z)^{j+1} \left(-\frac{(d - i p + 2 (b - i a) z)^2}{b - i a}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(d - i p + 2 (b - i a) z)^2}{4 (b - i a)}\right)\right) - 2^{-v-2} i^{-v-1} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left((-1)^{v+1} e^{-\frac{(d-i p+f i (2 s-v))^2}{4 (b-i a+c i (2 s-v))}+e-i q+g i (2 s-v)} \left(\sum_{j=0}^{n} 2^{j-n} (-d + i p - i f (2 s - v))^{n-j} (d - i p + f i (2 s - v) + 2 (b - i a + c i (2 s - v)) z)^{j+1} \left(-\frac{(d - i p + f i (2 s - v) + 2 (b - i a + c i (2 s - v)) z)^2}{b - i a + c i (2 s - v)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(d - i p + f i (2 s - v) + 2 (b - i a + c i (2 s - v)) z)^2}{4 (b - i a + c i (2 s - v))}\right)\right) (b - i a + c i (2 s - v))^{-n-1} + (-1)^v e^{-\frac{(d+i p+f i (2 s-v))^2}{4 (b+i a+c i (2 s-v))}+e+i q+g i (2 s-v)} (b + i a + c i (2 s - v))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (-d - i\,p - i\,f\,(2\,s - v))^{n-j} (d + i\,p + f\,i\,(2\,s - v) + 2\,(b + i\,a + c\,i\,(2\,s - v))\,z)^{j+1}$$

$$\left(-\frac{(d + i\,p + f\,i\,(2\,s - v) + 2\,(b + i\,a + c\,i\,(2\,s - v))\,z)^2}{b + i\,a + c\,i\,(2\,s - v)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2}, -\frac{(d + i\,p + f\,i\,(2\,s - v) + 2\,(b + i\,a + c\,i\,(2\,s - v))\,z)^2}{4\,(b + i\,a + c\,i\,(2\,s - v))}\right) -$$

$$e^{-\frac{(d - i\,p + f\,i\,(v - 2\,s))^2}{4\,(b - i\,a + c\,i\,(v - 2\,s))} + e - i\,q + g\,i\,(v - 2\,s)} (b - i\,a + c\,i\,(v - 2\,s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-d + i\,p - i\,f\,(v - 2\,s))^{n-j}$$

$$(d - i\,p + f\,i\,(v - 2\,s) + 2\,(b - i\,a + c\,i\,(v - 2\,s))\,z)^{j+1}$$

$$\left(-\frac{(d - i\,p + f\,i\,(v - 2\,s) + 2\,(b - i\,a + c\,i\,(v - 2\,s))\,z)^2}{b - i\,a + c\,i\,(v - 2\,s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2}, -\frac{(d - i\,p + f\,i\,(v - 2\,s) + 2\,(b - i\,a + c\,i\,(v - 2\,s))\,z)^2}{4\,(b - i\,a + c\,i\,(v - 2\,s))}\right) +$$

$$e^{-\frac{(d + i\,p + f\,i\,(v - 2\,s))^2}{4\,(b + i\,a + c\,i\,(v - 2\,s))} + e + i\,q + g\,i\,(v - 2\,s)} (b + i\,a + c\,i\,(v - 2\,s))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-d - i\,p - i\,f\,(v - 2\,s))^{n-j}$$

$$(d + i\,p + f\,i\,(v - 2\,s) + 2\,(b + i\,a + c\,i\,(v - 2\,s))\,z)^{j+1}$$

$$\left(-\frac{(d + i\,p + f\,i\,(v - 2\,s) + 2\,(b + i\,a + c\,i\,(v - 2\,s))\,z)^2}{b + i\,a + c\,i\,(v - 2\,s)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j}$$

$$\left.\Gamma\left(\frac{j+1}{2}, -\frac{(d + i\,p + f\,i\,(v - 2\,s) + 2\,(b + i\,a + c\,i\,(v - 2\,s))\,z)^2}{4\,(b + i\,a + c\,i\,(v - 2\,s))}\right)\right) /;\ n \in \mathbb{N} \land v \in \mathbb{N}^+$$

01.06.21.1584.01

$$\int z^n\, e^{\sqrt{z}\,b + d\,z + e} \sin\left(\sqrt{z}\,a + p\,z + q\right) \sin^v\left(\sqrt{z}\,c + f\,z + g\right) dz ==$$

$$i\,2^{-2\,n-v-2} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \left(e^{-\frac{(b - i\,a)^2}{4\,(d - i\,p)} + e - i\,q} (d - i\,p)^{-2\,n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (b - i\,a)^{-h-j+2\,n} \left(b - i\,a + 2\,(d - i\,p)\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{\left(b - i\,a + 2\,(d - i\,p)\sqrt{z}\right)^2}{d - i\,p}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left((b - i\,a)\left(b - i\,a + 2\,(d - i\,p)\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h + j + 1), -\frac{\left(b - i\,a + 2\,(d - i\,p)\sqrt{z}\right)^2}{4\,(d - i\,p)}\right) + 2\sqrt{-\frac{\left(b - i\,a + 2\,(d - i\,p)\sqrt{z}\right)^2}{d - i\,p}}$$

$$(d - i\, p)\, \Gamma\left(\frac{1}{2}(h + j + 2), -\frac{\left(b - i\, a + 2\,(d - i\, p)\sqrt{z}\right)^2}{4\,(d - i\, p)}\right)\Bigg)\Bigg) - e^{-\frac{(b+i\, a)^2}{4\,(d+i\, p)}+e+i\, q}\,(d + i\, p)^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(b + i\, a)^{-h-j+2\,n}\left(b + i\, a + 2\,(d + i\, p)\sqrt{z}\right)^{h+j}\left(-\frac{\left(b + i\, a + 2\,(d + i\, p)\sqrt{z}\right)^2}{d + i\, p}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((b + i\, a)\left(b + i\, a + 2\,(d + i\, p)\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h + j + 1), -\frac{\left(b + i\, a + 2\,(d + i\, p)\sqrt{z}\right)^2}{4\,(d + i\, p)}\right) + \right.$$

$$\left. 2\sqrt{-\frac{\left(b + i\, a + 2\,(d + i\, p)\sqrt{z}\right)^2}{d + i\, p}}\,(d + i\, p)\,\Gamma\left(\frac{1}{2}(h + j + 2), -\frac{\left(b + i\, a + 2\,(d + i\, p)\sqrt{z}\right)^2}{4\,(d + i\, p)}\right)\right)\Bigg)\Bigg) +$$

$$2^{-2\,n-v-2}\, i^{-v-1}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left((-1)^v\, e^{-\frac{(b+i\, a+c\, i\,(2\,s-v))^2}{4\,(d+i\, p+f\, i\,(2\,s-v))}+e+i\, q+g\, i\,(2\,s-v)}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(b + i\, a + c\, i\,(2\,s - v))^{-h-j+2\,n}\right.\right.$$

$$\left(b + i\, a + c\, i\,(2\,s - v) + 2\,(d + i\, p + f\, i\,(2\,s - v))\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(b + i\, a + c\, i\,(2\,s - v) + 2\,(d + i\, p + f\, i\,(2\,s - v))\sqrt{z}\right)^2}{d + i\, p + f\, i\,(2\,s - v)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\Bigg((b + i\, a + c\, i\,(2\,s - v))\left(b + i\, a + c\, i\,(2\,s - v) + 2\,(d + i\, p + f\, i\,(2\,s - v))\sqrt{z}\right)$$

$$\Gamma\Bigg(\frac{1}{2}(h + j + 1), -\left(b + i\, a + c\, i\,(2\,s - v) + 2\,(d + i\, p + f\, i\,(2\,s - v))\sqrt{z}\right)^2 \Big/$$

$$(4\,(d + i\, p + f\, i\,(2\,s - v)))\Bigg) + 2\,(d + i\, p + f\, i\,(2\,s - v))\,\Gamma\Bigg(\frac{1}{2}(h + j + 2),$$

$$-\left(b + i\, a + c\, i\,(2\,s - v) + 2\,(d + i\, p + f\, i\,(2\,s - v))\sqrt{z}\right)^2 \Big/ (4\,(d + i\, p + f\, i\,(2\,s - v)))\Bigg)$$

$$\sqrt{\left(-\left(b + i\, a + c\, i\,(2\,s - v) + 2\,(d + i\, p + f\, i\,(2\,s - v))\sqrt{z}\right)^2 \Big/ (d + i\, p + f\, i\,(2\,s - v))\right)}\Bigg)$$

$$(d + i\, p + f\, i\,(2\,s - v))^{-2\,n-2} + (-1)^{v+1}\, e^{-\frac{(b-i\, a+c\, i\,(2\,s-v))^2}{4\,(d-i\, p+f\, i\,(2\,s-v))}+e-i\, q+g\, i\,(2\,s-v)}\,(d - i\, p + f\, i\,(2\,s - v))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(b - i\, a + c\, i\,(2\,s - v))^{-h-j+2\,n}\left(b - i\, a + c\, i\,(2\,s - v) + 2\,(d - i\, p + f\, i\,(2\,s - v))\sqrt{z}\right)^{h+j}$$

$$\left(-\left(b-i a+c i(2 s-v)+2(d-i p+f i(2 s-v)) \sqrt{z}\right)^2 \Big/ (d-i p+f i(2 s-v))\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg((b-i a+c i(2 s-v))\left(b-i a+c i(2 s-v)+2(d-i p+f i(2 s-v)) \sqrt{z}\right)\Gamma\Big(\frac{1}{2}(h+j+1), -\left(b-i a+c i(2 s-v)+2(d-i p+f i(2 s-v)) \sqrt{z}\right)^2 \Big/ (4(d-i p+f i(2 s-v)))\Big)+2(d-i p+f i(2 s-v))\Gamma\Big(\frac{1}{2}(h+j+2), -\left(b-i a+c i(2 s-v)+2(d-i p+f i(2 s-v)) \sqrt{z}\right)^2 \Big/ (4(d-i p+f i(2 s-v)))\Big) \sqrt{\left(-\left(b-i a+c i(2 s-v)+2(d-i p+f i(2 s-v)) \sqrt{z}\right)^2 \Big/ (d-i p+f i(2 s-v))\right)}\Bigg)+$$

$$e^{-\frac{(b+i a+c i(v-2 s))^2}{4(d+i p+f i(v-2 s))}+e+i q+g i(v-2 s)} (d+i p+f i(v-2 s))^{-2 n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (b+i a+c i(v-2 s))^{-h-j+2 n}$$

$$\left(b+i a+c i(v-2 s)+2(d+i p+f i(v-2 s)) \sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(b+i a+c i(v-2 s)+2(d+i p+f i(v-2 s)) \sqrt{z}\right)^2}{d+i p+f i(v-2 s)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\binom{n}{j}$$

$$\Bigg((b+i a+c i(v-2 s))\left(b+i a+c i(v-2 s)+2(d+i p+f i(v-2 s)) \sqrt{z}\right)\Gamma\Bigg(\frac{1}{2}(h+j+1), -\frac{\left(b+i a+c i(v-2 s)+2(d+i p+f i(v-2 s)) \sqrt{z}\right)^2}{4(d+i p+f i(v-2 s))}\Bigg)+$$

$$2(d+i p+f i(v-2 s))\Gamma\Bigg(\frac{1}{2}(h+j+2), -\frac{\left(b+i a+c i(v-2 s)+2(d+i p+f i(v-2 s)) \sqrt{z}\right)^2}{4(d+i p+f i(v-2 s))}\Bigg)$$

$$\sqrt{\left(-\left(b+i a+c i(v-2 s)+2(d+i p+f i(v-2 s)) \sqrt{z}\right)^2 \Big/ (d+i p+f i(v-2 s))\right)}\Bigg)-$$

$$e^{-\frac{(b-i a+c i(v-2 s))^2}{4(d-i p+f i(v-2 s))}+e-i q+g i(v-2 s)} (d-i p+f i(v-2 s))^{-2 n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (b-i a+c i(v-2 s))^{-h-j+2 n}$$

$$\left(b-i a+c i(v-2 s)+2(d-i p+f i(v-2 s)) \sqrt{z}\right)^{h+j}$$

$$\left(-\left(b-i a+c i(v-2 s)+2(d-i p+f i(v-2 s)) \sqrt{z}\right)^2 \Big/ (d-i p+f i(v-2 s))\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}$$

$$\binom{n}{j}\Bigg((b-i a+c i(v-2 s))\left(b-i a+c i(v-2 s)+2(d-i p+f i(v-2 s)) \sqrt{z}\right)\Gamma\Big(\frac{1}{2}(h+j+1), -\left(b-i a+c i(v-2 s)+2(d-i p+f i(v-2 s)) \sqrt{z}\right)^2 \Big/ (4(d-i p+f i(v-2 s)))\Big)+$$

$$2\,(d - i\,p + f\,i\,(v - 2\,s))\,\Gamma\!\left(\frac{1}{2}\,(h + j + 2),\, -\left(b - i\,a\, + c\,i\,(v - 2\,s) + 2\,(d - i\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\right)^2 \Big/ (4\,(d - i\,p + f\,i\,(v - 2\,s)))\right) \sqrt{\left(-\left(b - i\,a\, + c\,i\,(v - 2\,s) + 2\,(d - i\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\right)^2 \Big/ (d - i\,p + f\,i\,(v - 2\,s))\right)}\Bigg) \Bigg) \Bigg/;\, n \in \mathbb{N} \bigwedge v \in \mathbb{N}^+$$

Involving product of powers of two direct functions, exponential and a power functions

Involving $z^{\alpha-1}\, e^{b\,z}\, \sin^{\mu}(c\,z)\, \sin^{\nu}(a\,z)$

01.06.21.1585.01

$$\int z^{\alpha-1}\, e^{b\,z} \sin^m(c\,z) \sin^v(a\,z)\, dz = (-1)^{m-1}\, 2^{-m-v}\, z^{\alpha}\, (-b\,z)^{-\alpha} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} \Gamma(\alpha,\, -b\,z)\,(1 - m \bmod 2)\,(1 - v \bmod 2) - 2^{-m-v}\, i^{-m-v}\, z^{\alpha} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^{k+m}\, e^{\frac{i\,\pi\,v}{2}} \binom{m}{k} \left(e^{i\,m\,\pi}\, \Gamma(\alpha,\, (-b + 2\,i\,c\,k - i\,c\,m)\,z)\,((-b + 2\,i\,c\,k - i\,c\,m)\,z)^{-\alpha} + ((i\,c\,(m - 2\,k) - b)\,z)^{-\alpha}\, \Gamma(\alpha,\, (i\,c\,(m - 2\,k) - b)\,z)\right) - (-1)^m\, i^{-v}\, 2^{-m-v}\, z^{\alpha} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s \binom{v}{s} \left(e^{i\,\pi\,v}\, \Gamma(\alpha,\, (-b - 2\,i\,a\,s + i\,a\,v)\,z)\,((-b - 2\,i\,a\,s + i\,a\,v)\,z)^{-\alpha} + ((-b - i\,a\,(v - 2\,s))\,z)^{-\alpha}\, \Gamma(\alpha,\, (-b - i\,a\,(v - 2\,s))\,z)\right) + 2^{-m-v}\, i^{-m-v}\, z^{\alpha} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^{m+s} \binom{v}{s} \Big(-e^{i\,\pi\,v}\, \Gamma(\alpha,\, (-b - 2\,i\,c\,k + i\,c\,m - 2\,i\,a\,s + i\,a\,v)\,z)\,((-b - 2\,i\,c\,k + i\,c\,m - 2\,i\,a\,s + i\,a\,v)\,z)^{-\alpha} - e^{i\,\pi\,m + i\,\pi\,v}\, ((-b + 2\,i\,c\,k - i\,c\,m - 2\,i\,a\,s + i\,a\,v)\,z)^{-\alpha}\, \Gamma(\alpha,\, (-b + 2\,i\,c\,k - i\,c\,m - 2\,i\,a\,s + i\,a\,v)\,z) - ((-b - 2\,i\,c\,k + i\,c\,m + 2\,i\,a\,s - i\,a\,v)\,z)^{-\alpha}\, \Gamma(\alpha,\, (-b - 2\,i\,c\,k + i\,c\,m + 2\,i\,a\,s - i\,a\,v)\,z) - e^{i\,m\,\pi}\, ((-b + 2\,i\,c\,k - i\,c\,m + 2\,i\,a\,s - i\,a\,v)\,z)^{-\alpha}\, \Gamma(\alpha,\, (-b + 2\,i\,c\,k - i\,c\,m + 2\,i\,a\,s - i\,a\,v)\,z)\Big) \,/;\, m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

01.06.21.1586.01

$$\int z^n e^{bz} \sin^\mu(cz) \sin^\nu(az)\, dz = 2^{-\nu} e^{bz} \binom{\nu}{\frac{\nu}{2}} n!\,(1-\nu \bmod 2) \sin^\mu(cz)$$
$$\left(\sum_{p=0}^{n} \frac{(-1)^p z^{n-p} (b - i c\mu)^{-p-1}}{(n-p)!}\, {}_{p+2}F_{p+1}\left(-\frac{i b + c\mu}{2c}, \ldots, -\frac{i b + c\mu}{2c}, -\mu; 1 - \frac{i b + c\mu}{2c}, \ldots, 1 - \frac{i b + c\mu}{2c}; e^{2icz}\right)\right)$$
$$\left(1 - e^{2icz}\right)^{-\mu} + 2^{-\nu} n! \sin^\mu(cz)$$
$$\left(\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(i^\nu e^{(b - i a(\nu - 2k))z} \sum_{p=0}^{n} \frac{(-1)^p z^{n-p} (b - i a(\nu - 2k) - i c\mu)^{-p-1}}{(n-p)!}\, {}_{p+2}F_{p+1}\left(-\frac{i b - 2ak + a\nu + c\mu}{2c}, \ldots,\right.\right.\right.$$
$$\left. -\frac{i b - 2ak + a\nu + c\mu}{2c}, -\mu; 1 - \frac{i b - 2ak + a\nu + c\mu}{2c}, \ldots, 1 - \frac{i b - 2ak + a\nu + c\mu}{2c}; e^{2icz}\right) +$$
$$i^{-\nu} e^{(b + a i(\nu - 2k))z} \sum_{p=0}^{n} \frac{(-1)^p z^{n-p} (b + a i(\nu - 2k) - i c\mu)^{-p-1}}{(n-p)!}\, {}_{p+2}F_{p+1}\left(-\frac{i b + 2ak - a\nu + c\mu}{2c},\right.$$
$$\ldots, -\frac{i b + 2ak - a\nu + c\mu}{2c}, -\mu; 1 - \frac{i b + 2ak - a\nu + c\mu}{2c}, \ldots,$$
$$\left.\left.\left. 1 - \frac{i b + 2ak - a\nu + c\mu}{2c}; e^{2icz}\right)\right)\right) \left(1 - e^{2icz}\right)^{-\mu} /;\ \nu \in \mathbb{N} \land n \in \mathbb{N}$$

Involving $z^{\alpha-1} e^{pz} \sin^m(cz) \sin^\nu(az + b)$

01.06.21.1587.01

$$\int z^{\alpha-1} e^{p z} \sin^m(c z) \sin^v(b + a z) \, dz = -2^{-m-v} z^\alpha \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} \Gamma(\alpha, -p z) (1 - m \bmod 2) (1 - v \bmod 2) (-p z)^{-\alpha} - 2^{-m-v} z^\alpha \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k ((-i c (m - 2 k) - p) z)^{-\alpha} ((i c (m - 2 k) - p) z)^{-\alpha} \binom{m}{k} \left(e^{\frac{i m \pi}{2}} \Gamma(\alpha, (i c (m - 2 k) - p) z) ((-i c (m - 2 k) - p) z)^\alpha + e^{-\frac{1}{2} i m \pi} ((i c (m - 2 k) - p) z)^\alpha \Gamma(\alpha, (-i c (m - 2 k) - p) z) \right) - 2^{-m-v} z^\alpha \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s ((-p - i a (v - 2 s)) z)^{-\alpha} ((i a (v - 2 s) - p) z)^{-\alpha} \binom{v}{s} \left(e^{-i \left(2 b s - b v + \frac{\pi v}{2}\right)} \Gamma(\alpha, (-p - i a (v - 2 s)) z) ((i a (v - 2 s) - p) z)^\alpha + e^{i \left(2 b s - b v + \frac{\pi v}{2}\right)} ((-p - i a (v - 2 s)) z)^\alpha \Gamma(\alpha, (i a (v - 2 s) - p) z) \right) - 2^{-m-v} z^\alpha \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^s (i (2 c k - c m + i p - 2 a s + a v) z)^{-\alpha} ((-p - i (2 c k - c m + 2 a s - a v)) z)^{-\alpha} ((-p - i (2 c k - c m - 2 a s + a v)) z)^{-\alpha} ((-p - i (c (m - 2 k) + a (v - 2 s))) z)^{-\alpha} \binom{v}{s} \left(\left(e^{-i \left(2 b s - b v + \frac{\pi v}{2}\right)} \left(e^{-\frac{1}{2} i m \pi} \Gamma(\alpha, (-p - i (c (m - 2 k) + a (v - 2 s))) z) ((-p - i (2 c k - c m - 2 a s + a v)) z)^\alpha + e^{\frac{i m \pi}{2}} ((-p - i (c (m - 2 k) + a (v - 2 s))) z)^\alpha \Gamma(\alpha, (-p - i (2 c k - c m - 2 a s + a v)) z) \right) (i (2 c k - c m + i p - 2 a s + a v) z)^\alpha + e^{-\frac{1}{2} i (\pi m - 4 b s + 2 b v - \pi v)} ((-p - i (2 c k - c m - 2 a s + a v)) z)^\alpha ((-p - i (c (m - 2 k) + a (v - 2 s))) z)^\alpha \Gamma(\alpha, (-p - i (-2 c k + c m + 2 a s - a v)) z) \right) ((-p - i (2 c k - c m + 2 a s - a v)) z)^\alpha + e^{\frac{1}{2} i (\pi m + 4 b s - 2 b v + \pi v)} (i (2 c k - c m + i p - 2 a s + a v) z)^\alpha ((-p - i (2 c k - c m - 2 a s + a v)) z)^\alpha ((-p - i (c (m - 2 k) + a (v - 2 s))) z)^\alpha \Gamma(\alpha, (-p - i (2 c k - c m + 2 a s - a v)) z) \right) /; m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

01.06.21.1588.01

$$\int z^n e^{pz}\sin^\mu(cz)\sin^\nu(az+b)\,dz = 2^{-\nu} e^{pz}\binom{\nu}{\frac{\nu}{2}} n!\,(1-\nu \bmod 2)\sin^\mu(cz)\left(1-e^{2icz}\right)^{-\mu} \sum_{j=0}^{n}\frac{(-1)^j z^{n-j}}{(n-j)!\,(p-ic\mu)^{j+1}}\;{}_{j+2}F_{j+1}\left(-\frac{ip+c\mu}{2c},\ldots,-\frac{ip+c\mu}{2c},-\mu;1-\frac{ip+c\mu}{2c},\ldots,1-\frac{ip+c\mu}{2c};e^{2icz}\right)+ 2^{-\nu} n!\sin^\mu(cz)\left(1-e^{2icz}\right)^{-\mu}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\left(e^{\frac{i\pi\nu}{2}-ib(\nu-2k)+(p-ia(\nu-2k))z} \sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(p-ia(\nu-2k)-ic\mu)^{-j-1}}{(n-j)!}\;{}_{j+2}F_{j+1}\left(-\frac{ip+a(-2k+\nu)+c\mu}{2c},\ldots,-\frac{ip+a(-2k+\nu)+c\mu}{2c},-\mu;1-\frac{ip+a(-2k+\nu)+c\mu}{2c},\ldots,1-\frac{ip+a(-2k+\nu)+c\mu}{2c};e^{2icz}\right)+e^{-\frac{1}{2}i\pi\nu+bi(\nu-2k)+(p+ai(\nu-2k))z} \sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(p+ai(\nu-2k)-ic\mu)^{-j-1}}{(n-j)!}\;{}_{j+2}F_{j+1}\left(-\frac{ip-a(-2k+\nu)+c\mu}{2c},\ldots,-\frac{ip-a(-2k+\nu)+c\mu}{2c},-\mu;1-\frac{ip-a(-2k+\nu)+c\mu}{2c},\ldots,1-\frac{ip-a(-2k+\nu)+c\mu}{2c};e^{2icz}\right)\right)\;/;\;n\in\mathbb{N}\land\nu\in\mathbb{N}^+$$

01.06.21.1589.01

$$\int z^n e^{pz}\sin^m(cz)\sin^\nu(b+az)\,dz = 2^{-m} e^{pz}\binom{m}{\frac{m}{2}} n!\,(1-m \bmod 2)\sin^\nu(b+az) \left(\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(p-ia\nu)^{-j-1}}{(n-j)!}\;{}_{j+2}F_{j+1}\left(-\frac{ip+a\nu}{2a},\ldots,-\frac{ip+a\nu}{2a},-\nu;1-\frac{ip+a\nu}{2a},\ldots,1-\frac{ip+a\nu}{2a};e^{2i(b+az)}\right)\right) \left(1-e^{2i(b+az)}\right)^{-\nu}+2^{-m}n!\sin^\nu(b+az) \left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left(e^{(ci(m-2k)+p)z-\frac{im\pi}{2}}\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(ci(m-2k)+p-ia\nu)^{-j-1}}{(n-j)!}\;{}_{j+2}F_{j+1}\left(-\frac{-c(m-2k)+ip+a\nu}{2a},\ldots,-\frac{-c(m-2k)+ip+a\nu}{2a},-\nu;1-\frac{-c(m-2k)+ip+a\nu}{2a},\ldots,1-\frac{-c(m-2k)+ip+a\nu}{2a};e^{2i(b+az)}\right)+e^{\frac{i\pi m}{2}+(p-ic(m-2k))z}\sum_{j=0}^{n}\frac{(-1)^j z^{n-j}(-ic(m-2k)+p-ia\nu)^{-j-1}}{(n-j)!}\;{}_{j+2}F_{j+1}\left(-\frac{c(m-2k)+ip+a\nu}{2a},\ldots,-\frac{c(m-2k)+ip+a\nu}{2a},-\nu;1-\frac{c(m-2k)+ip+a\nu}{2a},\ldots,1-\frac{c(m-2k)+ip+a\nu}{2a};e^{2i(b+az)}\right)\right)\right)\left(1-e^{2i(b+az)}\right)^{-\nu}\;/;\;n\in\mathbb{N}\land m\in\mathbb{N}^+$$

Involving $z^{\alpha-1} e^{pz}\sin^m(cz+d)\sin^\nu(az+b)$

01.06.21.1590.01

$$\int z^{\alpha-1} e^{p z} \sin^m(d + c z) \sin^\nu(b + a z)\, dz = -2^{-m-\nu} z^\alpha \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} \Gamma(\alpha, -p z)(1 - m \bmod 2)(1 - \nu \bmod 2)(-p z)^{-\alpha} - 2^{-m-\nu} z^\alpha \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} (-(p - i c (m - 2k)) z)^{-\alpha} (-(c i (m - 2k) + p) z)^{-\alpha} \left(e^{-i \left(2 d k - d m + \frac{m\pi}{2}\right)} \Gamma(\alpha, -(c i (m - 2k) + p) z) (-(p - i c (m - 2k)) z)^\alpha + e^{i \left(2 d k - d m + \frac{m\pi}{2}\right)} (-(c i (m - 2k) + p) z)^\alpha \Gamma(\alpha, -(p - i c (m - 2k)) z) \right) - 2^{-m-\nu} z^\alpha \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} (-(p - i a (\nu - 2s)) z)^{-\alpha} (-(p + a i (\nu - 2s)) z)^{-\alpha} \left(e^{i \left(2 b s - b \nu + \frac{\pi \nu}{2}\right)} \Gamma(\alpha, -(p - i a (\nu - 2s)) z) (-(p + a i (\nu - 2s)) z)^\alpha + e^{-i \left(2 b s - b \nu + \frac{\pi \nu}{2}\right)} (-(p - i a (\nu - 2s)) z)^\alpha \Gamma(\alpha, -(p + a i (\nu - 2s)) z) \right) - 2^{-m-\nu} z^\alpha \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} (i (2 c k - c m + i p - 2 a s + a \nu) z)^{-\alpha} (-(p + i (2 c k - c m + 2 a s - a \nu)) z)^{-\alpha} (-(p + i (2 c k - c m - 2 a s + a \nu)) z)^{-\alpha} (-(p + i (c (m - 2k) + a (\nu - 2s))) z)^{-\alpha} \left(\left(e^{-i \left(2 b s - b \nu + \frac{\pi \nu}{2}\right)} \left(e^{-i \left(2 d k - d m + \frac{m\pi}{2}\right)} \Gamma(\alpha, -(p + i (c (m - 2k) + a (\nu - 2s))) z) (-(p + i (2 c k - c m - 2 a s + a \nu)) z)^\alpha + e^{i \left(2 d k - d m + \frac{m\pi}{2}\right)} (-(p + i (c (m - 2k) + a (\nu - 2s))) z)^\alpha \Gamma(\alpha, -(p + i (2 c k - c m - 2 a s + a \nu)) z) \right) (i (2 c k - c m + i p - 2 a s + a \nu) z)^\alpha + e^{-i \frac{1}{2} (4 d k - 2 d m - 4 b s + 2 b \nu - \pi \nu + m\pi)} (-(p + i (2 c k - c m - 2 a s + a \nu)) z)^\alpha (-(p + i (c (m - 2k) + a (\nu - 2s))) z)^\alpha \Gamma(\alpha, -(p + i (-2 c k + c m + 2 a s - a \nu)) z) \right) (-(p + i (2 c k - c m + 2 a s - a \nu)) z)^\alpha + e^{\frac{1}{2} i (4 d k - 2 d m + 4 b s - 2 b \nu + \pi \nu + m\pi)} (i (2 c k - c m + i p - 2 a s + a \nu) z)^\alpha (-(p + i (2 c k - c m - 2 a s + a \nu)) z)^\alpha (-(p + i (c (m - 2k) + a (\nu - 2s))) z)^\alpha \Gamma(\alpha, -(p + i (2 c k - c m + 2 a s - a \nu)) z) \right) /; m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

01.06.21.1591.01

$$\int z^n e^{p z} \sin^\mu(c z+d) \sin^\nu(a z+b)\, dz = 2^{-\nu} e^{p z} \binom{\nu}{\frac{\nu}{2}} n!\,(1-\nu \bmod 2) \sin^\mu(d+c z)\left(1-e^{2 i (d+c z)}\right)^{-\mu} \sum_{j=0}^{n} \frac{(-1)^j z^{n-j}}{(n-j)!\,(p-i c \mu)^{j+1}}\, {}_{j+2}F_{j+1}\!\left(-\frac{i p+c\mu}{2c}, \ldots, -\frac{i p+c\mu}{2c}, -\mu; 1-\frac{i p+c\mu}{2c}, \ldots, 1-\frac{i p+c\mu}{2c}; e^{2 i (d+c z)}\right) + 2^{-\nu} n! \sin^\mu(d+c z)\left(1-e^{2 i (d+c z)}\right)^{-\mu} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left(e^{\frac{i\pi\nu}{2} - i b (\nu-2k) + (p - i a(\nu-2k)) z} \sum_{j=0}^{n} \frac{(-1)^j z^{n-j} (p - i a(\nu-2k) - i c\mu)^{-j-1}}{(n-j)!}\, {}_{j+2}F_{j+1}\!\left(-\frac{i p + a(-2k+\nu)+c\mu}{2c}, \ldots, -\frac{i p + a(-2k+\nu)+c\mu}{2c}, -\mu; 1-\frac{i p + a(-2k+\nu)+c\mu}{2c}, \ldots, 1-\frac{i p + a(-2k+\nu)+c\mu}{2c}; e^{2 i (d+c z)}\right) + e^{-\frac{1}{2} i \pi\nu + b i(\nu-2k) + (p + a i(\nu-2k)) z} \sum_{j=0}^{n} \frac{(-1)^j z^{n-j} (p + a i(\nu-2k) - i c\mu)^{-j-1}}{(n-j)!}\, {}_{j+2}F_{j+1}\!\left(-\frac{i p - a(-2k+\nu)+c\mu}{2c}, \ldots, -\frac{i p - a(-2k+\nu)+c\mu}{2c}, -\mu; 1-\frac{i p - a(-2k+\nu)+c\mu}{2c}, \ldots, 1-\frac{i p - a(-2k+\nu)+c\mu}{2c}; e^{2 i (d+c z)}\right)\right) /; n \in \mathbb{N} \land \nu \in \mathbb{N}^+$$

Involving $z^n e^{p z^r} \sin^m(b z) \sin^\nu(c z)$

01.06.21.1592.01

$$\int z^n e^{p z^2} \sin^m(b z) \sin^\nu(c z)\, dz = -(-1)^m 2^{-m-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \left(\sum_{k=0}^{\left\lfloor \frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k} \left(e^{\frac{b^2 (2k-m)^2}{4p} + \frac{i m\pi}{2}} \sum_{j=0}^{n} 2^{j-n} (i b(2k-m))^{n-j} (2 p z - i b(2k-m))^{j+1} \left(-\frac{(2 p z - i b(2k-m))^2}{p}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\!\left(\frac{j+1}{2}, -\frac{(2 p z - i b(2k-m))^2}{4p}\right) + e^{\frac{b^2 (m-2k)^2}{4p} - \frac{i m\pi}{2}} \sum_{j=0}^{n} 2^{j-n} (i b(m-2k))^{n-j} (2 p z - i b(m-2k))^{j+1} \left(-\frac{(2 p z - i b(m-2k))^2}{p}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\!\left(\frac{j+1}{2}, -\frac{(2 p z - i b(m-2k))^2}{4p}\right)\right)\right) p^{-n-1} - (-1)^m i^{-\nu} 2^{-m-\nu-1} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \left(\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^\nu e^{\frac{c^2 (2k-\nu)^2}{4p}} \sum_{j=0}^{n} 2^{j-n} (-i c(2k-\nu))^{n-j} (c i(2k-\nu) + 2 p z)^{j+1} \left(-\frac{(c i(2k-\nu)+2 p z)^2}{p}\right)^{\frac{1}{2}(-j-1)}\right.\right.$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(c\,i\,(2\,k-v)+2\,p\,z)^2}{4\,p}\right)+e^{\frac{c^2\,(v-2\,k)^2}{4\,p}}\sum_{j=0}^{n}2^{j-n}\,(-i\,c\,(v-2\,k))^{n-j}\,(c\,i\,(v-2\,k)+2\,p\,z)^{j+1}$$

$$\left(-\frac{(c\,i\,(v-2\,k)+2\,p\,z)^2}{p}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(c\,i\,(v-2\,k)+2\,p\,z)^2}{4\,p}\right)\Bigg)\Bigg)\,p^{-n-1}-$$

$$(-1)^m\,i^{-v}\,2^{-m-v-1}\left(\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left((-1)^v\,e^{\frac{i\,m\,\pi}{2}-\frac{(i\,c\,(2\,s-v)-i\,b\,(2\,k-m))^2}{4\,p}}\sum_{j=0}^{n}2^{j-n}\,(i\,b\,(2\,k-m)-i\,c\,(2\,s-v))^{n-j}\right.\right.$$

$$(-i\,b\,(2\,k-m)+c\,i\,(2\,s-v)+2\,p\,z)^{j+1}\left(-\frac{(-i\,b\,(2\,k-m)+c\,i\,(2\,s-v)+2\,p\,z)^2}{p}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(-i\,b\,(2\,k-m)+c\,i\,(2\,s-v)+2\,p\,z)^2}{4\,p}\right)+$$

$$(-1)^v\,e^{-\frac{(i\,c\,(2\,s-v)-i\,b\,(m-2\,k))^2}{4\,p}-\frac{i\,m\,\pi}{2}}\sum_{j=0}^{n}2^{j-n}\,(i\,b\,(m-2\,k)-i\,c\,(2\,s-v))^{n-j}$$

$$(-i\,b\,(m-2\,k)+c\,i\,(2\,s-v)+2\,p\,z)^{j+1}\left(-\frac{(-i\,b\,(m-2\,k)+c\,i\,(2\,s-v)+2\,p\,z)^2}{p}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(-i\,b\,(m-2\,k)+c\,i\,(2\,s-v)+2\,p\,z)^2}{4\,p}\right)+$$

$$e^{\frac{i\,m\,\pi}{2}-\frac{(i\,c\,(v-2\,s)-i\,b\,(2\,k-m))^2}{4\,p}}\sum_{j=0}^{n}2^{j-n}\,(i\,b\,(2\,k-m)-i\,c\,(v-2\,s))^{n-j}\,(-i\,b\,(2\,k-m)+c\,i\,(v-2\,s)+2\,p\,z)^{j+1}$$

$$\left(-\frac{(-i\,b\,(2\,k-m)+c\,i\,(v-2\,s)+2\,p\,z)^2}{p}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\Gamma\left(\frac{j+1}{2}, -\frac{(-i\,b\,(2\,k-m)+c\,i\,(v-2\,s)+2\,p\,z)^2}{4\,p}\right)+$$

$$e^{-\frac{(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))^2}{4\,p}-\frac{i\,m\,\pi}{2}}\sum_{j=0}^{n}2^{j-n}\,(i\,b\,(m-2\,k)-i\,c\,(v-2\,s))^{n-j}\,(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,p\,z)^{j+1}$$

$$\left(-\frac{(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,p\,z)^2}{p}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\left.\left.\Gamma\left(\frac{j+1}{2}, -\frac{(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,p\,z)^2}{4\,p}\right)\right)\right)$$

$$p^{-n-1}+(-1)^{m-1}\,2^{-m-v-1}\,z^{n+1}\left(-p\,z^2\right)^{\frac{1}{2}(-n-1)}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}\Gamma\left(\frac{n+1}{2}, -p\,z^2\right)(1-m \bmod 2)$$

$$(1-$$

$$v \bmod 2)\,/;\,n\in\mathbb{N}\land m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

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$$\int z^n e^{p\sqrt{z}} \sin^m(b z) \sin^\nu(c z)\, dz = (-1)^{m-1} 2^{-m-\nu+1} \left(-p\sqrt{z}\right)^{-2(n+1)} z^{n+1} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(2(n+1), -p\sqrt{z}\right) (1 - m \bmod 2)(1 - \nu \bmod 2) +$$

$$i^{-m} 2^{-m-2n-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k}$$

$$\left(e^{-\frac{i p^2}{4b(2k-m)}} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j p^{-h-j+2n} \left(p - 2 i b (2k-m)\sqrt{z}\right)^{h+j} \left(-\frac{i\left(p - 2 i b(2k-m)\sqrt{z}\right)^2}{b(2k-m)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}\right.\right.$$

$$\binom{n}{j} \left(p\left(p - 2 i b(2k-m)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(p - 2 i b(2k-m)\sqrt{z}\right)^2}{4b(2k-m)}\right) - 2 i b(2k-m)\right.$$

$$\left.\left.\left.\sqrt{-\frac{i\left(p - 2 i b(2k-m)\sqrt{z}\right)^2}{b(2k-m)}}\; \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(p - 2 i b(2k-m)\sqrt{z}\right)^2}{4b(2k-m)}\right)\right)\right)\right.$$

$$(-i b(2k-m))^{-2n-2} + (-1)^m e^{-\frac{i p^2}{4b(m-2k)}} (-i b(m-2k))^{-2n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j p^{-h-j+2n}$$

$$\left(p - 2 i b(m-2k)\sqrt{z}\right)^{h+j} \left(-\frac{i\left(p - 2 i b(m-2k)\sqrt{z}\right)^2}{b(m-2k)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\left(p\left(p - 2 i b(m-2k)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(p - 2 i b(m-2k)\sqrt{z}\right)^2}{4b(m-2k)}\right) - \right.$$

$$\left.\left.2 i b(m-2k) \sqrt{-\frac{i\left(p - 2 i b(m-2k)\sqrt{z}\right)^2}{b(m-2k)}}\; \Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(p - 2 i b(m-2k)\sqrt{z}\right)^2}{4b(m-2k)}\right)\right)\right) +$$

$$(-1)^m i^{-\nu} 2^{-m-2n-\nu-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^\nu e^{\frac{i p^2}{4c(2k-\nu)}} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j p^{-h-j+2n}\right.\right.$$

$$\left(p+2\,c\,i\,(2\,k-v)\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(p+2\,c\,i\,(2\,k-v)\,\sqrt{z}\right)^2}{c\,(2\,k-v)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(p\left(p+2\,c\,i\,(2\,k-v)\,\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(p+2\,c\,i\,(2\,k-v)\,\sqrt{z}\right)^2}{4\,c\,(2\,k-v)}\right)+2\,c\,i\,(2\,k-v)\sqrt{\frac{i\left(p+2\,c\,i\,(2\,k-v)\,\sqrt{z}\right)^2}{c\,(2\,k-v)}}$$

$$\left.\left.\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(p+2\,c\,i\,(2\,k-v)\,\sqrt{z}\right)^2}{4\,c\,(2\,k-v)}\right)\right)\right)(i\,c\,(2\,k-v))^{-2\,n-2}+e^{\frac{i\,p^2}{4\,c\,(v-2\,k)}}\,(i\,c\,(v-2\,k))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2\,n}\left(p+2\,c\,i\,(v-2\,k)\,\sqrt{z}\right)^{h+j}\left(\frac{i\left(p+2\,c\,i\,(v-2\,k)\,\sqrt{z}\right)^2}{c\,(v-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(p\left(p+2\,c\,i\,(v-2\,k)\,\sqrt{z}\right)\Gamma\left(\frac{1}{2}(h+j+1),\,\frac{i\left(p+2\,c\,i\,(v-2\,k)\,\sqrt{z}\right)^2}{4\,c\,(v-2\,k)}\right)+\right.$$

$$\left.\left.2\,c\,i\,(v-2\,k)\sqrt{\frac{i\left(p+2\,c\,i\,(v-2\,k)\,\sqrt{z}\right)^2}{c\,(v-2\,k)}}\;\Gamma\left(\frac{1}{2}(h+j+2),\,\frac{i\left(p+2\,c\,i\,(v-2\,k)\,\sqrt{z}\right)^2}{4\,c\,(v-2\,k)}\right)\right)\right)+$$

$$i^{-m-v}\,2^{-m-2\,n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left((-1)^v\,e^{-\frac{p^2}{4\,(i\,c\,(2\,s-v)-i\,b\,(2\,k-m))}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2\,n}\right.\right.$$

$$\left(p+2\,(i\,c\,(2\,s-v)-i\,b\,(2\,k-m))\,\sqrt{z}\right)^{h+j}\left(-\frac{\left(p+2\,(i\,c\,(2\,s-v)-i\,b\,(2\,k-m))\,\sqrt{z}\right)^2}{i\,c\,(2\,s-v)-i\,b\,(2\,k-m)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(p\left(p+2\,(i\,c\,(2\,s-v)-i\,b\,(2\,k-m))\,\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1),\,-\frac{\left(p+2\,(i\,c\,(2\,s-v)-i\,b\,(2\,k-m))\,\sqrt{z}\right)^2}{4\,(i\,c\,(2\,s-v)-i\,b\,(2\,k-m))}\right)+$$

$$2\sqrt{-\frac{\left(p+2\left(i\,c\,(2\,s-v)-i\,b\,(2\,k-m)\right)\sqrt{z}\right)^2}{i\,c\,(2\,s-v)-i\,b\,(2\,k-m)}}\;(i\,c\,(2\,s-v)-i\,b\,(2\,k-m))\,\Gamma\!\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{\left(p+2\left(i\,c\,(2\,s-v)-i\,b\,(2\,k-m)\right)\sqrt{z}\right)^2}{4\left(i\,c\,(2\,s-v)-i\,b\,(2\,k-m)\right)}\right)\right)\right)(i\,c\,(2\,s-v)-i\,b\,(2\,k-m))^{-2\,n-2}+$$

$$(-1)^{m+v}\,e^{-\frac{p^2}{4\,(i\,c\,(2\,s-v)-i\,b\,(m-2\,k))}}\,(i\,c\,(2\,s-v)-i\,b\,(m-2\,k))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2\,n}$$

$$\left(p+2\left(i\,c\,(2\,s-v)-i\,b\,(m-2\,k)\right)\sqrt{z}\right)^{h+j}\left(-\frac{\left(p+2\left(i\,c\,(2\,s-v)-i\,b\,(m-2\,k)\right)\sqrt{z}\right)^2}{i\,c\,(2\,s-v)-i\,b\,(m-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(p\left(p+2\left(i\,c\,(2\,s-v)-i\,b\,(m-2\,k)\right)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\right.\right.$$

$$\left.-\frac{\left(p+2\left(i\,c\,(2\,s-v)-i\,b\,(m-2\,k)\right)\sqrt{z}\right)^2}{4\left(i\,c\,(2\,s-v)-i\,b\,(m-2\,k)\right)}\right)+2\sqrt{-\frac{\left(p+2\left(i\,c\,(2\,s-v)-i\,b\,(m-2\,k)\right)\sqrt{z}\right)^2}{i\,c\,(2\,s-v)-i\,b\,(m-2\,k)}}$$

$$\left.(i\,c\,(2\,s-v)-i\,b\,(m-2\,k))\,\Gamma\!\left(\frac{1}{2}(h+j+2),-\frac{\left(p+2\left(i\,c\,(2\,s-v)-i\,b\,(m-2\,k)\right)\sqrt{z}\right)^2}{4\left(i\,c\,(2\,s-v)-i\,b\,(m-2\,k)\right)}\right)\right)+$$

$$e^{-\frac{p^2}{4\,(i\,c\,(v-2\,s)-i\,b\,(2\,k-m))}}\,(i\,c\,(v-2\,s)-i\,b\,(2\,k-m))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,p^{-h-j+2\,n}$$

$$\left(p+2\left(i\,c\,(v-2\,s)-i\,b\,(2\,k-m)\right)\sqrt{z}\right)^{h+j}\left(-\frac{\left(p+2\left(i\,c\,(v-2\,s)-i\,b\,(2\,k-m)\right)\sqrt{z}\right)^2}{i\,c\,(v-2\,s)-i\,b\,(2\,k-m)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(p\left(p+2\left(i\,c\,(v-2\,s)-i\,b\,(2\,k-m)\right)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\right.\right.$$

$$\left.-\frac{\left(p+2\left(i\,c\,(v-2\,s)-i\,b\,(2\,k-m)\right)\sqrt{z}\right)^2}{4\left(i\,c\,(v-2\,s)-i\,b\,(2\,k-m)\right)}\right)+2\sqrt{-\frac{\left(p+2\left(i\,c\,(v-2\,s)-i\,b\,(2\,k-m)\right)\sqrt{z}\right)^2}{i\,c\,(v-2\,s)-i\,b\,(2\,k-m)}}$$

$$(i\, c\, (v-2\, s) - i\, b\, (2\, k-m))\, \Gamma\!\left(\frac{1}{2}\, (h+j+2),\, -\frac{\left(p+2\, (i\, c\, (v-2\, s)-i\, b\, (2\, k-m))\, \sqrt{z}\right)^2}{4\, (i\, c\, (v-2\, s)-i\, b\, (2\, k-m))}\right)\Bigg) +$$

$$(-1)^m\, e^{-\frac{p^2}{4\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))}}\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))^{-2\, n-2} \sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, p^{-h-j+2\, n}$$

$$\left(p+2\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))\, \sqrt{z}\right)^{h+j} \left(-\frac{\left(p+2\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))\, \sqrt{z}\right)^2}{i\, c\, (v-2\, s)-i\, b\, (m-2\, k)}\right)^{\frac{1}{2}\, (-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg(p\left(p+2\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))\, \sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}\, (h+j+1),\, -\frac{\left(p+2\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))\, \sqrt{z}\right)^2}{4\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))}\right) +$$

$$2\, \sqrt{-\frac{\left(p+2\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))\, \sqrt{z}\right)^2}{i\, c\, (v-2\, s)-i\, b\, (m-2\, k)}}\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))$$

$$\Gamma\!\left(\frac{1}{2}\, (h+j+2),\, -\frac{\left(p+2\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))\, \sqrt{z}\right)^2}{4\, (i\, c\, (v-2\, s)-i\, b\, (m-2\, k))}\right)\Bigg)\Bigg) /;\, n \in \mathbb{N} \land m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

Involving $z^n\, e^{p\, z}\, \sin^m(b\, z^r)\, \sin^v(c\, z)$

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$$\int z^n\, e^{p\, z}\, \sin^m(b\, z^2)\, \sin^v(c\, z)\, dz = (-1)^{m-1}\, 2^{-m-v}\, (-p)^{-n-1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} \Gamma(n+1,\, -p\, z)\, (1-m \bmod 2)\, (1-v \bmod 2) -$$

$$(-1)^m\, i^{-v}\, 2^{-m-v}\, z^{n+1} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{v-1}{2} \right\rfloor} (-1)^k \binom{v}{k} \Big((-1)^v\, \Gamma(n+1,\, (-2\, c\, i\, k-p+i\, c\, v)\, z)\, ((-2\, c\, i\, k-p+i\, c\, v)\, z)^{-n-1} +$$

$$((-p-i\, c\, (v-2\, k))\, z)^{-n-1}\, \Gamma(n+1,\, (-p-i\, c\, (v-2\, k))\, z)\Big) - i^{-m}\, 2^{-m-v-1} \binom{v}{\frac{v}{2}} (1-v \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \Bigg(e^{-\frac{i\, p^2}{4\, b\, (2\, k-m)}} \Bigg(\sum_{j=0}^{n} 2^{j-n}\, (-p)^{n-j}\, (p-2\, i\, b\, (2\, k-m)\, z)^{j+1} \left(-\frac{i\, (p-2\, i\, b\, (2\, k-m)\, z)^2}{b\, (2\, k-m)}\right)^{\frac{1}{2}\, (-j-1)} \binom{n}{j} \Gamma\!\left(\frac{j+1}{2},\right.$$

$$-\frac{i\,(p-2\,i\,b\,(2\,k-m)\,z)^2}{4\,b\,(2\,k-m)}\Bigg)\Bigg)(-i\,b\,(2\,k-m))^{-n-1}+(-1)^m\,e^{-\frac{i\,p^2}{4\,b\,(m-2\,k)}}\,(-i\,b\,(m-2\,k))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-p)^{n-j}$$

$$(p-2\,i\,b\,(m-2\,k)\,z)^{j+1}\left(-\frac{i\,(p-2\,i\,b\,(m-2\,k)\,z)^2}{b\,(m-2\,k)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},-\frac{i\,(p-2\,i\,b\,(m-2\,k)\,z)^2}{4\,b\,(m-2\,k)}\right)\Bigg)-$$

$$(-1)^m\,2^{-m-\nu-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\Bigg(e^{-\frac{i\,(p+c\,i\,(2\,s-\nu))^2}{4\,b\,(2\,k-m)}+\frac{i\,\pi\,\nu}{2}+\frac{i\,m\,\pi}{2}}\Bigg(\sum_{j=0}^{n}2^{j-n}\,(-p-i\,c\,(2\,s-\nu))^{n-j}$$

$$(p+c\,i\,(2\,s-\nu)-2\,i\,b\,(2\,k-m)\,z)^{j+1}\left(-\frac{i\,(p+c\,i\,(2\,s-\nu)-2\,i\,b\,(2\,k-m)\,z)^2}{b\,(2\,k-m)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},-\frac{i\,(p+c\,i\,(2\,s-\nu)-2\,i\,b\,(2\,k-m)\,z)^2}{4\,b\,(2\,k-m)}\right)\Bigg)(-i\,b\,(2\,k-m))^{-n-1}+$$

$$e^{-\frac{i\,(p+c\,i\,(\nu-2\,s))^2}{4\,b\,(2\,k-m)}-\frac{i\,\pi\,\nu}{2}+\frac{i\,m\,\pi}{2}}\Bigg(\sum_{j=0}^{n}2^{j-n}\,(-p-i\,c\,(\nu-2\,s))^{n-j}\,(p+c\,i\,(\nu-2\,s)-2\,i\,b\,(2\,k-m)\,z)^{j+1}$$

$$\left(-\frac{i\,(p+c\,i\,(\nu-2\,s)-2\,i\,b\,(2\,k-m)\,z)^2}{b\,(2\,k-m)}\right)^{\frac{1}{2}(-j-1)}\binom{n}{j}$$

$$\Gamma\!\left(\frac{j+1}{2},-\frac{i\,(p+c\,i\,(\nu-2\,s)-2\,i\,b\,(2\,k-m)\,z)^2}{4\,b\,(2\,k-m)}\right)\Bigg)(-i\,b\,(2\,k-m))^{-n-1}+$$

$$e^{-\frac{i\,(p+c\,i\,(2\,s-\nu))^2}{4\,b\,(m-2\,k)}+\frac{i\,\pi\,\nu}{2}-\frac{i\,m\,\pi}{2}}\,(-i\,b\,(m-2\,k))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-p-i\,c\,(2\,s-\nu))^{n-j}$$

$$(p+c\,i\,(2\,s-\nu)-2\,i\,b\,(m-2\,k)\,z)^{j+1}\left(-\frac{i\,(p+c\,i\,(2\,s-\nu)-2\,i\,b\,(m-2\,k)\,z)^2}{b\,(m-2\,k)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},-\frac{i\,(p+c\,i\,(2\,s-\nu)-2\,i\,b\,(m-2\,k)\,z)^2}{4\,b\,(m-2\,k)}\right)+$$

$$e^{-\frac{i\,(p+c\,i\,(\nu-2\,s))^2}{4\,b\,(m-2\,k)}-\frac{i\,\pi\,\nu}{2}-\frac{i\,m\,\pi}{2}}\,(-i\,b\,(m-2\,k))^{-n-1}\sum_{j=0}^{n}2^{j-n}\,(-p-i\,c\,(\nu-2\,s))^{n-j}$$

$$(p+c\,i\,(\nu-2\,s)-2\,i\,b\,(m-2\,k)\,z)^{j+1}\left(-\frac{i\,(p+c\,i\,(\nu-2\,s)-2\,i\,b\,(m-2\,k)\,z)^2}{b\,(m-2\,k)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\!\left(\frac{j+1}{2},-\frac{i\,(p+c\,i\,(\nu-2\,s)-2\,i\,b\,(m-2\,k)\,z)^2}{4\,b\,(m-2\,k)}\right)\Bigg)\,/;\,n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge \nu\in\mathbb{N}^+$$

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$$\int z^n e^{p z} \sin^m\left(b \sqrt{z}\right) \sin^\nu(c z)\, dz = (-1)^{m-1} 2^{-m-\nu} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} \Gamma(n+1, -p z) (1 - m \bmod 2) (1 - \nu \bmod 2) (-p)^{-n-1} - (-1)^m i^{-\nu} 2^{-m-\nu} z^{n+1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \Big((-1)^\nu \Gamma(n+1, (-2 c i k - p + i c \nu) z) ((-2 c i k - p + i c \nu) z)^{-n-1} + ((-p - i c (\nu - 2k)) z)^{-n-1}$$

$$\Gamma(n+1, (-p - i c (\nu - 2k)) z) \Big) + 2^{-m-2n-\nu-1} i^{-m-\nu} p^{-2n-2} \binom{\nu}{\frac{\nu}{2}} (1 - \nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \Bigg(e^{\frac{b^2 (2k-m)^2}{4p} + \frac{i \pi \nu}{2}}$$

$$\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b (2k - m))^{-h-j+2n} \left(2 p \sqrt{z} - i b (2k - m)\right)^{h+j} \left(-\frac{\left(2 p \sqrt{z} - i b (2k - m)\right)^2}{p} \right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h}$$

$$\binom{n}{j} \Bigg(2 p \sqrt{ -\frac{\left(2 p \sqrt{z} - i b (2k - m)\right)^2}{p} }\; \Gamma\left(\frac{1}{2} (h + j + 2), -\frac{\left(2 p \sqrt{z} - i b (2k - m)\right)^2}{4 p} \right) - i b (2k - m)$$

$$\left(2 p \sqrt{z} - i b (2k - m)\right) \Gamma\left(\frac{1}{2} (h + j + 1), -\frac{\left(2 p \sqrt{z} - i b (2k - m)\right)^2}{4 p} \right) \Bigg) + (-1)^m e^{\frac{b^2 (m-2k)^2}{4p} + \frac{i \pi \nu}{2}}$$

$$\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b (m - 2k))^{-h-j+2n} \left(2 p \sqrt{z} - i b (m - 2k)\right)^{h+j} \left(-\frac{\left(2 p \sqrt{z} - i b (m - 2k)\right)^2}{p} \right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg(2 p \sqrt{ -\frac{\left(2 p \sqrt{z} - i b (m - 2k)\right)^2}{p} }\; \Gamma\left(\frac{1}{2} (h + j + 2), -\frac{\left(2 p \sqrt{z} - i b (m - 2k)\right)^2}{4 p} \right) -$$

$$i b (m - 2k) \left(2 p \sqrt{z} - i b (m - 2k)\right) \Gamma\left(\frac{1}{2} (h + j + 1), -\frac{\left(2 p \sqrt{z} - i b (m - 2k)\right)^2}{4 p} \right) \Bigg) \Bigg) +$$

$$2^{-m-2n-\nu-1} i^{-m-\nu} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \Bigg((-1)^\nu e^{\frac{b^2 (2k-m)^2}{4 (p + c i (2s - \nu))}} \Bigg(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b (2k - m))^{-h-j+2n}$$

$$\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-i\,b\,(2\,k-m)\right)^{h+j}\left(-\frac{\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-i\,b\,(2\,k-m)\right)^2}{p+c\,i\,(2\,s-v)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\,(p+c\,i\,(2\,s-v))\sqrt{-\frac{\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-i\,b\,(2\,k-m)\right)^2}{p+c\,i\,(2\,s-v)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.\right.$$

$$\left.-\frac{\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-i\,b\,(2\,k-m)\right)^2}{4\,(p+c\,i\,(2\,s-v))}\right)-i\,b\,(2\,k-m)\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-\right.$$

$$\left.\left.\left.i\,b\,(2\,k-m)\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-i\,b\,(2\,k-m)\right)^2}{4\,(p+c\,i\,(2\,s-v))}\right)\right)\right)$$

$$(p+c\,i\,(2\,s-v))^{-2\,n-2}+(-1)^{m+v}\,e^{\frac{b^2\,(m-2\,k)^2}{4\,(p+c\,i\,(2\,s-v))}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b\,(m-2\,k))^{-h-j+2\,n}\right.$$

$$\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-i\,b\,(m-2\,k)\right)^{h+j}\left(-\frac{\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-i\,b\,(m-2\,k)\right)^2}{p+c\,i\,(2\,s-v)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\,(p+c\,i\,(2\,s-v))\sqrt{-\frac{\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-i\,b\,(m-2\,k)\right)^2}{p+c\,i\,(2\,s-v)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.\right.$$

$$\left.-\frac{\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-i\,b\,(m-2\,k)\right)^2}{4\,(p+c\,i\,(2\,s-v))}\right)-i\,b\,(m-2\,k)\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-\right.$$

$$\left.\left.\left.i\,b\,(m-2\,k)\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{\left(2\,(p+c\,i\,(2\,s-v))\,\sqrt{z}\;-i\,b\,(m-2\,k)\right)^2}{4\,(p+c\,i\,(2\,s-v))}\right)\right)\right)$$

$$(p+c\,i\,(2\,s-v))^{-2\,n-2}+e^{\frac{b^2\,(2\,k-m)^2}{4\,(p+c\,i\,(v-2\,s))}}\,(p+c\,i\,(v-2\,s))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b\,(2\,k-m))^{-h-j+2\,n}$$

$$\left(2\,(p+c\,i\,(v-2\,s))\,\sqrt{z}\;-i\,b\,(2\,k-m)\right)^{h+j}\left(-\frac{\left(2\,(p+c\,i\,(v-2\,s))\,\sqrt{z}\;-i\,b\,(2\,k-m)\right)^2}{p+c\,i\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\,(p+c\,i\,(v-2\,s))\sqrt{-\frac{\left(2\,(p+c\,i\,(v-2\,s))\sqrt{z}-i\,b\,(2\,k-m)\right)^2}{p+c\,i\,(v-2\,s)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.\right.$$

$$\left.-\frac{\left(2\,(p+c\,i\,(v-2\,s))\sqrt{z}-i\,b\,(2\,k-m)\right)^2}{4\,(p+c\,i\,(v-2\,s))}\right)-i\,b\,(2\,k-m)\left(2\,(p+c\,i\,(v-2\,s))\sqrt{z}-\right.$$

$$\left.\left.i\,b\,(2\,k-m)\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),-\frac{\left(2\,(p+c\,i\,(v-2\,s))\sqrt{z}-i\,b\,(2\,k-m)\right)^2}{4\,(p+c\,i\,(v-2\,s))}\right)\right)+$$

$$(-1)^m\,e^{\frac{b^2\,(m-2\,k)^2}{4\,(p+c\,i\,(v-2\,s))}}\,(p+c\,i\,(v-2\,s))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b\,(m-2\,k))^{-h-j+2\,n}$$

$$\left(2\,(p+c\,i\,(v-2\,s))\sqrt{z}-i\,b\,(m-2\,k)\right)^{h+j}\left(-\frac{\left(2\,(p+c\,i\,(v-2\,s))\sqrt{z}-i\,b\,(m-2\,k)\right)^2}{p+c\,i\,(v-2\,s)}\right)^{\frac{1}{2}\,(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left(2\,(p+c\,i\,(v-2\,s))\sqrt{-\frac{\left(2\,(p+c\,i\,(v-2\,s))\sqrt{z}-i\,b\,(m-2\,k)\right)^2}{p+c\,i\,(v-2\,s)}}\right.$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+2),-\frac{\left(2\,(p+c\,i\,(v-2\,s))\sqrt{z}-i\,b\,(m-2\,k)\right)^2}{4\,(p+c\,i\,(v-2\,s))}\right)-$$

$$i\,b\,(m-2\,k)\left(2\,(p+c\,i\,(v-2\,s))\sqrt{z}-i\,b\,(m-2\,k)\right)\Gamma\!\left(\frac{1}{2}\,(h+j+1),\right.$$

$$\left.\left.\left.-\frac{\left(2\,(p+c\,i\,(v-2\,s))\sqrt{z}-i\,b\,(m-2\,k)\right)^2}{4\,(p+c\,i\,(v-2\,s))}\right)\right)\right)\,/;\,n\in\mathbb{N}\land m\in\mathbb{N}^+\land v\in\mathbb{N}^+$$

Involving $z^n\,e^{p\,z^r}\,\sin^m\!\left(b\,z^r\right)\sin^v(c\,z)$

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$$\int z^n\,e^{p\,z^2}\,\sin^m\!\left(b\,z^2\right)\sin^v(c\,z)\,dz = (-1)^{m-1}\,2^{-m-v-1}\,z^{n+1}\left(-p\,z^2\right)^{\frac{1}{2}\,(-n-1)}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}\Gamma\!\left(\frac{n+1}{2},-p\,z^2\right)(1-m \bmod 2)\,(1-v \bmod 2)-$$

$$i^m\,2^{-m-v-1}\,z^{n+1}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left((-1)^m\,\Gamma\!\left(\frac{n+1}{2},(2\,i\,b\,k-i\,b\,m-p)\,z^2\right)\left((2\,i\,b\,k-i\,b\,m-p)\,z^2\right)^{\frac{1}{2}\,(-n-1)}+\right.$$

$$\left((i\, b\, (m-2\, k)-p)\, z^2\right)^{\frac{1}{2}(-n-1)}\, \Gamma\left(\frac{n+1}{2},\, (i\, b\, (m-2\, k)-p)\, z^2\right)\Bigg)\Bigg)-(-1)^m\, i^{-\nu}\, 2^{-m-\nu-1}\, p^{-n-1} \binom{m}{\frac{m}{2}} (1-m \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \Bigg((-1)^\nu\, e^{\frac{c^2 (\nu-2k)^2}{4p}} \sum_{h=0}^{n} 2^{h-n}\, (i\, c\, (\nu-2\, k))^{n-h}\, (2\, p\, z-i\, c\, (\nu-2\, k))^{h+1} \left(-\frac{(2\, p\, z-i\, c\, (\nu-2\, k))^2}{p}\right)^{\frac{1}{2}(-h-1)}$$

$$\binom{n}{h} \Gamma\left(\frac{h+1}{2},\, -\frac{(2\, p\, z-i\, c\, (\nu-2\, k))^2}{4\, p}\right)+e^{\frac{c^2 (\nu-2k)^2}{4p}} \sum_{h=0}^{n} 2^{h-n}\, (-i\, c\, (\nu-2\, k))^{n-h}$$

$$(c\, i\, (\nu-2\, k)+2\, p\, z)^{h+1} \left(-\frac{(c\, i\, (\nu-2\, k)+2\, p\, z)^2}{p}\right)^{\frac{1}{2}(-h-1)} \binom{n}{h} \Gamma\left(\frac{h+1}{2},\, -\frac{(c\, i\, (\nu-2\, k)+2\, p\, z)^2}{4\, p}\right)\Bigg)-$$

$$(-1)^m\, i^{-\nu}\, 2^{-m-\nu-1} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{j=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^j \binom{\nu}{j} \Bigg(e^{\frac{c^2 (\nu-2j)^2}{4 (p-i b (m-2k))}+i \pi \nu-\frac{i m \pi}{2}} \Bigg(\sum_{h=0}^{n} 2^{h-n}\, (i\, c\, (\nu-2\, j))^{n-h}$$

$$(2\, (p-i\, b\, (m-2\, k))\, z-i\, c\, (\nu-2\, j))^{h+1} \left(-\frac{(2\, (p-i\, b\, (m-2\, k))\, z-i\, c\, (\nu-2\, j))^2}{p-i\, b\, (m-2\, k)}\right)^{\frac{1}{2}(-h-1)}$$

$$\binom{n}{h} \Gamma\left(\frac{h+1}{2},\, -\frac{(2\, (p-i\, b\, (m-2\, k))\, z-i\, c\, (\nu-2\, j))^2}{4\, (p-i\, b\, (m-2\, k))}\right)\Bigg) (p-i\, b\, (m-2\, k))^{-n-1}+$$

$$e^{\frac{c^2 (\nu-2j)^2}{4 (p-i b (m-2k))}-\frac{i m \pi}{2}} \Bigg(\sum_{h=0}^{n} 2^{h-n}\, (-i\, c\, (\nu-2\, j))^{n-h}\, (c\, i\, (\nu-2\, j)+2\, (p-i\, b\, (m-2\, k))\, z)^{h+1}$$

$$\left(-\frac{(c\, i\, (\nu-2\, j)+2\, (p-i\, b\, (m-2\, k))\, z)^2}{p-i\, b\, (m-2\, k)}\right)^{\frac{1}{2}(-h-1)} \binom{n}{h}$$

$$\Gamma\left(\frac{h+1}{2},\, -\frac{(c\, i\, (\nu-2\, j)+2\, (p-i\, b\, (m-2\, k))\, z)^2}{4\, (p-i\, b\, (m-2\, k))}\right)\Bigg) (p-i\, b\, (m-2\, k))^{-n-1}+$$

$$e^{\frac{c^2 (\nu-2j)^2}{4 (b i (m-2k)+p)}+i \pi \nu+\frac{i m \pi}{2}}\, (b\, i\, (m-2\, k)+p)^{-n-1} \sum_{h=0}^{n} 2^{h-n}\, (i\, c\, (\nu-2\, j))^{n-h}\, (2\, (b\, i\, (m-2\, k)+p)\, z-i\, c\, (\nu-2\, j))^{h+1}$$

$$\left(-\frac{(2\, (b\, i\, (m-2\, k)+p)\, z-i\, c\, (\nu-2\, j))^2}{b\, i\, (m-2\, k)+p}\right)^{\frac{1}{2}(-h-1)} \binom{n}{h}$$

$$\Gamma\left(\frac{h+1}{2},\, -\frac{(2\, (b\, i\, (m-2\, k)+p)\, z-i\, c\, (\nu-2\, j))^2}{4\, (b\, i\, (m-2\, k)+p)}\right)+$$

$$e^{\frac{c^2 (v-2j)^2}{4(b i (m-2k)+p)}+\frac{i m \pi}{2}} (b i (m-2k)+p)^{-n-1} \sum_{h=0}^{n} 2^{h-n} (-i c (v-2j))^{n-h} (c i (v-2j)+2(b i (m-2k)+p) z)^{h+1}$$

$$\left(-\frac{(c i (v-2j)+2(b i (m-2k)+p) z)^2}{b i (m-2k)+p}\right)^{\frac{1}{2}(-h-1)} \binom{n}{h}$$

$$\Gamma\left(\frac{h+1}{2}, -\frac{(c i (v-2j)+2(b i (m-2k)+p) z)^2}{4(b i (m-2k)+p)}\right)\Bigg) /; m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+ \bigwedge n \in \mathbb{N}$$

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$$\int z^n e^{p\sqrt{z}} \sin^m\left(b\sqrt{z}\right) \sin^v(c z)\, dz =$$

$$(-1)^{m-1} 2^{-m-v+1} \left(-p\sqrt{z}\right)^{-2(n+1)} z^{n+1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} \Gamma\left(2(n+1), -p\sqrt{z}\right) (1 - m \bmod 2)(1 - v \bmod 2) -$$

$$i^{-m} 2^{-m-v+1} z^{n+1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2) \sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k} \left(\Gamma\left(2(n+1), (2 i b k - i b m - p)\sqrt{z}\right) \left((2 i b k - i b m - p)\sqrt{z}\right)^{-2(n+1)} +\right.$$

$$\left.(-1)^m \left((i b (m-2k) - p)\sqrt{z}\right)^{-2(n+1)} \Gamma\left(2(n+1), (i b (m-2k) - p)\sqrt{z}\right)\right) +$$

$$(-1)^m i^{-v} 2^{-m-2n-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2) \sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor} (-1)^k \binom{v}{k} \left((-1)^v e^{-\frac{i p^2}{4c(v-2k)}} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j p^{-h-j+2n}\right.\right.$$

$$\left(p - 2 i c (v-2k)\sqrt{z}\right)^{h+j} \left(-\frac{i\left(p - 2 i c (v-2k)\sqrt{z}\right)^2}{c(v-2k)}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \left(p\left(p - 2 i c (v-2k)\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1), -\frac{i\left(p - 2 i c (v-2k)\sqrt{z}\right)^2}{4c(v-2k)}\right) - 2 i c (v-2k) \sqrt{-\frac{i\left(p - 2 i c (v-2k)\sqrt{z}\right)^2}{c(v-2k)}}$$

$$\left.\left.\Gamma\left(\frac{1}{2}(h+j+2), -\frac{i\left(p - 2 i c (v-2k)\sqrt{z}\right)^2}{4c(v-2k)}\right)\right)\right) (-i c (v-2k))^{-2n-2} + e^{\frac{i p^2}{4c(v-2k)}} (i c (v-2k))^{-2n-2}$$

$$\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j p^{-h-j+2n} \left(p + 2 c i (v-2k)\sqrt{z}\right)^{h+j} \left(\frac{i\left(p + 2 c i (v-2k)\sqrt{z}\right)^2}{c(v-2k)}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \left(p\left(p + 2 c i (v-2k)\sqrt{z}\right) \Gamma\left(\frac{1}{2}(h+j+1), \frac{i\left(p + 2 c i (v-2k)\sqrt{z}\right)^2}{4c(v-2k)}\right) +\right.$$

$$2\,c\,i\,(v-2\,k)\sqrt{\frac{i\left(p+2\,c\,i\,(v-2\,k)\sqrt{z}\right)^2}{c\,(v-2\,k)}}\;\Gamma\!\left(\frac{1}{2}\,(h+j+2),\,\frac{i\left(p+2\,c\,i\,(v-2\,k)\sqrt{z}\right)^2}{4\,c\,(v-2\,k)}\right)\Bigg)\Bigg)\Bigg)+$$

$$(-1)^m\,i^{-v}\,2^{-m-2\,n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg((-1)^v\,e^{-\frac{i\,(p-i\,b\,(m-2\,k))^2}{4\,c\,(v-2\,s)}-\frac{i\,m\,\pi}{2}}$$

$$\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(p-i\,b\,(m-2\,k))^{-h-j+2\,n}\left(-i\,b\,(m-2\,k)+p-2\,i\,c\,(v-2\,s)\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(-i\,b\,(m-2\,k)+p-2\,i\,c\,(v-2\,s)\sqrt{z}\right)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((p-i\,b\,(m-2\,k))\Big(-i\,b\,(m-2\,k)+$$

$$p-2\,i\,c\,(v-2\,s)\sqrt{z}\Big)\,\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(-i\,b\,(m-2\,k)+p-2\,i\,c\,(v-2\,s)\sqrt{z}\right)^2}{4\,c\,(v-2\,s)}\right)-$$

$$2\,i\,c\,(v-2\,s)\sqrt{-\frac{i\left(-i\,b\,(m-2\,k)+p-2\,i\,c\,(v-2\,s)\sqrt{z}\right)^2}{c\,(v-2\,s)}}\;\Gamma\!\Bigg(\frac{1}{2}\,(h+j+2),$$

$$-\frac{i\left(-i\,b\,(m-2\,k)+p-2\,i\,c\,(v-2\,s)\sqrt{z}\right)^2}{4\,c\,(v-2\,s)}\Bigg)\Bigg)\Bigg)(-i\,c\,(v-2\,s))^{-2\,n-2}+$$

$$(-1)^v\,e^{\frac{i\,m\,\pi}{2}-\frac{i\,(b\,i\,(m-2\,k)+p)^2}{4\,c\,(v-2\,s)}}\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(b\,i\,(m-2\,k)+p)^{-h-j+2\,n}\left(b\,i\,(m-2\,k)+p-2\,i\,c\,(v-2\,s)\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{i\left(b\,i\,(m-2\,k)+p-2\,i\,c\,(v-2\,s)\sqrt{z}\right)^2}{c\,(v-2\,s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((b\,i\,(m-2\,k)+p)\Big(b\,i\,(m-2\,k)+$$

$$p-2\,i\,c\,(v-2\,s)\sqrt{z}\Big)\,\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{i\left(b\,i\,(m-2\,k)+p-2\,i\,c\,(v-2\,s)\sqrt{z}\right)^2}{4\,c\,(v-2\,s)}\right)-$$

$$2\, i\, c\,(v-2s)\sqrt{-\frac{i\left(b\, i\,(m-2k)+p-2\, i\, c\,(v-2s)\sqrt{z}\right)^2}{c\,(v-2s)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{i\left(b\, i\,(m-2k)+p-2\, i\, c\,(v-2s)\sqrt{z}\right)^2}{4\, c\,(v-2s)}\right)\right)\right)(-i\, c\,(v-2s))^{-2n-2}+e^{\frac{i\,(p-i\, b\,(m-2k))^2}{4\, c\,(v-2s)}-\frac{i\, m\,\pi}{2}}$$

$$(i\, c\,(v-2s))^{-2n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(p-i\, b\,(m-2k))^{-h-j+2n}\left(-i\, b\,(m-2k)+p+2\, c\, i\,(v-2s)\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(-i\, b\,(m-2k)+p+2\, c\, i\,(v-2s)\sqrt{z}\right)^2}{c\,(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left((p-i\, b\,(m-2k))\left(-i\, b\,(m-2k)+\right.\right.$$

$$\left.p+2\, c\, i\,(v-2s)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\;\frac{i\left(-i\, b\,(m-2k)+p+2\, c\, i\,(v-2s)\sqrt{z}\right)^2}{4\, c\,(v-2s)}\right)+$$

$$2\, c\, i\,(v-2s)\sqrt{\frac{i\left(-i\, b\,(m-2k)+p+2\, c\, i\,(v-2s)\sqrt{z}\right)^2}{c\,(v-2s)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\frac{i\left(-i\, b\,(m-2k)+p+2\, c\, i\,(v-2s)\sqrt{z}\right)^2}{4\, c\,(v-2s)}\right)\right)+e^{\frac{i\,(b\, i\,(m-2k)+p)^2}{4\, c\,(v-2s)}+\frac{i\, m\,\pi}{2}}\,(i\, c\,(v-2s))^{-2n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\, 4^j\,(b\, i\,(m-2k)+p)^{-h-j+2n}\left(b\, i\,(m-2k)+p+2\, c\, i\,(v-2s)\sqrt{z}\right)^{h+j}$$

$$\left(\frac{i\left(b\, i\,(m-2k)+p+2\, c\, i\,(v-2s)\sqrt{z}\right)^2}{c\,(v-2s)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left((b\, i\,(m-2k)+p)\left(b\, i\,(m-2k)+\right.\right.$$

$$\left.p+2\, c\, i\,(v-2s)\sqrt{z}\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\;\frac{i\left(b\, i\,(m-2k)+p+2\, c\, i\,(v-2s)\sqrt{z}\right)^2}{4\, c\,(v-2s)}\right)+$$

$$2\, c\, i\,(v-2s)\sqrt{\frac{i\left(b\, i\,(m-2k)+p+2\, c\, i\,(v-2s)\sqrt{z}\right)^2}{c\,(v-2s)}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.i\left(b\, i\,(m-2k)+p+2\, c\, i\,(v-2s)\sqrt{z}\right)^2\right)\right)\right)$$

Involving $z^n e^{p z} \sin^m(b z^r) \sin^v(c z^r)$

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$$\int z^n e^{p z} \sin^m(b z^2) \sin^v(c z^2)\, dz = $$

$$(-1)^{m-1} 2^{-m-v} (-p)^{-n-1} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} \Gamma(n+1, -p z) (1 - m \bmod 2) (1 - v \bmod 2) - i^{-m} 2^{-m-v-1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)$$

$$\sum_{k=0}^{\lfloor \frac{m-1}{2} \rfloor} (-1)^k \binom{m}{k} \Bigg(e^{-\frac{i p^2}{4 b (2k-m)}} \Bigg(\sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p - 2 i b (2k-m) z)^{j+1} \left(-\frac{i (p - 2 i b (2k-m) z)^2}{b (2k-m)} \right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (p - 2 i b (2k-m) z)^2}{4 b (2k-m)} \right) \Bigg) (-i b (2k-m))^{-n-1} +$$

$$(-1)^m e^{-\frac{i p^2}{4 b (m-2k)}} (-i b (m-2k))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p - 2 i b (m-2k) z)^{j+1} \left(-\frac{i (p - 2 i b (m-2k) z)^2}{b (m-2k)} \right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{i (p - 2 i b (m-2k) z)^2}{4 b (m-2k)} \right) \Bigg) - (-1)^m i^{-v} 2^{-m-v-1} \binom{m}{\frac{m}{2}} (1 - m \bmod 2)$$

$$\sum_{k=0}^{\lfloor \frac{v-1}{2} \rfloor} (-1)^k \binom{v}{k} \Bigg((-1)^v e^{\frac{i p^2}{4 c (2k-v)}} \Bigg(\sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2 c i (2k-v) z)^{j+1} \left(\frac{i (p + 2 c i (2k-v) z)^2}{c (2k-v)} \right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (p + 2 c i (2k-v) z)^2}{4 c (2k-v)} \right) \Bigg) (i c (2k-v))^{-n-1} + e^{\frac{i p^2}{4 c (v-2k)}} (i c (v-2k))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j}$$

$$(p + 2 c i (v-2k) z)^{j+1} \left(\frac{i (p + 2 c i (v-2k) z)^2}{c (v-2k)} \right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, \frac{i (p + 2 c i (v-2k) z)^2}{4 c (v-2k)} \right) \Bigg) -$$

$$i^{-m-v} 2^{-m-v-1} \sum_{k=0}^{\lfloor \frac{m-1}{2} \rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\lfloor \frac{v-1}{2} \rfloor} (-1)^s \binom{v}{s} \Bigg((-1)^v e^{-\frac{p^2}{4 (i c (2s-v) - i b (2k-m))}}$$

$$\Bigg(\sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2 (i c (2s-v) - i b (2k-m)) z)^{j+1} \left(-\frac{(p + 2 (i c (2s-v) - i b (2k-m)) z)^2}{i c (2s-v) - i b (2k-m)} \right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2 (i c (2s-v) - i b (2k-m)) z)^2}{4 (i c (2s-v) - i b (2k-m))} \right) \Bigg)$$

$$(i c (2s-v) - i b (2k-m))^{-n-1} + (-1)^{m+v} e^{-\frac{p^2}{4 (i c (2s-v) - i b (m-2k))}} (i c (2s-v) - i b (m-2k))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2 (i c (2 s - v) - i b (m - 2 k)) z)^{j+1} \left(-\frac{(p + 2 (i c (2 s - v) - i b (m - 2 k)) z)^2}{i c (2 s - v) - i b (m - 2 k)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2 (i c (2 s - v) - i b (m - 2 k)) z)^2}{4 (i c (2 s - v) - i b (m - 2 k))}\right) +$$

$$e^{-\frac{p^2}{4 (i c (v-2 s) - i b (2 k-m))}} (i c (v - 2 s) - i b (2 k - m))^{-n-1} \sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2 (i c (v - 2 s) - i b (2 k - m)) z)^{j+1}$$

$$\left(-\frac{(p + 2 (i c (v - 2 s) - i b (2 k - m)) z)^2}{i c (v - 2 s) - i b (2 k - m)}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2 (i c (v - 2 s) - i b (2 k - m)) z)^2}{4 (i c (v - 2 s) - i b (2 k - m))}\right) + (-1)^m e^{-\frac{p^2}{4 (i c (v-2 s) - i b (m-2 k))}} (i c (v - 2 s) - i b (m - 2 k))^{-n-1}$$

$$\sum_{j=0}^{n} 2^{j-n} (-p)^{n-j} (p + 2 (i c (v - 2 s) - i b (m - 2 k)) z)^{j+1} \left(-\frac{(p + 2 (i c (v - 2 s) - i b (m - 2 k)) z)^2}{i c (v - 2 s) - i b (m - 2 k)}\right)^{\frac{1}{2}(-j-1)}$$

$$\left.\left.\binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(p + 2 (i c (v - 2 s) - i b (m - 2 k)) z)^2}{4 (i c (v - 2 s) - i b (m - 2 k))}\right)\right)\right) /; n \in \mathbb{N} \land m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

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$$\int z^n e^{p z} \sin^m\left(b \sqrt{z}\right) \sin^v\left(c \sqrt{z}\right) dz ==$$

$$(-1)^{m+n} 2^{-m-v} p^{-1-n} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2) (1 - v \bmod 2) \Gamma(n + 1, -p z) + i^{-m} 2^{-m-2 n-v-1} \binom{v}{\frac{v}{2}} (1 - v \bmod 2)$$

$$\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor} (-1)^k \binom{m}{k} \left(e^{\frac{b^2 (2 k-m)^2}{4 p}} \left(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h} 4^j (-i b (2 k - m))^{-h-j+2 n} \left(2 p \sqrt{z} - i b (2 k - m)\right)^{h+j}\right.\right.$$

$$\left(-\frac{\left(2 p \sqrt{z} - i b (2 k - m)\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j}$$

$$\left(2 p \sqrt{-\frac{\left(2 p \sqrt{z} - i b (2 k - m)\right)^2}{p}} \Gamma\left(\frac{1}{2} (h + j + 2), -\frac{\left(2 p \sqrt{z} - i b (2 k - m)\right)^2}{4 p}\right) - i b (2 k - m)\right.$$

$$\left.\left.\left.\left(2 p \sqrt{z} - i b (2 k - m)\right) \Gamma\left(\frac{1}{2} (h + j + 1), -\frac{\left(2 p \sqrt{z} - i b (2 k - m)\right)^2}{4 p}\right)\right)\right)\right) p^{-2 n-2} + (-1)^m e^{\frac{b^2 (m-2 k)^2}{4 p}}$$

$$\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(-i\,b\,(m-2k))^{-h-j+2n}\left(2p\sqrt{z}-i\,b\,(m-2k)\right)^{h+j}\left(-\frac{\left(2p\sqrt{z}-i\,b\,(m-2k)\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}\right.$$

$$\binom{j}{h}\binom{n}{j}\left(2p\sqrt{-\frac{\left(2p\sqrt{z}-i\,b\,(m-2k)\right)^2}{p}}\;\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{\left(2p\sqrt{z}-i\,b\,(m-2k)\right)^2}{4p}\right)-i\,b\right.$$

$$\left.\left.(m-2k)\left(2p\sqrt{z}-i\,b\,(m-2k)\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{\left(2p\sqrt{z}-i\,b\,(m-2k)\right)^2}{4p}\right)\right)p^{-2n-2}\right)+$$

$$i^{-m-v}\,2^{-m-2n-v-1}\binom{m}{\frac{m}{2}}(1-m\bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\left((-1)^v\,e^{\frac{c^2(2k-v)^2}{4p}-\frac{i m\pi}{2}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(2k-v))^{-h-j+2n}\right.\right.$$

$$\left(2\sqrt{z}\,p+c\,i\,(2k-v)\right)^{h+j}\left(-\frac{\left(2\sqrt{z}\,p+c\,i\,(2k-v)\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\left(c\,i\,(2k-v)\left(2\sqrt{z}\,p+\right.\right.$$

$$\left.c\,i\,(2k-v)\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{\left(2\sqrt{z}\,p+c\,i\,(2k-v)\right)^2}{4p}\right)+2\sqrt{-\frac{\left(2\sqrt{z}\,p+c\,i\,(2k-v)\right)^2}{p}}$$

$$\left.\left.\left.p\,\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{\left(2\sqrt{z}\,p+c\,i\,(2k-v)\right)^2}{4p}\right)\right)\right)p^{-2n-2}+e^{\frac{c^2(v-2k)^2}{4p}-\frac{i m\pi}{2}}$$

$$\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2k))^{-h-j+2n}\left(2\sqrt{z}\,p+c\,i\,(v-2k)\right)^{h+j}\left(-\frac{\left(2\sqrt{z}\,p+c\,i\,(v-2k)\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}\right.$$

$$\binom{j}{h}\binom{n}{j}\left(c\,i\,(v-2k)\left(2\sqrt{z}\,p+c\,i\,(v-2k)\right)\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{\left(2\sqrt{z}\,p+c\,i\,(v-2k)\right)^2}{4p}\right)+2\right.$$

$$\left.\left.\sqrt{-\frac{\left(2\sqrt{z}\,p+c\,i\,(v-2k)\right)^2}{p}}\;p\,\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{\left(2\sqrt{z}\,p+c\,i\,(v-2k)\right)^2}{4p}\right)\right)p^{-2n-2}\right)+i^{-m-v}$$

$$2^{-m-2n-\nu-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^s\binom{\nu}{s}\left((-1)^{\nu}e^{-\frac{(i c(2s-\nu)-i b(2k-m))^2}{4p}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(i c(2s-\nu)-i b(2k-m))^{-h-j+2n}\right.\right.$$

$$\left(-i b(2k-m)+c i(2s-\nu)+2p\sqrt{z}\right)^{h+j}\left(-\frac{\left(-i b(2k-m)+c i(2s-\nu)+2p\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((i c(2s-\nu)-i b(2k-m))\left(-i b(2k-m)+c i(2s-\nu)+2p\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1),-\frac{\left(-i b(2k-m)+c i(2s-\nu)+2p\sqrt{z}\right)^2}{4p}\right)+$$

$$2\sqrt{-\frac{\left(-i b(2k-m)+c i(2s-\nu)+2p\sqrt{z}\right)^2}{p}}\;p\,\Gamma\left(\frac{1}{2}(h+j+2),\right.$$

$$\left.\left.\left.-\frac{\left(-i b(2k-m)+c i(2s-\nu)+2p\sqrt{z}\right)^2}{4p}\right)\right)\right)p^{-2n-2}+$$

$$(-1)^{m+\nu}e^{-\frac{(i c(2s-\nu)-i b(m-2k))^2}{4p}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}4^j(i c(2s-\nu)-i b(m-2k))^{-h-j+2n}\right.$$

$$\left(-i b(m-2k)+c i(2s-\nu)+2p\sqrt{z}\right)^{h+j}\left(-\frac{\left(-i b(m-2k)+c i(2s-\nu)+2p\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\left((i c(2s-\nu)-i b(m-2k))\left(-i b(m-2k)+c i(2s-\nu)+2p\sqrt{z}\right)\right.$$

$$\Gamma\left(\frac{1}{2}(h+j+1),-\frac{\left(-i b(m-2k)+c i(2s-\nu)+2p\sqrt{z}\right)^2}{4p}\right)+$$

$$2\sqrt{-\frac{\left(-i\,b\,(m-2\,k)+c\,i\,(2\,s-v)+2\,p\,\sqrt{z}\right)^2}{p}}\;p\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.$$

$$\left.\left.\left.-\frac{\left(-i\,b\,(m-2\,k)+c\,i\,(2\,s-v)+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)\right)\right)p^{-2\,n-2}+e^{-\frac{(i\,c\,(v-2\,s)-i\,b\,(2\,k-m))^2}{4\,p}}$$

$$\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s)-i\,b\,(2\,k-m))^{-h-j+2\,n}\left(-i\,b\,(2\,k-m)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)^{h+j}\right.$$

$$\left(-\frac{\left(-i\,b\,(2\,k-m)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}$$

$$\left((i\,c\,(v-2\,s)-i\,b\,(2\,k-m))\left(-i\,b\,(2\,k-m)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)\right.$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{\left(-i\,b\,(2\,k-m)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)+$$

$$2\sqrt{-\frac{\left(-i\,b\,(2\,k-m)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)^2}{p}}\;p\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.$$

$$\left.\left.\left.-\frac{\left(-i\,b\,(2\,k-m)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)\right)\right)p^{-2\,n-2}+$$

$$(-1)^m\,e^{-\frac{(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))^2}{4\,p}}\left(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(i\,c\,(v-2\,s)-i\,b\,(m-2\,k))^{-h-j+2\,n}\right.$$

$$\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)^{h+j}\left(-\frac{\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)^2}{p}\right)^{\frac{1}{2}\,(-h-j-1)}$$

$$\binom{j}{h}\binom{n}{j}\Bigg((i\,c\,(v-2\,s)-i\,b\,(m-2\,k))\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\,-\frac{\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)+$$

$$2\,\sqrt{-\frac{\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)^2}{p}}\;p\,\Gamma\!\left(\frac{1}{2}\,(h+j+2),\right.$$

$$\left.\left.\left.-\frac{\left(-i\,b\,(m-2\,k)+c\,i\,(v-2\,s)+2\,p\,\sqrt{z}\right)^2}{4\,p}\right)\right)\right)p^{-2\,n-2}\Bigg)\;/;\;n\in\mathbb{N}\bigwedge m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $z^{\alpha-1}\,e^{p\,z^r}\,\sin^m(b\,z^r)\,\sin^v(c\,z^r)$

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$$\int z^{\alpha-1}\,e^{p\,z^r}\,\sin^m(b\,z^r)\,\sin^v(c\,z^r)\,dz = \frac{(-1)^{m-1}\,2^{-m-v}\,z^\alpha\,(-p\,z^r)^{-\frac{\alpha}{r}}\,(1-m \bmod 2)\,(1-v \bmod 2)}{r}\binom{m}{\frac{m}{2}}\binom{v}{\frac{v}{2}}\Gamma\!\left(\frac{\alpha}{r},\,-p\,z^r\right)-$$

$$\frac{(2\,i)^{-m-v}\,z^\alpha}{r}\binom{v}{\frac{v}{2}}(1-v \bmod 2)\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\left((-1)^m\,e^{\frac{i\,\pi\,v}{2}}\,\Gamma\!\left(\frac{\alpha}{r},\,(-2\,b\,i\,k+i\,b\,m-p)\,z^r\right)((-2\,b\,i\,k+i\,b\,m-p)\,z^r)^{-\frac{\alpha}{r}}+\right.$$

$$\left.e^{\frac{i\,\pi\,v}{2}}\,((2\,i\,b\,k-i\,b\,m-p)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(2\,i\,b\,k-i\,b\,m-p)\,z^r\right)\right)-$$

$$\frac{(-1)^m\,i^{-v}\,2^{-m-v}\,z^\alpha}{r}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\left((-1)^v\,\Gamma\!\left(\frac{\alpha}{r},\,(-2\,c\,i\,k-p+i\,c\,v)\,z^r\right)((-2\,c\,i\,k-p+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}+\right.$$

$$\left.((2\,i\,c\,k-p-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(2\,i\,c\,k-p-i\,c\,v)\,z^r\right)\right)-\frac{i^{m-v}\,2^{-m-v}\,z^\alpha}{r}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}$$

$$\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\left((-1)^v\,\Gamma\!\left(\frac{\alpha}{r},\,(-2\,b\,i\,k+i\,b\,m-p-2\,i\,c\,s+i\,c\,v)\,z^r\right)((-2\,b\,i\,k+i\,b\,m-p-2\,i\,c\,s+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}+\right.$$

$$(-1)^{m+v}\,((2\,i\,b\,k-i\,b\,m-p-2\,i\,c\,s+i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(2\,i\,b\,k-i\,b\,m-p-2\,i\,c\,s+i\,c\,v)\,z^r\right)+$$

$$((-2\,b\,i\,k+i\,b\,m-p+2\,i\,c\,s-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(-2\,b\,i\,k+i\,b\,m-p+2\,i\,c\,s-i\,c\,v)\,z^r\right)+(-1)^m$$

$$\left.((2\,i\,b\,k-i\,b\,m-p+2\,i\,c\,s-i\,c\,v)\,z^r)^{-\frac{\alpha}{r}}\,\Gamma\!\left(\frac{\alpha}{r},\,(2\,i\,b\,k-i\,b\,m-p+2\,i\,c\,s-i\,c\,v)\,z^r\right)\right)\;/;\;m\in\mathbb{N}^+\bigwedge v\in\mathbb{N}^+$$

Involving $z^{\alpha-1} e^{b z^r+e} \sin^m(a z^r+q) \sin^\nu(c z^r+g)$

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$$\int z^{\alpha-1} e^{b z^r+e} \sin^m(a z^r+q) \sin^\nu(c z^r+g)\, dz = \frac{(-1)^{m-1} 2^{-m-\nu} e^e z^\alpha (-b z^r)^{-\frac{\alpha}{r}} (1-m \bmod 2)(1-\nu \bmod 2)}{r} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} \Gamma\left(\frac{\alpha}{r}, -b z^r\right) - \frac{(2 i)^{-m-\nu} z^\alpha}{r} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left((-1)^m e^{e+2 i k q - i m q + \frac{i \pi \nu}{2}} \Gamma\left(\frac{\alpha}{r}, (-b-2 i a k + i a m) z^r\right) ((-b-2 i a k+i a m) z^r)^{-\frac{\alpha}{r}} + e^{e-2 i k q + i m q + \frac{i \pi \nu}{2}} ((-b+2 i a k - i a m) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b+2 i a k - i a m) z^r\right)\right) - \frac{(-1)^m i^{-\nu} 2^{-m-\nu} z^\alpha}{r} \binom{m}{\frac{m}{2}} (1-m \bmod 2) \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left((-1)^\nu e^{e+2 i g k - i g \nu} \Gamma\left(\frac{\alpha}{r}, (-b-2 i c k + i c \nu) z^r\right) ((-b-2 i c k+i c \nu) z^r)^{-\frac{\alpha}{r}} + e^{e-2 i g k + i g \nu} ((-b+2 i c k - i c \nu) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b+2 i c k - i c \nu) z^r\right)\right) - \frac{i^{m-\nu} 2^{-m-\nu} z^\alpha}{r} \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \sum_{s=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^s \binom{\nu}{s} \left((-1)^\nu e^{e+2 i k q - i m q + 2 i g s - i g \nu} \Gamma\left(\frac{\alpha}{r}, (-b-2 i a k + i a m - 2 i c s + i c \nu) z^r\right) ((-b-2 i a k + i a m - 2 i c s + i c \nu) z^r)^{-\frac{\alpha}{r}} + (-1)^{m+\nu} e^{e-2 i k q + i m q + 2 i g s - i g \nu} ((-b+2 i a k - i a m - 2 i c s + i c \nu) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b+2 i a k - i a m - 2 i c s + i c \nu) z^r\right) + e^{e+2 i k q - i m q - 2 i g s + i g \nu} ((-b-2 i a k + i a m + 2 i c s - i c \nu) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b-2 i a k + i a m + 2 i c s - i c \nu) z^r\right) + (-1)^m e^{e-2 i k q + i m q - 2 i g s + i g \nu} ((-b+2 i a k - i a m + 2 i c s - i c \nu) z^r)^{-\frac{\alpha}{r}} \Gamma\left(\frac{\alpha}{r}, (-b+2 i a k - i a m + 2 i c s - i c \nu) z^r\right)\right) /;\ m \in \mathbb{N}^+ \land \nu \in \mathbb{N}^+$$

Involving $z^n e^{b z^r+d z+e} \sin^m(a z^r+p z+q) \sin^\nu(c z^r+f z+g)$

01.06.21.1602.01

$$\int z^n e^{b z^2+d z+e} \sin^m(a z^2+p z+q) \sin^\nu(c z^2+f z+g)\, dz = (-1)^{m-1} 2^{-m-\nu-1} b^{-n-1} e^{e-\frac{d^2}{4b}} \binom{m}{\frac{m}{2}} \binom{\nu}{\frac{\nu}{2}} (1-m \bmod 2)(1-\nu \bmod 2) \sum_{j=0}^n 2^{j-n} (-d)^{n-j} (d+2 b z)^{j+1} \left(-\frac{(d+2 b z)^2}{b}\right)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\left(\frac{j+1}{2}, -\frac{(d+2 b z)^2}{4 b}\right) - i^{-m} 2^{-m-\nu-1} \binom{\nu}{\frac{\nu}{2}} (1-\nu \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \left(e^{-\frac{(d-i(2k-m)p)^2}{4(b-i a(2k-m))}+e-i(2k-m)q} \left(\sum_{j=0}^n 2^{j-n} (i(2k-m)p-d)^{n-j} (d-i(2k-m)p+2(b-i a(2k-m))z)^{j+1} \left(-\frac{(d-i(2k-m)p+2(b-i a(2k-m))z)^2}{b-i a(2k-m)}\right)^{\frac{1}{2}(-j-1)}\right.\right.$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(d-i(2k-m)p+2(b-ia(2k-m))z)^2}{4(b-ia(2k-m))}\right)\Bigg)(b-ia(2k-m))^{-n-1} +$$

$$(-1)^m e^{-\frac{(d-i(m-2k)p)^2}{4(b-ia(m-2k))}+e-i(m-2k)q}(b-ia(m-2k))^{-n-1}\sum_{j=0}^{n}2^{j-n}(i(m-2k)p-d)^{n-j}$$

$$(d-i(m-2k)p+2(b-ia(m-2k))z)^{j+1}\left(-\frac{(d-i(m-2k)p+2(b-ia(m-2k))z)^2}{b-ia(m-2k)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(d-i(m-2k)p+2(b-ia(m-2k))z)^2}{4(b-ia(m-2k))}\right)\Bigg) -$$

$$i^{-m-v}2^{-m-v-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^k\binom{v}{k}\Bigg((-1)^v e^{-\frac{(d+fi(2k-v))^2}{4(b+ci(2k-v))}+e+gi(2k-v)-\frac{im\pi}{2}}\Bigg(\sum_{j=0}^{n}2^{j-n}(-d-if(2k-v))^{n-j}$$

$$(d+fi(2k-v)+2(b+ci(2k-v))z)^{j+1}\left(-\frac{(d+fi(2k-v)+2(b+ci(2k-v))z)^2}{b+ci(2k-v)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(d+fi(2k-v)+2(b+ci(2k-v))z)^2}{4(b+ci(2k-v))}\right)\Bigg)(b+ci(2k-v))^{-n-1} +$$

$$e^{-\frac{(d+fi(v-2k))^2}{4(b+ci(v-2k))}+e+gi(v-2k)-\frac{im\pi}{2}}(b+ci(v-2k))^{-n-1}\sum_{j=0}^{n}2^{j-n}(-d-if(v-2k))^{n-j}$$

$$(d+fi(v-2k)+2(b+ci(v-2k))z)^{j+1}\left(-\frac{(d+fi(v-2k)+2(b+ci(v-2k))z)^2}{b+ci(v-2k)}\right)^{\frac{1}{2}(-j-1)}$$

$$\binom{n}{j}\Gamma\left(\frac{j+1}{2}, -\frac{(d+fi(v-2k)+2(b+ci(v-2k))z)^2}{4(b+ci(v-2k))}\right)\Bigg) -$$

$$i^{-m-v}2^{-m-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg((-1)^v e^{-\frac{(d-i(2k-m)p+fi(2s-v))^2}{4(b-ia(2k-m)+ci(2s-v))}+e-i(2k-m)q+gi(2s-v)}$$

$$\Bigg(\sum_{j=0}^{n}2^{j-n}(-d+i(2k-m)p-if(2s-v))^{n-j}(d-i(2k-m)p+fi(2s-v)+2(b-ia(2k-m)+ci(2s-$$

$$v))z)^{j+1}\left(-(d-i(2k-m)p+fi(2s-v)+2(b-ia(2k-m)+ci(2s-v))z)^2\right/$$

$$(b-ia(2k-m)+ci(2s-v))\Big)^{\frac{1}{2}(-j-1)}\binom{n}{j}\Gamma\Bigg(\frac{j+1}{2}, -(d-i(2k-m)p+$$

$$fi(2s-v)+2(b-ia(2k-m)+ci(2s-v))z)^2\Big/(4(b-ia(2k-m)+ci(2s-v)))\Bigg)\Bigg)$$

$$(b - i\, a\,(2k - m) + c\, i\,(2s - v))^{-n-1} + (-1)^{m+v}\, e^{-\frac{(d - i\,(m-2k)\,p + f\,i\,(2s-v))^2}{4\,(b - i\,a\,(m-2k) + c\,i\,(2s-v))} + e - i\,(m-2k)\,q + g\,i\,(2s-v)}$$
$$(b - i\,a\,(m-2k) + c\,i\,(2s-v))^{-n-1} \sum_{j=0}^{n} 2^{j-n}\,(-d + i\,(m-2k)\,p - i\,f\,(2s-v))^{n-j}$$
$$(d - i\,(m-2k)\,p + f\,i\,(2s-v) + 2\,(b - i\,a\,(m-2k) + c\,i\,(2s-v))\,z)^{j+1}$$
$$\Big(-(d - i\,(m-2k)\,p + f\,i\,(2s-v) + 2\,(b - i\,a\,(m-2k) + c\,i\,(2s-v))\,z)^2 \Big/$$
$$(b - i\,a\,(m-2k) + c\,i\,(2s-v))\Big)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\Big(\frac{j+1}{2}, -(d - i\,(m-2k)\,p + f\,i\,(2s-v) +$$
$$2\,(b - i\,a\,(m-2k) + c\,i\,(2s-v))\,z)^2 \Big/ (4\,(b - i\,a\,(m-2k) + c\,i\,(2s-v)))\Big) +$$
$$e^{-\frac{(d - i\,(2k-m)\,p + f\,i\,(v-2s))^2}{4\,(b - i\,a\,(2k-m) + c\,i\,(v-2s))} + e - i\,(2k-m)\,q + g\,i\,(v-2s)}\,(b - i\,a\,(2k-m) + c\,i\,(v-2s))^{-n-1} \sum_{j=0}^{n} 2^{j-n}$$
$$(-d + i\,(2k-m)\,p - i\,f\,(v-2s))^{n-j}\,(d - i\,(2k-m)\,p + f\,i\,(v-2s) + 2\,(b - i\,a\,(2k-m) + c\,i\,(v-2s))$$
$$z)^{j+1} \Big(-(d - i\,(2k-m)\,p + f\,i\,(v-2s) + 2\,(b - i\,a\,(2k-m) + c\,i\,(v-2s))\,z)^2 \Big/$$
$$(b - i\,a\,(2k-m) + c\,i\,(v-2s))\Big)^{\frac{1}{2}(-j-1)} \binom{n}{j} \Gamma\Big(\frac{j+1}{2}, -(d - i\,(2k-m)\,p + f\,i\,(v-2s) +$$
$$2\,(b - i\,a\,(2k-m) + c\,i\,(v-2s))\,z)^2 \Big/ (4\,(b - i\,a\,(2k-m) + c\,i\,(v-2s)))\Big) +$$
$$(-1)^m\, e^{-\frac{(d - i\,(m-2k)\,p + f\,i\,(v-2s))^2}{4\,(b - i\,a\,(m-2k) + c\,i\,(v-2s))} + e - i\,(m-2k)\,q + g\,i\,(v-2s)}\,(b - i\,a\,(m-2k) + c\,i\,(v-2s))^{-n-1}$$
$$\sum_{j=0}^{n} 2^{j-n}\,(-d + i\,(m-2k)\,p - i\,f\,(v-2s))^{n-j}\,(d - i\,(m-2k)\,p + f\,i\,(v-2s) +$$
$$2\,(b - i\,a\,(m-2k) + c\,i\,(v-2s))\,z)^{j+1} \Big(-(d - i\,(m-2k)\,p + f\,i\,(v-2s) +$$
$$2\,(b - i\,a\,(m-2k) + c\,i\,(v-2s))\,z)^2 \Big/ (b - i\,a\,(m-2k) + c\,i\,(v-2s))\Big)^{\frac{1}{2}(-j-1)}$$
$$\binom{n}{j} \Gamma\Big(\frac{j+1}{2}, -(d - i\,(m-2k)\,p + f\,i\,(v-2s) + 2\,(b - i\,a\,(m-2k) + c\,i\,(v-2s))\,z)^2 \Big/$$
$$(4\,(b - i\,a\,(m-2k) + c\,i\,(v-2s)))\Big)\Big) /;\ n \in \mathbb{N} \bigwedge m \in \mathbb{N}^+ \bigwedge v \in \mathbb{N}^+$$

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$$\int z^n\, e^{\sqrt{z}\,b + d\,z + e} \sin^m\big(\sqrt{z}\,a + p\,z + q\big) \sin^v\big(\sqrt{z}\,c + f\,z + g\big)\, dz =$$
$$(-1)^m\, 2^{-m-2n-v-1}\, d^{-2n-2}\, e^{e - \frac{b^2}{4d}} \binom{m}{\frac{m}{2}} \binom{v}{\frac{v}{2}} (1 - m \bmod 2)\,(1 - v \bmod 2)$$
$$\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, b^{-h-j+2n} \big(b + 2d\sqrt{z}\big)^{h+j} \left(-\frac{\big(b + 2d\sqrt{z}\big)^2}{d}\right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \Bigg(b\,\big(b + 2d\sqrt{z}\big)\,\Gamma\Bigg(\frac{1}{2}(h + j + 1),$$
$$-\frac{\big(b + 2d\sqrt{z}\big)^2}{4d}\Bigg) + 2\sqrt{-\frac{\big(b + 2d\sqrt{z}\big)^2}{d}}\; d\,\Gamma\Bigg(\frac{1}{2}(h + j + 2), -\frac{\big(b + 2d\sqrt{z}\big)^2}{4d}\Bigg)\Bigg) + i^{-m}\, 2^{-m-2n-v-1} \binom{v}{\frac{v}{2}}$$

$$(1 - v \bmod 2) \sum_{k=0}^{\left\lfloor \frac{m-1}{2} \right\rfloor} (-1)^k \binom{m}{k} \Bigg(e^{-\frac{(b-i\,a\,(2\,k-m))^2}{4\,(d-i\,(2\,k-m)\,p)} + e - i\,(2\,k-m)\,q} \Bigg(\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (b - i\,a\,(2\,k-m))^{-h-j+2\,n} \Big(b - i\,a\,(2\,k-m) +$$

$$2\,(d - i\,(2\,k-m)\,p)\,\sqrt{z}\Big)^{h+j} \left(-\frac{\left(b - i\,a\,(2\,k-m) + 2\,(d - i\,(2\,k-m)\,p)\,\sqrt{z}\right)^2}{d - i\,(2\,k-m)\,p} \right)^{\frac{1}{2}(-h-j-1)}$$

$$\binom{j}{h} \binom{n}{j} \Bigg((b - i\,a\,(2\,k-m)) \left(b - i\,a\,(2\,k-m) + 2\,(d - i\,(2\,k-m)\,p)\,\sqrt{z}\right)$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+1),\, -\frac{\left(b - i\,a\,(2\,k-m) + 2\,(d - i\,(2\,k-m)\,p)\,\sqrt{z}\right)^2}{4\,(d - i\,(2\,k-m)\,p)} \right) + 2$$

$$\sqrt{-\frac{\left(b - i\,a\,(2\,k-m) + 2\,(d - i\,(2\,k-m)\,p)\,\sqrt{z}\right)^2}{d - i\,(2\,k-m)\,p}}\ (d - i\,(2\,k-m)\,p)$$

$$\Gamma\!\left(\frac{1}{2}\,(h+j+2),\, -\frac{\left(b - i\,a\,(2\,k-m) + 2\,(d - i\,(2\,k-m)\,p)\,\sqrt{z}\right)^2}{4\,(d - i\,(2\,k-m)\,p)} \right) \Bigg) \Bigg) \Bigg)$$

$$(d - i\,(2\,k-m)\,p)^{-2\,n-2} + (-1)^m\, e^{-\frac{(b-i\,a\,(m-2\,k))^2}{4\,(d-i\,(m-2\,k)\,p)} + e - i\,(m-2\,k)\,q}\, (d - i\,(m-2\,k)\,p)^{-2\,n-2}$$

$$\sum_{j=0}^{n} \sum_{h=0}^{j} (-1)^{j-h}\, 4^j\, (b - i\,a\,(m-2\,k))^{-h-j+2\,n} \left(b - i\,a\,(m-2\,k) + 2\,(d - i\,(m-2\,k)\,p)\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(b - i\,a\,(m-2\,k) + 2\,(d - i\,(m-2\,k)\,p)\,\sqrt{z}\right)^2}{d - i\,(m-2\,k)\,p} \right)^{\frac{1}{2}(-h-j-1)} \binom{j}{h} \binom{n}{j} \Bigg((b - i\,a\,(m-2\,k)) \Big(b - i\,a\,(m-2\,k) +$$

$$2\,(d - i\,(m-2\,k)\,p)\,\sqrt{z}\Big)\, \Gamma\!\left(\frac{1}{2}\,(h+j+1),\, -\frac{\left(b - i\,a\,(m-2\,k) + 2\,(d - i\,(m-2\,k)\,p)\,\sqrt{z}\right)^2}{4\,(d - i\,(m-2\,k)\,p)} \right) +$$

$$2\,\sqrt{-\frac{\left(b - i\,a\,(m-2\,k) + 2\,(d - i\,(m-2\,k)\,p)\,\sqrt{z}\right)^2}{d - i\,(m-2\,k)\,p}}\ (d - i\,(m-2\,k)\,p)\, \Gamma\Bigg($$

$$\frac{1}{2}(h+j+2),\, -\frac{\left(b-i\,a\,(m-2\,k)+2\,(d-i\,(m-2\,k)\,p)\,\sqrt{z}\right)^2}{4\,(d-i\,(m-2\,k)\,p)}\Bigg)\Bigg)\Bigg)\Bigg)+$$

$$i^{-m-\nu}\,2^{-m-2\,n-\nu-1}\binom{m}{\frac{m}{2}}(1-m \bmod 2)\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^k\binom{\nu}{k}\Bigg((-1)^\nu\,e^{-\frac{(b+c\,i\,(2\,k-\nu))^2}{4\,(d+f\,i\,(2\,k-\nu))}+e+g\,i\,(2\,k-\nu)-\frac{i\,m\,\pi}{2}}$$

$$\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(b+c\,i\,(2\,k-\nu))^{-h-j+2\,n}\left(b+c\,i\,(2\,k-\nu)+2\,(d+f\,i\,(2\,k-\nu))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(b+c\,i\,(2\,k-\nu)+2\,(d+f\,i\,(2\,k-\nu))\,\sqrt{z}\right)^2}{d+f\,i\,(2\,k-\nu)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((b+c\,i\,(2\,k-\nu))\Big(b+c\,i\,(2\,k-\nu)+$$

$$2\,(d+f\,i\,(2\,k-\nu))\,\sqrt{z}\Big)\,\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{\left(b+c\,i\,(2\,k-\nu)+2\,(d+f\,i\,(2\,k-\nu))\,\sqrt{z}\right)^2}{4\,(d+f\,i\,(2\,k-\nu))}\right)+2$$

$$\sqrt{-\frac{\left(b+c\,i\,(2\,k-\nu)+2\,(d+f\,i\,(2\,k-\nu))\,\sqrt{z}\right)^2}{d+f\,i\,(2\,k-\nu)}}\;(d+f\,i\,(2\,k-\nu))$$

$$\Gamma\!\left(\frac{1}{2}(h+j+2),\,-\frac{\left(b+c\,i\,(2\,k-\nu)+2\,(d+f\,i\,(2\,k-\nu))\,\sqrt{z}\right)^2}{4\,(d+f\,i\,(2\,k-\nu))}\right)\Bigg)\Bigg)$$

$$(d+f\,i\,(2\,k-\nu))^{-2\,n-2}+e^{-\frac{(b+c\,i\,(\nu-2\,k))^2}{4\,(d+f\,i\,(\nu-2\,k))}+e+g\,i\,(\nu-2\,k)-\frac{i\,m\,\pi}{2}}\,(d+f\,i\,(\nu-2\,k))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(b+c\,i\,(\nu-2\,k))^{-h-j+2\,n}\left(b+c\,i\,(\nu-2\,k)+2\,(d+f\,i\,(\nu-2\,k))\,\sqrt{z}\right)^{h+j}$$

$$\left(-\frac{\left(b+c\,i\,(\nu-2\,k)+2\,(d+f\,i\,(\nu-2\,k))\,\sqrt{z}\right)^2}{d+f\,i\,(\nu-2\,k)}\right)^{\frac{1}{2}(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((b+c\,i\,(\nu-2\,k))\Big(b+c\,i\,(\nu-2\,k)+$$

$$2\,(d+f\,i\,(\nu-2\,k))\,\sqrt{z}\Big)\,\Gamma\!\left(\frac{1}{2}(h+j+1),\,-\frac{\left(b+c\,i\,(\nu-2\,k)+2\,(d+f\,i\,(\nu-2\,k))\,\sqrt{z}\right)^2}{4\,(d+f\,i\,(\nu-2\,k))}\right)+$$

$$2\sqrt{-\frac{\left(b+c\,i\,(v-2\,k)+2\,(d+f\,i\,(v-2\,k))\sqrt{z}\right)^2}{d+f\,i\,(v-2\,k)}}\;(d+f\,i\,(v-2\,k))\,\Gamma\Bigg($$

$$\frac{1}{2}\,(h+j+2),\,-\frac{\left(b+c\,i\,(v-2\,k)+2\,(d+f\,i\,(v-2\,k))\sqrt{z}\right)^2}{4\,(d+f\,i\,(v-2\,k))}\Bigg)\Bigg)\Bigg)\Bigg)+$$

$$i^{-m-v}\,2^{-m-2\,n-v-1}\sum_{k=0}^{\left\lfloor\frac{m-1}{2}\right\rfloor}(-1)^k\binom{m}{k}\sum_{s=0}^{\left\lfloor\frac{v-1}{2}\right\rfloor}(-1)^s\binom{v}{s}\Bigg((-1)^v\,e^{-\frac{(b-i\,a\,(2\,k-m)+c\,i\,(2\,s-v))^2}{4\,(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))}+e-i\,(2\,k-m)\,q+g\,i\,(2\,s-v)}$$

$$\Bigg(\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(b-i\,a\,(2\,k-m)+c\,i\,(2\,s-v))^{-h-j+2\,n}$$

$$\left(b-i\,a\,(2\,k-m)+c\,i\,(2\,s-v)+2\,(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))\sqrt{z}\right)^{h+j}$$

$$\Bigg(-\left(b-i\,a\,(2\,k-m)+c\,i\,(2\,s-v)+2\,(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))\sqrt{z}\right)^2\Big/$$

$$(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))\Bigg)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((b-i\,a\,(2\,k-m)+c\,i\,(2\,s-v))$$

$$\left(b-i\,a\,(2\,k-m)+c\,i\,(2\,s-v)+2\,(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))\sqrt{z}\right)$$

$$\Gamma\Bigg(\frac{1}{2}\,(h+j+1),\,-\left(b-i\,a\,(2\,k-m)+c\,i\,(2\,s-v)+2\,(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))\sqrt{z}\right)^2\Big/$$

$$(4\,(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v)))\Bigg)+2\,(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))\,\Gamma\Bigg(\frac{1}{2}\,(h+j+2),$$

$$-\left(b-i\,a\,(2\,k-m)+c\,i\,(2\,s-v)+2\,(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))\sqrt{z}\right)^2\Big/$$

$$(4\,(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v)))\Bigg)\sqrt{\Big(-\big(b-i\,a\,(2\,k-m)+c\,i\,(2\,s-v)+}$$

$$\overline{2\,(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))\sqrt{z}\big)^2\Big/(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))\Big)}\Bigg)\Bigg)$$

$$(d-i\,(2\,k-m)\,p+f\,i\,(2\,s-v))^{-2\,n-2}+(-1)^{m+v}\,e^{-\frac{(b-i\,a\,(m-2\,k)+c\,i\,(2\,s-v))^2}{4\,(d-i\,(m-2\,k)\,p+f\,i\,(2\,s-v))}+e-i\,(m-2\,k)\,q+g\,i\,(2\,s-v)}$$

$$(d-i\,(m-2\,k)\,p+f\,i\,(2\,s-v))^{-2\,n-2}\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(b-i\,a\,(m-2\,k)+c\,i\,(2\,s-v))^{-h-j+2\,n}$$

$$\left(b-i\,a\,(m-2\,k)+c\,i\,(2\,s-v)+2\,(d-i\,(m-2\,k)\,p+f\,i\,(2\,s-v))\sqrt{z}\right)^{h+j}$$

$$\Bigg(-\left(b-i\,a\,(m-2\,k)+c\,i\,(2\,s-v)+2\,(d-i\,(m-2\,k)\,p+f\,i\,(2\,s-v))\sqrt{z}\right)^2\Big/$$

$$(d-i\,(m-2\,k)\,p+f\,i\,(2\,s-v))\Bigg)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}\Bigg((b-i\,a\,(m-2\,k)+c\,i\,(2\,s-v))$$

$$\left(b-i\,a\,(m-2\,k)+c\,i\,(2\,s-v)+2\,(d-i\,(m-2\,k)\,p+f\,i\,(2\,s-v))\sqrt{z}\right)$$

$$\Gamma\Bigg(\frac{1}{2}\,(h+j+1),\,-\left(b-i\,a\,(m-2\,k)+c\,i\,(2\,s-v)+2\,(d-i\,(m-2\,k)\,p+f\,i\,(2\,s-v))\sqrt{z}\right)^2\Big/$$

$$(4\,(d - i\,(m - 2\,k)\,p + f\,i\,(2\,s - v)))\Big) + 2\,(d - i\,(m - 2\,k)\,p + f\,i\,(2\,s - v))$$

$$\Gamma\Big(\frac{1}{2}\,(h + j + 2),\, -\big(b - i\,a\,(m - 2\,k) + c\,i\,(2\,s - v) + 2\,(d - i\,(m - 2\,k)\,p + f\,i\,(2\,s - v))\,\sqrt{z}\,\big)^2 \Big/$$

$$(4\,(d - i\,(m - 2\,k)\,p + f\,i\,(2\,s - v)))\Big)\sqrt{\Big(-\big(b - i\,a\,(m - 2\,k) + c\,i\,(2\,s - v) +}$$

$$2\,(d - i\,(m - 2\,k)\,p + f\,i\,(2\,s - v))\,\sqrt{z}\,\big)^2 \Big/ (d - i\,(m - 2\,k)\,p + f\,i\,(2\,s - v))\Big)\Big) +$$

$$e^{-\frac{(b-i\,a\,(2\,k-m)+c\,i\,(v-2\,s))^2}{4\,(d-i\,(2\,k-m)\,p+f\,i\,(v-2\,s))}+e-i\,(2\,k-m)\,q+g\,i\,(v-2\,s)}\,(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(b - i\,a\,(2\,k - m) + c\,i\,(v - 2\,s))^{-h-j+2\,n}$$

$$\big(b - i\,a\,(2\,k - m) + c\,i\,(v - 2\,s) + 2\,(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)^{h+j}$$

$$\Big(-\big(b - i\,a\,(2\,k - m) + c\,i\,(v - 2\,s) + 2\,(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)^2 \Big/$$

$$(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s))\Big)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}\Big((b - i\,a\,(2\,k - m) + c\,i\,(v - 2\,s))$$

$$\big(b - i\,a\,(2\,k - m) + c\,i\,(v - 2\,s) + 2\,(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)$$

$$\Gamma\Big(\frac{1}{2}\,(h + j + 1),\, -\big(b - i\,a\,(2\,k - m) + c\,i\,(v - 2\,s) + 2\,(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)^2 \Big/$$

$$(4\,(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s)))\Big) + 2\,(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s))$$

$$\Gamma\Big(\frac{1}{2}\,(h + j + 2),\, -\big(b - i\,a\,(2\,k - m) + c\,i\,(v - 2\,s) + 2\,(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)^2 \Big/$$

$$(4\,(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s)))\Big)\sqrt{\Big(-\big(b - i\,a\,(2\,k - m) + c\,i\,(v - 2\,s) +}$$

$$2\,(d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)^2 \Big/ (d - i\,(2\,k - m)\,p + f\,i\,(v - 2\,s))\Big)\Big) +$$

$$(-1)^m\,e^{-\frac{(b-i\,a\,(m-2\,k)+c\,i\,(v-2\,s))^2}{4\,(d-i\,(m-2\,k)\,p+f\,i\,(v-2\,s))}+e-i\,(m-2\,k)\,q+g\,i\,(v-2\,s)}\,(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s))^{-2\,n-2}$$

$$\sum_{j=0}^{n}\sum_{h=0}^{j}(-1)^{j-h}\,4^j\,(b - i\,a\,(m - 2\,k) + c\,i\,(v - 2\,s))^{-h-j+2\,n}$$

$$\big(b - i\,a\,(m - 2\,k) + c\,i\,(v - 2\,s) + 2\,(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)^{h+j}$$

$$\Big(-\big(b - i\,a\,(m - 2\,k) + c\,i\,(v - 2\,s) + 2\,(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)^2 \Big/$$

$$(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s))\Big)^{\frac{1}{2}\,(-h-j-1)}\binom{j}{h}\binom{n}{j}\Big((b - i\,a\,(m - 2\,k) + c\,i\,(v - 2\,s))$$

$$\big(b - i\,a\,(m - 2\,k) + c\,i\,(v - 2\,s) + 2\,(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)$$

$$\Gamma\Big(\frac{1}{2}\,(h + j + 1),\, -\big(b - i\,a\,(m - 2\,k) + c\,i\,(v - 2\,s) + 2\,(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)^2 \Big/$$

$$(4\,(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s)))\Big) + 2\,(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s))$$

$$\Gamma\Big(\frac{1}{2}\,(h + j + 2),\, -\big(b - i\,a\,(m - 2\,k) + c\,i\,(v - 2\,s) + 2\,(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)^2 \Big/$$

$$(4\,(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s)))\Big)$$

$$\sqrt{\Big(-\big(b - i\,a\,(m - 2\,k) + c\,i\,(v - 2\,s) + 2\,(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s))\,\sqrt{z}\,\big)^2 \Big/}$$

$$(d - i\,(m - 2\,k)\,p + f\,i\,(v - 2\,s))\Big)\Big)\Big)\,/;\, n \in \mathbb{N} \land m \in \mathbb{N}^+ \land v \in \mathbb{N}^+$$

Involving products of powers of several direct functions, exponential and a power functions

Involving $z^{\alpha-1}\, d^z \sin^2(a\,z) \sin(b\,z) \sin(c\,z)$

01.06.21.1604.01

$$\int z^{\alpha-1}\, d^z \sin^2(a\,z) \sin(b\,z) \sin(c\,z)\, dz = \frac{1}{16}\Big(-z^\alpha\,\Gamma(\alpha,\, -z\,(-i\,(2\,a - b - c) + \log(d)))\,(-z\,(-i\,(2\,a - b - c) + \log(d)))^{-\alpha} -$$
$$z^\alpha\,\Gamma(\alpha,\, -z\,(i\,(2\,a - b - c) + \log(d)))\,(-z\,(i\,(2\,a - b - c) + \log(d)))^{-\alpha}\Big) +$$
$$\frac{1}{8}\Big(-z^\alpha\,\Gamma(\alpha,\, -z\,(-i\,(b - c) + \log(d)))\,(-z\,(-i\,(b - c) + \log(d)))^{-\alpha} - z^\alpha\,\Gamma(\alpha,\, -z\,(i\,(b - c) + \log(d)))\,(-z\,(i\,(b - c) + \log(d)))^{-\alpha}\Big) +$$
$$\frac{1}{16}\Big(z^\alpha\,\Gamma(\alpha,\, -z\,(-i\,(2\,a + b - c) + \log(d)))\,(-z\,(-i\,(2\,a + b - c) + \log(d)))^{-\alpha} +$$
$$z^\alpha\,\Gamma(\alpha,\, -z\,(i\,(2\,a + b - c) + \log(d)))\,(-z\,(i\,(2\,a + b - c) + \log(d)))^{-\alpha}\Big) +$$
$$\frac{1}{16}\Big(z^\alpha\,\Gamma(\alpha,\, -z\,(-i\,(2\,a - b + c) + \log(d)))\,(-z\,(-i\,(2\,a - b + c) + \log(d)))^{-\alpha} +$$
$$z^\alpha\,\Gamma(\alpha,\, -z\,(i\,(2\,a - b + c) + \log(d)))\,(-z\,(i\,(2\,a - b + c) + \log(d)))^{-\alpha}\Big) +$$
$$\frac{1}{8}\Big(z^\alpha\,\Gamma(\alpha,\, -z\,(-i\,(b + c) + \log(d)))\,(-z\,(-i\,(b + c) + \log(d)))^{-\alpha} + z^\alpha\,\Gamma(\alpha,\, -z\,(i\,(b + c) + \log(d)))\,(-z\,(i\,(b + c) + \log(d)))^{-\alpha}\Big) +$$
$$\frac{1}{16}\Big(-z^\alpha\,\Gamma(\alpha,\, -z\,(-i\,(2\,a + b + c) + \log(d)))\,(-z\,(-i\,(2\,a + b + c) + \log(d)))^{-\alpha} -$$
$$z^\alpha\,\Gamma(\alpha,\, -z\,(i\,(2\,a + b + c) + \log(d)))\,(-z\,(i\,(2\,a + b + c) + \log(d)))^{-\alpha}\Big)$$

Involving functions of the direct function, exponential and algebraic functions

Involving powers of the direct function, exponential and algebraic functions

Involving powers of sin, exp and algebraic functions

Involving $(a\,z + b)^\beta\, d^z \sin^v(c\,z + e)$

01.06.21.1605.01

$$\int (a\,z+b)^{\beta}\,d^{z}\sin^{\nu}(c\,z+e)\,dz = -\frac{1}{a}\,2^{-\nu}\,(b+a\,z)^{\beta+1}\,d^{-\frac{b}{a}}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{k}\binom{\nu}{k}\left(e^{-i\left(-\frac{b\,c\,(2k-\nu)}{a}+\frac{\pi\nu}{2}-e\,(\nu-2k)\right)}E_{-\beta}\left(\frac{i\,(b+a\,z)\,(c\,(2k-\nu)+i\log(d))}{a}\right)+e^{i\left(-\frac{b\,c\,(2k-\nu)}{a}+\frac{\pi\nu}{2}-e\,(\nu-2k)\right)}E_{-\beta}\left(-\frac{i\,(b+a\,z)\,(c\,(2k-\nu)-i\log(d))}{a}\right)\right)-\frac{2^{-\nu}\,(1-\nu \bmod 2)}{a}\,d^{-\frac{b}{a}}\,(b+a\,z)^{\beta+1}\,E_{-\beta}\left(-\frac{(b+a\,z)\log(d)}{a}\right)\binom{\nu}{\frac{\nu}{2}}\;/;\;\nu\in\mathbb{N}$$

01.06.21.1606.01

$$\int (a\,z+b)^{\beta}\,e^{p\,z}\sin^{\nu}(c\,z+e)\,dz = -\frac{1}{a}\,2^{-\nu}\,e^{-\frac{p\,b}{a}}\,(b+a\,z)^{\beta+1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{k}\binom{\nu}{k}\left(e^{-i\left(-\frac{b\,c\,(2k-\nu)}{a}+\frac{\pi\nu}{2}-e\,(\nu-2k)\right)}E_{-\beta}\left(\frac{i\,(b+a\,z)\,(i\,p+c\,(2k-\nu))}{a}\right)+e^{i\left(-\frac{b\,c\,(2k-\nu)}{a}+\frac{\pi\nu}{2}-e\,(\nu-2k)\right)}E_{-\beta}\left(-\frac{i\,(b+a\,z)\,(c\,(2k-\nu)-i\,p)}{a}\right)\right)-\frac{2^{-\nu}\,(1-\nu \bmod 2)}{a}\,e^{-\frac{p\,b}{a}}\,(b+a\,z)^{\beta+1}\,E_{-\beta}\left(-\frac{(b+a\,z)\,p}{a}\right)\binom{\nu}{\frac{\nu}{2}}\;/;\;\nu\in\mathbb{N}$$

01.06.21.1607.01

$$\int (a\,z+b)^{\beta}\,d^{z}\sin^{\nu}(c\,z)\,dz = -\frac{1}{a}\,2^{-\nu}\,(b+a\,z)^{\beta+1}\,d^{-\frac{b}{a}}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{k}\binom{\nu}{k}\left(e^{-i\left(-\frac{b\,c\,(2k-\nu)}{a}+\frac{\pi\nu}{2}\right)}E_{-\beta}\left(\frac{i\,(b+a\,z)\,(c\,(2k-\nu)+i\log(d))}{a}\right)+e^{i\left(-\frac{b\,c\,(2k-\nu)}{a}+\frac{\pi\nu}{2}\right)}E_{-\beta}\left(-\frac{i\,(b+a\,z)\,(c\,(2k-\nu)-i\log(d))}{a}\right)\right)-\frac{2^{-\nu}\,(1-\nu \bmod 2)}{a}\,d^{-\frac{b}{a}}\,(b+a\,z)^{\beta+1}\,E_{-\beta}\left(-\frac{(b+a\,z)\log(d)}{a}\right)\binom{\nu}{\frac{\nu}{2}}\;/;\;\nu\in\mathbb{N}$$

01.06.21.1608.01

$$\int (b+a\,z)^{\beta}\,e^{p\,z}\sin^{\nu}(c\,z)\,dz = \frac{2^{-\nu}\,(1-\nu \bmod 2)}{p}\,e^{-\frac{b\,p}{a}}\,(b+a\,z)^{\beta}\left(-\frac{p\,(b+a\,z)}{a}\right)^{-\beta}\binom{\nu}{\frac{\nu}{2}}\Gamma\left(\beta+1,\,-\frac{p\,(b+a\,z)}{a}\right)-\frac{1}{a}\,2^{-\nu}\,(b+a\,z)^{\beta+1}\sum_{k=0}^{\left\lfloor\frac{\nu-1}{2}\right\rfloor}(-1)^{k}\binom{\nu}{k}\left(i^{\nu}\,e^{-\frac{b\,(p-i\,c\,(\nu-2k))}{a}}\left(-\frac{(p-i\,c\,(\nu-2k))\,(b+a\,z)}{a}\right)^{-\beta-1}\Gamma\left(\beta+1,\,-\frac{(p-i\,c\,(\nu-2k))\,(b+a\,z)}{a}\right)+i^{-\nu}\,e^{-\frac{b\,(p+c\,i\,(\nu-2k))}{a}}\left(-\frac{(p+c\,i\,(\nu-2k))\,(b+a\,z)}{a}\right)^{-\beta-1}\Gamma\left(\beta+1,\,-\frac{(p+c\,i\,(\nu-2k))\,(b+a\,z)}{a}\right)\right)\;/;\;\nu\in\mathbb{N}$$

01.06.21.1609.01

$$\int \frac{e^{p z} \sin^{\nu}(c z)}{\sqrt{a z + b}}\, dz = \frac{2^{-\nu} e^{-\frac{b p}{a}} \sqrt{\pi}\ (1 - \nu \bmod 2)}{a \sqrt{\frac{p}{a}}} \binom{\nu}{\frac{\nu}{2}} \operatorname{erfi}\left(\sqrt{\frac{p}{a}}\ \sqrt{b + a z}\right) +$$

$$\frac{2^{-\nu} \sqrt{\pi}}{a} \sum_{k=0}^{\left\lfloor \frac{\nu-1}{2} \right\rfloor} (-1)^k \binom{\nu}{k} \left(\frac{i^{\nu}}{\sqrt{\frac{p - i c (\nu - 2k)}{a}}} e^{-\frac{b (p - i c (\nu - 2 k))}{a}} \operatorname{erfi}\left(\sqrt{\frac{p - i c (\nu - 2 k)}{a}}\ \sqrt{b + a z}\right) + \right.$$

$$\left. \frac{i^{-\nu}}{\sqrt{\frac{p + c i (\nu - 2 k)}{a}}} e^{-\frac{b (p + c i (\nu - 2 k))}{a}} \operatorname{erfi}\left(\sqrt{\frac{p + c i (\nu - 2 k)}{a}}\ \sqrt{b + a z}\right)\right) /; \nu \in \mathbb{N}$$

01.06.21.1610.01

$$\int \frac{e^{p z} \sin^{2}(c z)}{\sqrt{a z + b}}\, dz =$$

$$\frac{\sqrt{\pi}}{4 a} \left(-\frac{e^{-\frac{b (-2 i c + p)}{a}} \operatorname{erfi}\left(\sqrt{\frac{-2 i c + p}{a}}\ \sqrt{b + a z}\right)}{\sqrt{\frac{-2 i c + p}{a}}} - \frac{e^{-\frac{b (2 i c + p)}{a}} \operatorname{erfi}\left(\sqrt{\frac{2 i c + p}{a}}\ \sqrt{b + a z}\right)}{\sqrt{\frac{2 i c + p}{a}}} \right) + \frac{e^{-\frac{b p}{a}} \sqrt{\pi}}{2 a \sqrt{\frac{p}{a}}} \operatorname{erfi}\left(\sqrt{\frac{p}{a}}\ \sqrt{b + a z}\right)$$

Involving products of the direct function, exponential and algebraic functions

Involving products of sin, exp and algebraic functions

Involving $(a z + b)^{\beta} d^{z} \sin(c z) \sin(e z)$

01.06.21.1611.01

$$\int (a+b\,z)^{\beta}\, d^{z} \sin(c\,z)\sin(e\,z)\,dz = -\frac{1}{4}\, i\, d^{-\frac{a}{b}}\,(a+b\,z)^{\beta} \left(-\frac{1}{b}\left(i\,(a+b\,z)\,\Gamma\!\left(\beta+1,\, \frac{i\,(a+b\,z)\,(c-e+i\log(d))}{b}\right)\left(\frac{i\,(a+b\,z)\,(c-e+i\log(d))}{b}\right)^{-\beta-1}\left(\cos\!\left(\frac{a\,(c-e)}{b}\right)+i\sin\!\left(\frac{a\,(c-e)}{b}\right)\right)\right)+\right.$$
$$\frac{1}{c-e-i\log(d)}\left(\Gamma\!\left(\beta+1,\, -\frac{i\,(a+b\,z)\,(c-e-i\log(d))}{b}\right)\left(-\frac{i\,(a+b\,z)\,(c-e-i\log(d))}{b}\right)^{-\beta}\left(\cos\!\left(\frac{a\,(c-e)}{b}\right)-i\sin\!\left(\frac{a\,(c-e)}{b}\right)\right)\right)+$$
$$\frac{\Gamma\!\left(\beta+1,\, \frac{i\,(a+b\,z)\,(c+e+i\log(d))}{b}\right)\left(\frac{i\,(a+b\,z)\,(c+e+i\log(d))}{b}\right)^{-\beta}\left(\cos\!\left(\frac{a\,(c+e)}{b}\right)+i\sin\!\left(\frac{a\,(c+e)}{b}\right)\right)}{c+e+i\log(d)} - \frac{1}{c+e-i\log(d)}$$
$$\left.\left(\Gamma\!\left(\beta+1,\, -\frac{i\,(a+b\,z)\,(c+e-i\log(d))}{b}\right)\left(-\frac{i\,(a+b\,z)\,(c+e-i\log(d))}{b}\right)^{-\beta}\left(\cos\!\left(\frac{a\,(c+e)}{b}\right)-i\sin\!\left(\frac{a\,(c+e)}{b}\right)\right)\right)\right)$$

Definite integration

For the direct function itself

01.06.21.0014.01

$$\int_0^\infty \frac{\sin(t)}{t}\,dt = \frac{\pi}{2}$$

01.06.21.0015.01

$$\int_0^\infty \frac{\sin(a\,t)}{t}\,dt = \frac{\pi}{2}\operatorname{sgn}(a) \;/;\; a \in \mathbb{R}$$

01.06.21.0016.01

$$\int_0^\infty \sin\!\left(t^2\right)dt = \frac{1}{2}\sqrt{\frac{\pi}{2}}$$

01.06.21.0017.01

$$\int_0^\infty t^k \sin(t)\,dt = \cos\!\left(\frac{k\,\pi}{2}\right)\Gamma(k+1) \;/;\; -2 < \operatorname{Re}(k) < 0$$

01.06.21.0018.01

$$\int_0^\infty t^{-z}\sin(a\,t)\,dt = \frac{\pi\,a^{z-1}}{2\,\Gamma(z)\sin\!\left(\frac{\pi z}{2}\right)} \;/;\; 0 < \operatorname{Re}(z) < 2 \land a \in \mathbb{R}$$

01.06.21.1612.01

$$\int_0^\infty \left(\frac{\sin(x)}{x}\right)^n dx = 2^{1-2n}\sqrt{\pi}\,\frac{\Gamma\!\left(\frac{1}{4}\left(-2\,n-(-1)^n+3\right)\right)}{\Gamma\!\left(\frac{1}{4}\left(2\,n-(-1)^n+1\right)\right)}\sum_{j=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}\frac{(-1)^{j+\left\lfloor\frac{n}{2}\right\rfloor}(n-2\,j)^{n-1}\,n!}{j!\,(n-j)!} \;/;\; n \in \mathbb{N}^+$$

01.06.21.1613.01

$$\int_0^{\infty} \sin\left(a\,x^4\right)\sin\left(b\,x^2\right)dx = -\frac{1}{4}\pi\sqrt{\frac{b}{2\,a}}\,\sin\left(\frac{b^2}{8\,a}-\frac{3\,\pi}{8}\right)J_{\frac{1}{4}}\left(\frac{b^2}{8\,a}\right)\;/;\;a\in\mathbb{R}\land b\in\mathbb{R}$$

Involving the direct function

01.06.21.0019.01

$$\int_0^{2\pi}\sin(n\,t)\sin(m\,t)\,dt = \frac{-m\sin(2\,\pi\,m+2\,n\,\pi)+n\sin(2\,\pi\,m+2\,n\,\pi)+m\sin(2\,m\,\pi-2\,n\,\pi)+n\sin(2\,m\,\pi-2\,n\,\pi)}{2\,(m-n)\,(m+n)}$$

01.06.21.0020.01

$$\int_0^{2\pi}\sin^2(n\,t)\,dt = \pi-\frac{\sin(4\,n\,\pi)}{4\,n}$$

01.06.21.1618.01

$$\int_0^{z}\sin^{2n}(t)\,dt = \frac{\left(\frac{1}{2}\right)_n}{n!}\left(z-\frac{1}{2}\cot(z)\sum_{k=1}^{n}\frac{(k-1)!\,\sin^{2k}(z)}{\left(\frac{1}{2}\right)_k}\right)\;/;\;n\in\mathbb{N}$$

01.06.21.0021.01

$$\int_0^{\pi}\frac{1}{\sin\left(\frac{t}{2}\right)}\sin\left(\left(n+\frac{1}{2}\right)t\right)dt = \pi\;/;\;n\in\mathbb{N}$$

Dirichlet lemma

01.06.21.1619.01

$$\int_{\pi\,k+\csc^{-1}\left(\sqrt{m}\right)}^{\pi\,k+\frac{\pi}{2}}\sqrt{1-m\sin^2(t)}\;dt = (2\,k+1)\,E(m)-E\left(\pi\,k+\csc^{-1}\left(\sqrt{m}\right)\,\middle|\,m\right)\;/;\;k\in\mathbb{Z}$$

Dirichlet lemma

01.06.21.1620.01

$$\int_{k\,\pi-\csc^{-1}\left(\sqrt{m}\right)}^{k\,n+\frac{\pi}{2}}\frac{1}{\sqrt{1-m\sin^2(t)}}\,dt = (2\,k+1)\,K(m)-F\left(k\,\pi-\csc^{-1}\left(\sqrt{m}\right)\,\middle|\,m\right)\;/;\;k\in\mathbb{Z}$$

Dirichlet lemma

01.06.21.1621.01

$$\int_{\pi\,k+\csc^{-1}\left(\sqrt{m}\right)}^{\pi\,k+\frac{\pi}{2}}\frac{1}{\left(1-n\sin^2(t)\right)\sqrt{1-m\sin^2(t)}}\,dt = (2\,k+1)\,\Pi(n\,|\,m)-\Pi\left(n;\,\pi\,k+\csc^{-1}\left(\sqrt{m}\right)\,\middle|\,m\right)\;/;\;k\in\mathbb{Z}$$

Dirichlet lemma

Involving related functions

01.06.21.0022.01

$$\int_0^{2\pi}\cos(n\,t)\sin(m\,t)\,dt = \frac{m\cos(2\,\pi\,m+2\,n\,\pi)-n\cos(2\,\pi\,m+2\,n\,\pi)+m\cos(2\,m\,\pi-2\,n\,\pi)+n\cos(2\,m\,\pi-2\,n\,\pi)}{2\,(n-m)\,(m+n)}-\frac{m}{(n-m)\,(m+n)}$$

01.06.21.0023.01

$$\int_0^{\frac{\pi}{2}} \log(\sin(t))\, dt == -\frac{\pi}{2} \log(2)$$

Integral transforms

Fourier exp transforms

01.06.22.0001.01

$$\mathcal{F}_t[\sin(a\, t)](x) = i \sqrt{\frac{\pi}{2}}\, \delta(x-a) - i \sqrt{\frac{\pi}{2}}\, \delta(a+x) \;/;\; a \in \mathbb{R}$$

Inverse Fourier exp transforms

01.06.22.0002.01

$$\mathcal{F}_t^{-1}[\sin(t)](z) == -i \sqrt{\frac{\pi}{2}}\, \delta(z-1) + i \sqrt{\frac{\pi}{2}}\, \delta(z+1)$$

Fourier cos transforms

01.06.22.0003.01

$$\mathcal{F}c_t[\sin(a\, t)](z) == \sqrt{\frac{2}{\pi}}\, \frac{a}{a^2 - z^2} \;/;\; a \in \mathbb{R}$$

Fourier sin transforms

01.06.22.0004.01

$$\mathcal{F}s_t[\sin(a\, t)](z) == \sqrt{\frac{\pi}{2}}\, (\delta(a-z) - \delta(a+z)) \;/;\; a \in \mathbb{R}$$

Laplace transforms

01.06.22.0005.01

$$\mathcal{L}_t[\sin(t)](z) == \frac{1}{z^2+1}$$

Mellin transforms

01.06.22.0006.01

$$\mathcal{M}_t[\sin(t)](z) == \Gamma(z) \sin\left(\frac{\pi z}{2}\right) \;/;\; -1 < \mathrm{Re}(z) < 1$$

Hankel transforms

01.06.22.0007.01

$$\mathcal{H}_{t;\nu}\left[t^{\alpha-1} \sin(t)\right](z) == -\frac{1}{\Gamma(\nu+1)} \left(2^{-\nu} z^{\nu+\frac{1}{2}} \cos\left(\frac{1}{4} \pi (2\alpha + 2\nu + 3)\right) \Gamma\left(\alpha + \nu + \frac{1}{2}\right) {}_2F_1\left(\frac{1}{4} (2\alpha + 2\nu + 1), \frac{1}{4} (2\alpha + 2\nu + 3); \nu + 1; z^2\right)\right) /;$$

$$\mathrm{Re}(\alpha + \nu) > -\frac{3}{2} \bigwedge \mathrm{Re}(\alpha) < 1$$

Hilbert transforms

01.06.22.0008.01

$$\mathcal{H}_t[\sin(t)](x) = \cos(x)$$

Summation

Finite summation

01.06.23.0001.01

$$\sum_{k=0}^{n} \sin(a\,k) = \csc\left(\frac{a}{2}\right) \sin\left(\frac{1}{2}\,a\,(n+1)\right) \sin\left(\frac{a\,n}{2}\right)$$

01.06.23.0002.01

$$\sum_{k=0}^{n} (-1)^k \sin(a\,k) = \cos\left(\frac{1}{2}\,(a+n\,(a+\pi))\right) \sec\left(\frac{a}{2}\right) \sin\left(\frac{1}{2}\,n\,(a+\pi)\right)$$

01.06.23.0003.01

$$\sum_{k=0}^{n} \sin(a\,k+z) = \csc\left(\frac{a}{2}\right) \sin\left(\frac{1}{2}\,a\,(n+1)\right) \sin\left(\frac{a\,n}{2}+z\right)$$

01.06.23.0004.01

$$\sum_{k=0}^{n} (-1)^k \sin(a\,k+z) = \cos\left(\frac{1}{2}\,(a+n\,(a+\pi))\right) \sec\left(\frac{a}{2}\right) \sin\left(\frac{1}{2}\,n\,(a+\pi)+z\right)$$

01.06.23.0005.01

$$\sum_{k=1}^{n} \sin((2\,k-1)\,a) = \csc(a) \sin^2(a\,n)$$

01.06.23.0006.01

$$\sum_{k=1}^{n} (-1)^k \sin((2\,k-1)\,a) = \frac{1}{2} \sec(a) \sin(n\,(2\,a-\pi))$$

01.06.23.0007.01

$$\sum_{k=1}^{n} k \sin(k\,a) = \frac{1}{4} \csc^2\left(\frac{a}{2}\right) ((n+1) \sin(n\,a) - n \sin((n+1)\,a))$$

01.06.23.0008.01

$$\sum_{k=1}^{n} z^k \sin(k\,a) = \frac{z\,((z \sin(a\,n) - \sin(a\,(n+1)))\,z^n + \sin(a))}{z^2 - 2\cos(a)\,z + 1}$$

Infinite summation

01.06.23.0009.01

$$\sum_{k=1}^{\infty} \frac{\sin(k\,x)}{k} = \frac{\pi - x}{2} \;/;\; 0 < \mathrm{Re}(x) < 2\,\pi$$

01.06.23.0010.01

$$\sum_{k=1}^{\infty} \frac{(-1)^{k-1} \sin(k\,x)}{k} = \frac{x}{2} \;/;\; |\mathrm{Re}(x)| < \pi$$

01.06.23.0011.01

$$\sum_{k=1}^{\infty} \frac{\sin(k\,x)}{k^3} == \frac{x^3}{12} - \frac{\pi\,x^2}{4} + \frac{\pi^2\,x}{6} \;/;\; 0 \le \mathrm{Re}(x) \le 2\,\pi$$

01.06.23.0012.01

$$\sum_{k=1}^{\infty} \frac{k\sin(k\,x)}{a^2 + k^2} == \frac{\pi\sinh((\pi - x)\,a)}{2\sinh(\pi\,a)} \;/;\; 0 < \mathrm{Re}(x) < 2\,\pi$$

01.06.23.0013.01

$$\sum_{k=1}^{\infty} \frac{(-1)^{k-1}\,k\sin(k\,x)}{a^2 + k^2} == \frac{\pi\sinh(x\,a)}{2\sinh(\pi\,a)} \;/;\; |\mathrm{Re}(x)| < \pi$$

01.06.23.0014.01

$$\sum_{k=1}^{\infty} e^{-k\,a} \sin(k\,x) == \frac{\sin(x)}{2\,(\cosh(a) - \cos(x))} \;/;\; \mathrm{Re}(a) > 0$$

01.06.23.0015.01

$$\sum_{k=1}^{\infty} z^k \sin(k\,x) == \frac{z\sin(x)}{z^2 - 2\cos(x)\,z + 1} \;/;\; |z| < 1$$

01.06.23.0016.01

$$\sum_{k=1}^{\infty} \frac{z^k \sin(k\,x)}{k} == \tan^{-1}\!\left(\frac{z\sin(x)}{1 - z\cos(x)}\right) \;/;\; 0 < \mathrm{Re}(x) < 2\,\pi \land |z| < 1$$

01.06.23.0017.01

$$\sum_{k=1}^{\infty} \frac{\sin(k\,x)}{k!} == e^{\cos(x)} \sin(\sin(x))$$

01.06.23.0018.01

$$\sum_{k=1}^{\infty} \frac{z^k \sin(k\,x)}{k!} == e^{z\cos(x)} \sin(z\sin(x))$$

01.06.23.0019.01

$$\sum_{k=1}^{\infty} \sin(k\,x) = \frac{1}{2}\cot\!\left(\frac{x}{2}\right) \;/;\; x \in \mathbb{R}$$

Above relation holds in a distributional sense for $x \in \mathbb{R}$.

01.06.23.0020.01

$$\sum_{k=1}^{\infty} k\sin(k\,x) = -\frac{1}{2}\,\frac{\partial\,\mathrm{DiracComb}\!\left(\frac{x}{2\,\pi}\right)}{\partial x} \;/;\; x \in \mathbb{R}$$

Above relation holds in a distributional sense for $x \in \mathbb{R}$.

01.06.23.0021.01

$$\sum_{k=1}^{\infty} k^{2\,m+1} \sin(k\,x) = \frac{1}{2}\,(-1)^{m-1}\,\frac{\partial^{2\,m+1}\,\mathrm{DiracComb}\!\left(\frac{x}{2\,\pi}\right)}{\partial x^{2\,m+1}} \;/;\; x \in \mathbb{R} \land m \in \mathbb{N}$$

Above relation holds in a distributional sense for $x \in \mathbb{R}$.

01.06.23.0022.01

$$\sum_{k=1}^{\infty} k^{2m} \sin(k\,x) = -\frac{\delta_m\,i}{2} + \frac{1}{2}\left(\cot\left(\frac{z}{2}\right)+i\right)\sum_{k=0}^{2m}\frac{(-1)^k\,k!}{2^k}\,\mathcal{S}_{2m}^{(k)}\left(i\cot\left(\frac{z}{2}\right)+1\right)^k \;/;\; x\in\mathbb{R}\wedge m\in\mathbb{N}$$

Above relation holds in a distributional sense for $x \in \mathbb{R}$.

Products

Finite products

01.06.24.0001.01

$$\prod_{k=1}^{n-1} \sin\left(\frac{k\,\pi}{n}\right) = \frac{n}{2^{n-1}} \;/;\; n\in\mathbb{N}^+$$

01.06.24.0002.01

$$\prod_{k=1}^{n-1} \sin\left(\frac{\pi\,k}{n}+z\right) = \frac{2^{1-n}\sin(n\,z)}{\sin(z)} \;/;\; n\in\mathbb{N}^+$$

01.06.24.0003.01

$$\prod_{k=1}^{n-1} \sin\left(\frac{2\,\pi\,k}{n}+z\right) = (-2)^{1-n}\csc(z)\left(\cos\left(n\,z-\frac{\pi\,n}{2}\right)-\cos\left(\frac{n\,\pi}{2}\right)\right) \;/;\; n\in\mathbb{N}^+$$

01.06.24.0004.01

$$\prod_{k=1}^{\left\lfloor\frac{n-1}{2}\right\rfloor} \sin\left(\frac{\pi\,k}{n}\right) = 2^{\frac{1-n}{2}}\sqrt{n} \;/;\; n\in\mathbb{N}^+$$

01.06.24.0005.01

$$\prod_{k=1}^{\left\lfloor\frac{n-1}{2}\right\rfloor} \sin\left(\frac{(2\,k+1)\,\pi}{2\,n}\right) = 2^{\frac{1-n}{2}}\csc\left(\frac{\pi}{2\,n}\right) \;/;\; n\in\mathbb{N}^+$$

Infinite products

01.06.24.0006.01

$$\prod_{k=1}^{\infty}\left(1-\frac{4}{3}\sin^2\left(\frac{z}{3^k}\right)\right) = \frac{\sin(z)}{z}$$

Representations through more general functions

Through hypergeometric functions

Involving ${}_0F_1$

01.06.26.0001.01

$$\sin(z) = z\;{}_0F_1\left(;\frac{3}{2};-\frac{z^2}{4}\right)$$

01.06.26.0002.01

$$\sin(z) = {}_0F_1\left(;\frac{1}{2};-\frac{1}{4}\left(z-\frac{\pi}{2}\right)^2\right)$$

01.06.26.0004.01

$$\sin^2(z) = \frac{1}{2}\,{}_0F_1\left(;\frac{1}{2};-\left(z-\frac{\pi}{2}\right)^2\right)+\frac{1}{2}$$

01.06.26.0005.01

$$\sin^3(z) = \frac{3}{4}\,{}_0F_1\left(;\frac{1}{2};-\frac{1}{4}\left(z-\frac{\pi}{2}\right)^2\right)+\frac{1}{4}\,{}_0F_1\left(;\frac{1}{2};-\frac{9}{4}\left(z-\frac{\pi}{2}\right)^2\right)$$

Involving ${}_pF_q$

01.06.26.0101.01

$$\sin(z) = z\,{}_3F_2\left(\frac{z}{\pi},\frac{z}{\pi},\frac{z}{\pi};1,1;-1\right)-\frac{2z^3}{\pi^2}\,{}_3F_2\left(\frac{z}{\pi}+1,\frac{z}{\pi}+1,\frac{z}{\pi}+1;2,2;-1\right)$$

Brychkov Yu.A. (2005)

01.06.26.0003.01

$$\sin^2(z) = z^2\,{}_1F_2\left(1;2,\frac{3}{2};-z^2\right)$$

Through Meijer *G*

Classical cases for the direct function itself

01.06.26.0006.01

$$\sin(z) = \frac{\sqrt{\pi}}{2}\,z\,G_{0,2}^{1,0}\left(\frac{z^2}{4}\,\middle|\,0,-\tfrac{1}{2}\right)$$

01.06.26.0007.01

$$\sin(z) = \frac{\sqrt{\pi z^2}}{z}\,G_{0,2}^{1,0}\left(\frac{z^2}{4}\,\middle|\,\tfrac{1}{2},0\right)$$

01.06.26.0008.01

$$\sin(z) = \sqrt{\pi}\,G_{0,2}^{1,0}\left(\frac{z^2}{4}\,\middle|\,\tfrac{1}{2},0\right)\;/;\;\mathrm{Re}(z)>0$$

01.06.26.0009.01

$$\sin\left(a+\sqrt{z}\right) = \sqrt{\pi}\,G_{1,3}^{2,0}\left(\frac{z}{4}\,\middle|\,\begin{matrix}\frac{a}{\pi}\\ 0,\frac{1}{2},\frac{a}{\pi}\end{matrix}\right)$$

Classical cases for powers of sin

01.06.26.0010.01

$$\sin^n\left(\sqrt{z}\right) = 2^{-n-1}\left((-1)^n+1\right)\binom{n}{\frac{n}{2}}+2^{1-n}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^{\left\lfloor\frac{n}{2}\right\rfloor-k}\binom{n}{k}G_{0,2}^{1,0}\left(\frac{1}{4}z(n-2k)^2\,\middle|\,\tfrac{1}{4}(1-(-1)^n),\tfrac{1}{4}(1+(-1)^n)\right)\;/;\;n\in\mathbb{N}^+$$

Classical cases involving exp

01.06.26.0095.01

$$e^{-\frac{\sqrt[3]{z}}{\sqrt{3}}} \sin\left(\sqrt[3]{z}\right) = \frac{1}{2} \sqrt{3}\, G_{0,3}^{2,0}\left(\frac{8 z}{81 \sqrt{3}} \,\middle|\, \frac{1}{3}, \frac{2}{3}, 0\right)$$

01.06.26.0102.01

$$e^{-\sqrt[4]{z}} \sin\left(\sqrt[4]{z}\right) = \frac{1}{\sqrt{2 \pi}} G_{0,4}^{3,0}\left(\frac{z}{64} \,\middle|\, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 0\right)$$

01.06.26.0096.01

$$e^{-\sqrt{3} \sqrt[6]{z}} \sin\left(\sqrt[6]{z}\right) = \frac{\sqrt{3}}{4 \pi^{3/2}} G_{0,6}^{5,0}\left(\frac{z}{729} \,\middle|\, \frac{1}{6}, \frac{1}{3}, \frac{1}{2}, \frac{2}{3}, \frac{5}{6}, 0\right)$$

Classical cases involving sinh

01.06.26.0097.01

$$\sin\left(\sqrt[4]{z}\right) \sinh\left(\sqrt[4]{z}\right) = \sqrt{2}\, \pi^{3/2} G_{0,4}^{1,0}\left(\frac{z}{64} \,\middle|\, \frac{1}{2}, 0, \frac{1}{4}, \frac{3}{4}\right)$$

Classical cases involving cosh

01.06.26.0098.01

$$\sin\left(\sqrt[4]{z}\right) \cosh\left(\sqrt[4]{z}\right) = \sqrt{2}\, \pi^{3/2} G_{1,5}^{2,0}\left(\frac{z}{64} \,\middle|\, \begin{matrix} \frac{1}{2} \\ \frac{1}{4}, \frac{3}{4}, 0, \frac{1}{2}, \frac{1}{2} \end{matrix}\right)$$

Classical cases involving cos, Ci, Si

01.06.26.0011.01

$$\cos\left(\sqrt{z}\right) \operatorname{Ci}\left(\sqrt{z}\right) + \sin\left(\sqrt{z}\right) \operatorname{Si}\left(\sqrt{z}\right) = -\frac{1}{2} \pi^{3/2} G_{2,4}^{2,1}\left(\frac{z}{4} \,\middle|\, \begin{matrix} 0, \frac{1}{2} \\ 0, 0, \frac{1}{2}, \frac{1}{2} \end{matrix}\right)$$

01.06.26.0012.01

$$\cos\left(\sqrt{z}\right) \operatorname{Ci}\left(\sqrt{z}\right) + \sin\left(\sqrt{z}\right) \left(\operatorname{Si}\left(\sqrt{z}\right) - \frac{\pi}{2}\right) = -\frac{1}{2 \sqrt{\pi}} G_{1,3}^{3,1}\left(\frac{z}{4} \,\middle|\, \begin{matrix} 0 \\ 0, 0, \frac{1}{2} \end{matrix}\right)$$

01.06.26.0013.01

$$\sin\left(\sqrt{z}\right) \operatorname{Ci}\left(\sqrt{z}\right) - \cos\left(\sqrt{z}\right) \operatorname{Si}\left(\sqrt{z}\right) = -\frac{1}{2} \pi^{3/2} G_{2,4}^{2,1}\left(\frac{z}{4} \,\middle|\, \begin{matrix} \frac{1}{2}, 1 \\ \frac{1}{2}, \frac{1}{2}, 1, 0 \end{matrix}\right)$$

01.06.26.0014.01

$$\sin\left(\sqrt{z}\right) \operatorname{Ci}\left(\sqrt{z}\right) - \cos\left(\sqrt{z}\right) \left(\operatorname{Si}\left(\sqrt{z}\right) - \frac{\pi}{2}\right) = \frac{1}{2 \sqrt{\pi}} G_{1,3}^{3,1}\left(\frac{z}{4} \,\middle|\, \begin{matrix} \frac{1}{2} \\ 0, \frac{1}{2}, \frac{1}{2} \end{matrix}\right)$$

Classical cases involving $\cos^{-1}$ in the arguments and unit step θ

01.06.26.0015.01

$$\theta(1 - |z|) \sin\left(\nu \cos^{-1}\left(\sqrt{z}\right)\right) = \frac{\sqrt{\pi}\, \nu}{2} G_{2,2}^{2,0}\left(z \,\middle|\, \begin{matrix} 1 - \frac{\nu}{2}, \frac{\nu+2}{2} \\ 0, \frac{1}{2} \end{matrix}\right) /; z \notin (-1, 0)$$

Classical cases involving $\tan^{-1}$ in the arguments

01.06.26.0016.01

$$(z+1)^{\nu/2}\sin\left(\nu\tan^{-1}\left(\sqrt{z}\right)\right)=-\frac{2^{-\nu-1}}{\Gamma(-\nu)}G_{2,2}^{1,2}\left(z\left|\begin{array}{c}\frac{\nu}{2}+1,\ \frac{\nu+1}{2}\\ \frac{1}{2},\ 0\end{array}\right.\right)$$

Classical cases involving $\cot^{-1}$ in the arguments

01.06.26.0017.01

$$(z+1)^{\nu/2}\sin\left(\nu\cot^{-1}\left(\sqrt{z}\right)\right)=-\frac{2^{-\nu-1}}{\Gamma(-\nu)}G_{2,2}^{2,1}\left(z\left|\begin{array}{c}\frac{\nu+1}{2},\ \frac{\nu}{2}+1\\ 0,\ \frac{1}{2}\end{array}\right.\right)/;\ z\notin(-1,0)$$

Classical cases involving $\sec^{-1}$ in the arguments and unit step θ

01.06.26.0018.01

$$\theta(|z|-1)\sin\left(\nu\sec^{-1}\left(\sqrt{z}\right)\right)=\frac{\sqrt{\pi}\,\nu}{2}G_{2,2}^{0,2}\left(z\left|\begin{array}{c}\frac{1}{2},\ 1\\ -\frac{\nu}{2},\ \frac{\nu}{2}\end{array}\right.\right)$$

Classical cases involving Bessel J

01.06.26.0019.01

$$\sin\left(\sqrt{z}\right)J_\nu\left(\sqrt{z}\right)=\frac{1}{\sqrt{2}}G_{2,4}^{1,2}\left(z\left|\begin{array}{c}\frac{1}{4},\ \frac{3}{4}\\ \frac{\nu+1}{2},\ -\frac{\nu}{2},\ \frac{1-\nu}{2},\ \frac{\nu}{2}\end{array}\right.\right)$$

01.06.26.0020.01

$$\sin\left(a+\sqrt{z}\right)J_\nu\left(\sqrt{z}\right)=\frac{1}{\sqrt{2}}G_{3,5}^{2,2}\left(z\left|\begin{array}{c}\frac{1}{4},\ \frac{3}{4},\ \frac{a}{\pi}+\frac{\nu}{2}\\ \frac{\nu}{2},\ \frac{\nu+1}{2},\ -\frac{\nu}{2},\ \frac{1-\nu}{2},\ \frac{a}{\pi}+\frac{\nu}{2}\end{array}\right.\right)$$

Classical cases involving cos and Bessel J

01.06.26.0021.01

$$\cos\left(\sqrt{z}\right)J_{-\nu}\left(\sqrt{z}\right)+\sin\left(\sqrt{z}\right)J_\nu\left(\sqrt{z}\right)=-\sqrt{2}\sin\left(\frac{1}{4}(2\nu-1)\pi\right)G_{2,4}^{2,1}\left(z\left|\begin{array}{c}\frac{3}{4},\ \frac{1}{4}\\ -\frac{\nu}{2},\ \frac{\nu+1}{2},\ \frac{\nu}{2},\ \frac{1-\nu}{2}\end{array}\right.\right)$$

01.06.26.0022.01

$$\cos\left(\sqrt{z}\right)J_{-\nu}\left(\sqrt{z}\right)-\sin\left(\sqrt{z}\right)J_\nu\left(\sqrt{z}\right)=\sqrt{2}\sin\left(\frac{1}{4}\pi(2\nu+1)\right)G_{2,4}^{2,1}\left(z\left|\begin{array}{c}\frac{1}{4},\ \frac{3}{4}\\ -\frac{\nu}{2},\ \frac{\nu+1}{2},\ \frac{1-\nu}{2},\ \frac{\nu}{2}\end{array}\right.\right)$$

01.06.26.0103.01

$$J_\nu\left(\sqrt{z}\right)\cos\left(\sqrt{z}\right)+J_{-\nu}\left(\sqrt{z}\right)\sin\left(\sqrt{z}\right)=\sqrt{2}\sin\left(\frac{1}{4}\pi(2\nu+1)\right)G_{2,4}^{2,1}\left(z\left|\begin{array}{c}\frac{3}{4},\ \frac{1}{4}\\ \frac{\nu}{2},\ \frac{1-\nu}{2},\ \frac{\nu+1}{2},\ -\frac{\nu}{2}\end{array}\right.\right)$$

01.06.26.0104.01

$$\sin\left(\sqrt{z}\right)J_{-\nu}\left(\sqrt{z}\right)-\cos\left(\sqrt{z}\right)J_\nu\left(\sqrt{z}\right)=\sqrt{2}\sin\left(\frac{1}{4}\pi(2\nu-1)\right)G_{2,4}^{2,1}\left(z\left|\begin{array}{c}\frac{1}{4},\ \frac{3}{4}\\ \frac{\nu}{2},\ \frac{1-\nu}{2},\ \frac{\nu+1}{2},\ -\frac{\nu}{2}\end{array}\right.\right)$$

Classical cases involving Bessel Y

01.06.26.0023.01

$$\sin\left(\sqrt{z}\right) Y_\nu\left(\sqrt{z}\right) == \frac{1}{\sqrt{2}} G_{3,5}^{2,2}\left(z \left| \begin{array}{c} \frac{1}{4}, \frac{3}{4}, -\frac{\nu}{2} \\ \frac{\nu+1}{2}, \frac{1-\nu}{2}, -\frac{\nu}{2}, -\frac{\nu}{2}, \frac{\nu}{2} \end{array} \right.\right)$$

Classical cases involving cos and Bessel J, Y

01.06.26.0024.01

$$\cos\left(\sqrt{z}\right) Y_\nu\left(\sqrt{z}\right) + \sin\left(\sqrt{z}\right) J_\nu\left(\sqrt{z}\right) == -\sqrt{2}\, G_{2,4}^{3,0}\left(z \left| \begin{array}{c} \frac{1}{4}, \frac{3}{4} \\ -\frac{\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, \frac{1-\nu}{2} \end{array} \right.\right)$$

01.06.26.0025.01

$$\sin\left(\sqrt{z}\right) Y_\nu\left(\sqrt{z}\right) - \cos\left(\sqrt{z}\right) J_\nu\left(\sqrt{z}\right) == -\sqrt{2}\, G_{2,4}^{3,0}\left(z \left| \begin{array}{c} \frac{1}{4}, \frac{3}{4} \\ \frac{1-\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, -\frac{\nu}{2} \end{array} \right.\right)$$

01.06.26.0026.01

$$\cos\left(\sqrt{z}\right) Y_\nu\left(\sqrt{z}\right) - \sin\left(\sqrt{z}\right) J_\nu\left(\sqrt{z}\right) == -\frac{\cos(\nu\pi)}{\pi^2\sqrt{2}} G_{2,4}^{3,2}\left(z \left| \begin{array}{c} \frac{1}{4}, \frac{3}{4} \\ -\frac{\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, \frac{1-\nu}{2} \end{array} \right.\right)$$

01.06.26.0027.01

$$\sin\left(\sqrt{z}\right) Y_\nu\left(\sqrt{z}\right) + \cos\left(\sqrt{z}\right) J_\nu\left(\sqrt{z}\right) == \frac{\cos(\nu\pi)}{\pi^2\sqrt{2}} G_{2,4}^{3,2}\left(z \left| \begin{array}{c} \frac{1}{4}, \frac{3}{4} \\ \frac{1-\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, -\frac{\nu}{2} \end{array} \right.\right)$$

01.06.26.0028.01

$$\sin\left(a+\sqrt{z}\right) J_\nu\left(\sqrt{z}\right) - \cos\left(a+\sqrt{z}\right) Y_\nu\left(\sqrt{z}\right) == \frac{\cos(\pi\nu)}{\pi^2\sqrt{2}} G_{3,5}^{4,2}\left(z \left| \begin{array}{c} \frac{1}{4}, \frac{3}{4}, \frac{1-\nu}{2} - \frac{a}{\pi} \\ -\frac{\nu}{2}, \frac{1-\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, \frac{1-\nu}{2} - \frac{a}{\pi} \end{array} \right.\right)$$

01.06.26.0105.01

$$\cos\left(a+\sqrt{z}\right) J_\nu\left(\sqrt{z}\right) + \sin\left(a+\sqrt{z}\right) Y_\nu\left(\sqrt{z}\right) = \frac{\cos(\pi\nu)}{\sqrt{2}\,\pi^2} G_{3,5}^{4,2}\left(z \left| \begin{array}{c} \frac{1}{4}, \frac{3}{4}, -\frac{a}{\pi} - \frac{\nu}{2} \\ \frac{1-\nu}{2}, -\frac{\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, -\frac{a}{\pi} - \frac{\nu}{2} \end{array} \right.\right)$$

Classical cases involving ${}_0F_1$

01.06.26.0029.01

$$\sin(z)\, {}_0F_1\left(; b; -\frac{z^2}{4}\right) == 2^{b-\frac{3}{2}}\, \Gamma(b)\, G_{2,4}^{1,2}\left(z^2 \left| \begin{array}{c} \frac{3-2b}{4}, \frac{5-2b}{4} \\ \frac{1}{2}, 0, 1-b, \frac{3}{2}-b \end{array} \right.\right) /; -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

01.06.26.0106.01

$$\sin(z)\, {}_0F_1\left(; b; -\frac{z^2}{4}\right) = \frac{2^{b-\frac{3}{2}}\, \Gamma(b)}{z} G_{2,4}^{1,2}\left(z^2 \left| \begin{array}{c} \frac{5}{4} - \frac{b}{2}, \frac{7}{4} - \frac{b}{2} \\ 1, \frac{1}{2}, \frac{3}{2}-b, 2-b \end{array} \right.\right)$$

01.06.26.0031.01

$$\sin(a+z)\, {}_0F_1\left(; b; -\frac{z^2}{4}\right) == -2^{b-\frac{3}{2}}\, \Gamma(b)\, G_{3,5}^{2,2}\left(z^2 \left| \begin{array}{c} \frac{3-2b}{4}, \frac{5-2b}{4}, \frac{a}{\pi}+1 \\ 0, \frac{1}{2}, 1-b, \frac{3}{2}-b, \frac{a}{\pi}+1 \end{array} \right.\right) /; -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

01.06.26.0107.01

$$\sin(a+z)\,{}_0F_1\left(;b;-\frac{z^2}{4}\right)=2^{b-\frac{3}{2}}\,\Gamma(b)\left(\frac{\cos(a)}{z}\,G_{2,4}^{1,2}\left(z^2\,\middle|\,\begin{matrix}\frac{5}{4}-\frac{b}{2},\frac{7}{4}-\frac{b}{2}\\1,\frac{1}{2},\frac{3}{2}-b,2-b\end{matrix}\right)+\sin(a)\,G_{2,4}^{1,2}\left(z^2\,\middle|\,\begin{matrix}\frac{1}{4}(3-2b),\frac{1}{4}(5-2b)\\0,\frac{1}{2},1-b,\frac{3}{2}-b\end{matrix}\right)\right)$$

01.06.26.0030.01

$$\sin\left(2\sqrt{z}\right)\,{}_0F_1(;b;-z)=2^{b-\frac{3}{2}}\,\Gamma(b)\,G_{2,4}^{1,2}\left(4z\,\middle|\,\begin{matrix}\frac{3-2b}{4},\frac{5-2b}{4}\\\frac{1}{2},0,1-b,\frac{3}{2}-b\end{matrix}\right)$$

01.06.26.0032.01

$$\sin\left(a+2\sqrt{z}\right)\,{}_0F_1(;b;-z)=-2^{b-\frac{3}{2}}\,\Gamma(b)\,G_{3,5}^{2,2}\left(4z\,\middle|\,\begin{matrix}\frac{3-2b}{4},\frac{5-2b}{4},\frac{a}{\pi}+1\\0,\frac{1}{2},1-b,\frac{3}{2}-b,\frac{a}{\pi}+1\end{matrix}\right)$$

Classical cases involving ${}_0\tilde{F}_1$

01.06.26.0033.01

$$\sin(z)\,{}_0\tilde{F}_1\left(;b;-\frac{z^2}{4}\right)=2^{b-\frac{3}{2}}\,G_{2,4}^{1,2}\left(z^2\,\middle|\,\begin{matrix}\frac{3-2b}{4},\frac{5-2b}{4}\\\frac{1}{2},0,1-b,\frac{3}{2}-b\end{matrix}\right)\;/;\;-\frac{\pi}{2}<\arg(z)\leq\frac{\pi}{2}$$

01.06.26.0108.01

$$\sin(z)\,{}_0\tilde{F}_1\left(;b;-\frac{z^2}{4}\right)=\frac{2^{b-\frac{3}{2}}}{z}\,G_{2,4}^{1,2}\left(z^2\,\middle|\,\begin{matrix}\frac{5}{4}-\frac{b}{2},\frac{7}{4}-\frac{b}{2}\\1,\frac{1}{2},\frac{3}{2}-b,2-b\end{matrix}\right)$$

01.06.26.0035.01

$$\sin(a+z)\,{}_0\tilde{F}_1\left(;b;-\frac{z^2}{4}\right)=-2^{b-\frac{3}{2}}\,G_{3,5}^{2,2}\left(z^2\,\middle|\,\begin{matrix}\frac{3-2b}{4},\frac{5-2b}{4},\frac{a}{\pi}+1\\0,\frac{1}{2},1-b,\frac{3}{2}-b,\frac{a}{\pi}+1\end{matrix}\right)\;/;\;-\frac{\pi}{2}<\arg[z]\leq\frac{\pi}{2}$$

01.06.26.0109.01

$$\sin(a+z)\,{}_0\tilde{F}_1\left(;b;-\frac{z^2}{4}\right)=2^{b-\frac{3}{2}}\left(\frac{\cos(a)}{z}\,G_{2,4}^{1,2}\left(z^2\,\middle|\,\begin{matrix}\frac{5}{4}-\frac{b}{2},\frac{7}{4}-\frac{b}{2}\\1,\frac{1}{2},\frac{3}{2}-b,2-b\end{matrix}\right)+\sin(a)\,G_{2,4}^{1,2}\left(z^2\,\middle|\,\begin{matrix}\frac{1}{4}(3-2b),\frac{1}{4}(5-2b)\\0,\frac{1}{2},1-b,\frac{3}{2}-b\end{matrix}\right)\right)$$

01.06.26.0034.01

$$\sin\left(2\sqrt{z}\right)\,{}_0\tilde{F}_1(;b;-z)=2^{b-\frac{3}{2}}\,G_{2,4}^{1,2}\left(4z\,\middle|\,\begin{matrix}\frac{3-2b}{4},\frac{5-2b}{4}\\\frac{1}{2},0,1-b,\frac{3}{2}-b\end{matrix}\right)$$

01.06.26.0036.01

$$\sin\left(a+2\sqrt{z}\right)\,{}_0\tilde{F}_1(;b;-z)=-2^{b-\frac{3}{2}}\,G_{3,5}^{2,2}\left(4z\,\middle|\,\begin{matrix}\frac{3-2b}{4},\frac{5-2b}{4},\frac{a}{\pi}+1\\0,\frac{1}{2},1-b,\frac{3}{2}-b,\frac{a}{\pi}+1\end{matrix}\right)$$

Generalized cases for the direct function itself

01.06.26.0037.01

$$\sin(z)=\sqrt{\pi}\,G_{0,2}^{1,0}\left(\frac{z}{2},\frac{1}{2}\,\middle|\,\frac{1}{2},0\right)$$

01.06.26.0038.01

$$\sin(a+z)=\sqrt{\pi}\,G_{1,3}^{2,0}\left(\frac{z}{2},\frac{1}{2}\,\middle|\,\begin{matrix}\frac{a}{\pi}\\0,\frac{1}{2},\frac{a}{\pi}\end{matrix}\right)$$

Generalized cases for powers of sin

01.06.26.0039.01

$$\sin^n(z) = 2^{-n-1}\left((-1)^n+1\right)\binom{n}{\frac{n}{2}} + 2^{1-n}\sqrt{\pi}\sum_{k=0}^{\left\lfloor\frac{n-1}{2}\right\rfloor}(-1)^{\left\lfloor\frac{n}{2}\right\rfloor-k}\binom{n}{k}G_{0,2}^{1,0}\left(\frac{1}{2}z(n-2k), \frac{1}{2} \,\middle|\, \frac{1}{4}\left(1-(-1)^n\right), \frac{1}{4}\left(1+(-1)^n\right)\right) /; n \in \mathbb{N}^+$$

01.06.26.0099.01

$$\sin^{2n}(z) = \sqrt{\pi}\, 2^{1-2n}\sum_{k=0}^{n-1}(-1)^{-k+n-1}\binom{2n}{k}G_{1,3}^{1,1}\left((n-k)z, \frac{1}{2} \,\middle|\, \begin{matrix}1\\ 1, 0, \frac{1}{2}\end{matrix}\right) /; n \in \mathbb{N}^+$$

Generalized cases involving exp

01.06.26.0040.01

$$e^{-z}\sin(z) = \frac{1}{\sqrt{2\pi}}G_{0,4}^{3,0}\left(\frac{z}{2\sqrt{2}}, \frac{1}{4} \,\middle|\, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 0\right)$$

01.06.26.0041.01

$$e^{-\frac{z}{\sqrt{3}}}\sin(z) = \frac{1}{2}\sqrt{3}\, G_{0,3}^{2,0}\left(\frac{2z}{3\sqrt{3}}, \frac{1}{3} \,\middle|\, \frac{1}{3}, \frac{2}{3}, 0\right)$$

01.06.26.0042.01

$$e^{-\sqrt{3}\, z}\sin(z) = \frac{\sqrt{3}}{4\pi^{3/2}}G_{0,6}^{5,0}\left(\frac{z}{3}, \frac{1}{6} \,\middle|\, \frac{1}{6}, \frac{1}{3}, \frac{1}{2}, \frac{2}{3}, \frac{5}{6}, 0\right)$$

Generalized cases involving cosh

01.06.26.0043.01

$$\sin(z)\cosh(z) = \sqrt{2}\,\pi^{3/2}G_{1,5}^{2,0}\left(\frac{z}{2\sqrt{2}}, \frac{1}{4} \,\middle|\, \begin{matrix}\frac{1}{2}\\ \frac{1}{4}, \frac{3}{4}, 0, \frac{1}{2}, \frac{1}{2}\end{matrix}\right)$$

Generalized cases involving sinh

01.06.26.0044.01

$$\sin(z)\sinh(z) = \sqrt{2}\,\pi^{3/2}G_{0,4}^{1,0}\left(\frac{z}{2\sqrt{2}}, \frac{1}{4} \,\middle|\, \frac{1}{2}, 0, \frac{1}{4}, \frac{3}{4}\right)$$

Generalized cases involving cos, Ci, Si

01.06.26.0045.01

$$\cos(z)\,\text{Ci}(z) + \sin(z)\,\text{Si}(z) = -\frac{1}{2}\pi^{3/2}G_{2,4}^{2,1}\left(\frac{z}{2}, \frac{1}{2} \,\middle|\, \begin{matrix}0, \frac{1}{2}\\ 0, 0, \frac{1}{2}, \frac{1}{2}\end{matrix}\right)$$

01.06.26.0046.01

$$\cos(z)\,\text{Ci}(z) + \sin(z)\left(\text{Si}(z) - \frac{\pi}{2}\right) = -\frac{1}{2\sqrt{\pi}}G_{1,3}^{3,1}\left(\frac{z}{2}, \frac{1}{2} \,\middle|\, \begin{matrix}0\\ 0, 0, \frac{1}{2}\end{matrix}\right)$$

01.06.26.0047.01

$$\sin(z)\,\text{Ci}(z) - \cos(z)\,\text{Si}(z) = -\frac{1}{2}\pi^{3/2}G_{2,4}^{2,1}\left(\frac{z}{2}, \frac{1}{2} \,\middle|\, \begin{matrix}\frac{1}{2}, 1\\ \frac{1}{2}, \frac{1}{2}, 1, 0\end{matrix}\right)$$

01.06.26.0048.01

$$\sin(z)\,\text{Ci}(z)-\cos(z)\left(\text{Si}(z)-\frac{\pi}{2}\right)=\frac{1}{2\sqrt{\pi}}\,G_{1,3}^{3,1}\!\left(\frac{z}{2},\frac{1}{2}\,\middle|\,\begin{matrix}\frac{1}{2}\\0,\frac{1}{2},\frac{1}{2}\end{matrix}\right)$$

Generalized cases involving cos and Fresnel *C*, *S*

01.06.26.0049.01

$$\cos(z)\,C\!\left(\sqrt{\frac{2z}{\pi}}\right)+\sin(z)\,S\!\left(\sqrt{\frac{2z}{\pi}}\right)=\sqrt{\frac{\pi}{2}}\,G_{1,3}^{1,1}\!\left(\frac{z}{2},\frac{1}{2}\,\middle|\,\begin{matrix}\frac{1}{4}\\\frac{1}{4},0,\frac{1}{2}\end{matrix}\right)$$

01.06.26.0050.01

$$\cos(z)\,S\!\left(\sqrt{\frac{2z}{\pi}}\right)-\sin(z)\,C\!\left(\sqrt{\frac{2z}{\pi}}\right)=-\sqrt{\frac{\pi}{2}}\,G_{1,3}^{1,1}\!\left(\frac{z}{2},\frac{1}{2}\,\middle|\,\begin{matrix}\frac{3}{4}\\\frac{3}{4},0,\frac{1}{2}\end{matrix}\right)$$

01.06.26.0051.01

$$\cos(z)\left(\frac{1}{2}-C\!\left(\sqrt{\frac{2z}{\pi}}\right)\right)+\sin(z)\left(\frac{1}{2}-S\!\left(\sqrt{\frac{2z}{\pi}}\right)\right)=(2\pi)^{-3/2}\,G_{1,3}^{3,1}\!\left(\frac{z}{2},\frac{1}{2}\,\middle|\,\begin{matrix}\frac{1}{4}\\0,\frac{1}{4},\frac{1}{2}\end{matrix}\right)$$

01.06.26.0052.01

$$\cos(z)\left(\frac{1}{2}-S\!\left(\sqrt{\frac{2z}{\pi}}\right)\right)-\sin(z)\left(\frac{1}{2}-C\!\left(\sqrt{\frac{2z}{\pi}}\right)\right)=(2\pi)^{-3/2}\,G_{1,3}^{3,1}\!\left(\frac{z}{2},\frac{1}{2}\,\middle|\,\begin{matrix}\frac{3}{4}\\0,\frac{1}{2},\frac{3}{4}\end{matrix}\right)$$

01.06.26.0110.01

$$\cos\left(\frac{\pi z^2}{2}\right)C(z)+\sin\left(\frac{\pi z^2}{2}\right)S(z)=\sqrt{\frac{\pi}{2}}\,G_{1,3}^{1,1}\!\left(\frac{\sqrt{\pi}\,z}{2},\frac{1}{4}\,\middle|\,\begin{matrix}\frac{1}{4}\\\frac{1}{4},0,\frac{1}{2}\end{matrix}\right)$$

01.06.26.0111.01

$$\cos\left(\frac{\pi z^2}{2}\right)S(z)-\sin\left(\frac{\pi z^2}{2}\right)C(z)=-\sqrt{\frac{\pi}{2}}\,G_{1,3}^{1,1}\!\left(\frac{\sqrt{\pi}\,z}{2},\frac{1}{4}\,\middle|\,\begin{matrix}\frac{3}{4}\\\frac{3}{4},0,\frac{1}{2}\end{matrix}\right)$$

01.06.26.0112.01

$$\cos\left(\frac{\pi z^2}{2}\right)\left(\frac{1}{2}-C(z)\right)+\sin\left(\frac{\pi z^2}{2}\right)\left(\frac{1}{2}-S(z)\right)=(2\pi)^{-3/2}\,G_{1,3}^{3,1}\!\left(\frac{\sqrt{\pi}\,z}{2},\frac{1}{4}\,\middle|\,\begin{matrix}\frac{1}{4}\\0,\frac{1}{4},\frac{1}{2}\end{matrix}\right)$$

01.06.26.0113.01

$$\cos\left(\frac{\pi z^2}{2}\right)\left(\frac{1}{2}-C(z)\right)+\sin\left(\frac{\pi z^2}{2}\right)\left(\frac{1}{2}-S(z)\right)=(2\pi)^{-3/2}\,G_{1,3}^{3,1}\!\left(\frac{\sqrt{\pi}\,z}{2},\frac{1}{4}\,\middle|\,\begin{matrix}\frac{3}{4}\\0,\frac{1}{2},\frac{3}{4}\end{matrix}\right)$$

Generalized cases involving $\cos^{-1}$ in the arguments and unit step θ

01.06.26.0053.01

$$\theta(1-|z|)\sin\left(\nu\cos^{-1}(z)\right)=\frac{\sqrt{\pi}\,\nu}{2}\,G_{2,2}^{2,0}\!\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}1-\frac{\nu}{2},\frac{\nu+2}{2}\\0,\frac{1}{2}\end{matrix}\right)$$

Generalized cases involving $\tan^{-1}$ in the arguments

01.06.26.0054.01

$$\left(z^2+1\right)^{\nu/2}\sin\left(\nu\tan^{-1}(z)\right)=-\frac{2^{-\nu-1}}{\Gamma(-\nu)}G_{2,2}^{1,2}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{\nu}{2}+1,\frac{\nu+1}{2}\\ \frac{1}{2},0\end{matrix}\right)$$

Generalized cases involving $\cot^{-1}$ in the arguments

01.06.26.0055.01

$$\left(z^2+1\right)^{\nu/2}\sin\left(\nu\cot^{-1}(z)\right)=-\frac{2^{-\nu-1}}{\Gamma(-\nu)}G_{2,2}^{2,1}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{\nu+1}{2},\frac{\nu}{2}+1\\ 0,\frac{1}{2}\end{matrix}\right)/;\operatorname{Re}(z)>0$$

Generalized cases involving $\sec^{-1}$ in the arguments and unit step θ

01.06.26.0056.01

$$\theta(|z|-1)\sin\left(\nu\sec^{-1}(z)\right)=\frac{\sqrt{\pi}\,\nu}{2}G_{2,2}^{0,2}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{1}{2},1\\ -\frac{\nu}{2},\frac{\nu}{2}\end{matrix}\right)$$

Generalized cases involving Bessel J

01.06.26.0057.01

$$\sin(z)J_\nu(z)=\frac{1}{\sqrt{2}}G_{2,4}^{1,2}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{1}{4},\frac{3}{4}\\ \frac{\nu+1}{2},-\frac{\nu}{2},\frac{1-\nu}{2},\frac{\nu}{2}\end{matrix}\right)$$

01.06.26.0058.01

$$\sin(a+z)J_\nu(z)=\frac{1}{\sqrt{2}}G_{3,5}^{2,2}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{1}{4},\frac{3}{4},\frac{a}{\pi}+\frac{\nu}{2}\\ \frac{\nu}{2},\frac{\nu+1}{2},-\frac{\nu}{2},\frac{1-\nu}{2},\frac{a}{\pi}+\frac{\nu}{2}\end{matrix}\right)$$

Generalized cases involving cos and Bessel J

01.06.26.0059.01

$$\cos(z)J_{-\nu}(z)+\sin(z)J_\nu(z)=-\sqrt{2}\sin\left(\frac{1}{4}\pi(2\nu-1)\right)G_{2,4}^{2,1}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{3}{4},\frac{1}{4}\\ -\frac{\nu}{2},\frac{\nu+1}{2},\frac{1-\nu}{2},\frac{\nu}{2}\end{matrix}\right)$$

01.06.26.0060.01

$$\cos(z)J_{-\nu}(z)-\sin(z)J_\nu(z)=\sqrt{2}\sin\left(\frac{1}{4}\pi(2\nu+1)\right)G_{2,4}^{2,1}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{1}{4},\frac{3}{4}\\ -\frac{\nu}{2},\frac{\nu+1}{2},\frac{1-\nu}{2},\frac{\nu}{2}\end{matrix}\right)$$

01.06.26.0114.01

$$\sin(z)J_{-\nu}(z)+\cos(z)J_\nu(z)=\sqrt{2}\sin\left(\frac{1}{4}\pi(2\nu+1)\right)G_{2,4}^{2,1}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{3}{4},\frac{1}{4}\\ \frac{\nu}{2},\frac{1-\nu}{2},\frac{\nu+1}{2},-\frac{\nu}{2}\end{matrix}\right)$$

01.06.26.0115.01

$$\sin(z)J_{-\nu}(z)-\cos(z)J_\nu(z)=\sqrt{2}\sin\left(\frac{1}{4}\pi(2\nu-1)\right)G_{2,4}^{2,1}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{1}{4},\frac{3}{4}\\ \frac{\nu}{2},\frac{1-\nu}{2},\frac{\nu+1}{2},-\frac{\nu}{2}\end{matrix}\right)$$

Generalized cases involving Bessel Y

01.06.26.0061.01

$$\sin(z)\, Y_\nu(z) = \frac{1}{\sqrt{2}}\, G_{3,5}^{2,2}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{1}{4}, \frac{3}{4}, -\frac{\nu}{2} \\ \frac{\nu+1}{2}, \frac{1-\nu}{2}, -\frac{\nu}{2}, -\frac{\nu}{2}, \frac{\nu}{2} \end{array}\right)$$

01.06.26.0100.01

$$\sin(a+z)\, Y_\nu(z) = \frac{\cos(\pi\nu)}{\sqrt{2}\, \pi^2}\, G_{3,5}^{4,2}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{1}{4}, \frac{3}{4}, -\frac{a}{\pi} - \frac{\nu}{2} \\ \frac{1-\nu}{2}, -\frac{\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, -\frac{a}{\pi} - \frac{\nu}{2} \end{array}\right) - \frac{1}{\sqrt{2}}\, G_{3,5}^{2,2}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{1}{4}, \frac{3}{4}, \frac{1}{2}\left(\frac{2a}{\pi} + \nu + 1\right) \\ \frac{\nu}{2}, \frac{\nu+1}{2}, \frac{1-\nu}{2}, -\frac{\nu}{2}, \frac{1}{2}\left(\frac{2a}{\pi} + \nu + 1\right) \end{array}\right)$$

Generalized cases involving cos and Bessel J, Y

01.06.26.0062.01

$$\sin(z)\, J_\nu(z) + \cos(z)\, Y_\nu(z) = -\sqrt{2}\, G_{2,4}^{3,0}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{1}{4}, \frac{3}{4} \\ -\frac{\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, \frac{1-\nu}{2} \end{array}\right)$$

01.06.26.0063.01

$$\cos(z)\, J_\nu(z) - \sin(z)\, Y_\nu(z) = \sqrt{2}\, G_{2,4}^{3,0}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{1}{4}, \frac{3}{4} \\ \frac{1-\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, -\frac{\nu}{2} \end{array}\right)$$

01.06.26.0064.01

$$\sin(z)\, J_\nu(z) - \cos(z)\, Y_\nu(z) = \frac{\cos(\nu\pi)}{\pi^2 \sqrt{2}}\, G_{2,4}^{3,2}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{1}{4}, \frac{3}{4} \\ -\frac{\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, \frac{1-\nu}{2} \end{array}\right)$$

01.06.26.0065.01

$$\cos(z)\, J_\nu(z) + \sin(z)\, Y_\nu(z) = \frac{\cos(\nu\pi)}{\pi^2 \sqrt{2}}\, G_{2,4}^{3,2}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{1}{4}, \frac{3}{4} \\ \frac{1-\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, -\frac{\nu}{2} \end{array}\right)$$

01.06.26.0066.01

$$\sin(a+z)\, J_\nu(z) - \cos(a+z)\, Y_\nu(z) = \frac{\cos(\pi\nu)}{\pi^2 \sqrt{2}}\, G_{3,5}^{4,2}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{1}{4}, \frac{3}{4}, \frac{1-\nu}{2} - \frac{a}{\pi} \\ -\frac{\nu}{2}, \frac{1-\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, \frac{1-\nu}{2} - \frac{a}{\pi} \end{array}\right)$$

01.06.26.0116.01

$$\cos(a+z)\, J_\nu(z) + \sin(a+z)\, Y_\nu(z) = \frac{\cos(\pi\nu)}{\sqrt{2}\, \pi^2}\, G_{3,5}^{4,2}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{1}{4}, \frac{3}{4}, -\frac{a}{\pi} - \frac{\nu}{2} \\ \frac{1-\nu}{2}, -\frac{\nu}{2}, \frac{\nu}{2}, \frac{\nu+1}{2}, -\frac{a}{\pi} - \frac{\nu}{2} \end{array}\right)$$

Generalized cases involving ${}_0F_1$

01.06.26.0117.01

$$\sin(z)\, {}_0F_1\!\left(; b; -\frac{z^2}{4}\right) = 2^{b-\frac{3}{2}}\, \Gamma(b)\, G_{2,4}^{1,2}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{3-2b}{4}, \frac{5-2b}{4} \\ \frac{1}{2}, 0, 1-b, \frac{3}{2} - b \end{array}\right)$$

01.06.26.0118.01

$$\sin(a+z)\, {}_0F_1\!\left(; b; -\frac{z^2}{4}\right) = 2^{b-\frac{3}{2}}\, \Gamma(b)\, G_{3,5}^{2,2}\!\left(z, \frac{1}{2} \,\middle|\, \begin{array}{c} \frac{3}{4} - \frac{b}{2}, \frac{5}{4} - \frac{b}{2}, \frac{a}{\pi} \\ 0, \frac{1}{2}, 1-b, \frac{3}{2} - b, \frac{a}{\pi} \end{array}\right)$$

Generalized cases involving ${}_0\tilde{F}_1$

01.06.26.0119.01

$$\sin(z)\,{}_0\tilde{F}_1\left(;b;-\frac{z^2}{4}\right)=2^{b-\frac{3}{2}}\,G_{2,4}^{1,2}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{1}{4}(3-2b),\ \frac{1}{4}(5-2b)\\ \frac{1}{2},\ 0,\ 1-b,\ \frac{3}{2}-b\end{matrix}\right)$$

01.06.26.0120.01

$$\sin(a+z)\,{}_0\tilde{F}_1\left(;b;-\frac{z^2}{4}\right)=2^{b-\frac{3}{2}}\,G_{3,5}^{2,2}\left(z,\frac{1}{2}\,\middle|\,\begin{matrix}\frac{3}{4}-\frac{b}{2},\ \frac{5}{4}-\frac{b}{2},\ \frac{a}{\pi}\\ 0,\ \frac{1}{2},\ 1-b,\ \frac{3}{2}-b,\ \frac{a}{\pi}\end{matrix}\right)$$

Through other functions

Involving Bessel functions

01.06.26.0067.01

$$\sin(z)=\sqrt{\frac{\pi z}{2}}\;J_{\frac{1}{2}}(z)$$

01.06.26.0068.01

$$\sin(z)=-i\sqrt{\frac{\pi i z}{2}}\;I_{\frac{1}{2}}(i z)$$

01.06.26.0069.01

$$\sin(z)=\sqrt{\frac{\pi z}{2}}\;Y_{-\frac{1}{2}}(z)$$

01.06.26.0070.01

$$\sin(z)=\frac{i}{\sqrt{2\pi}}\left(\sqrt{i z}\;K_{-\frac{1}{2}}(i z)-\sqrt{-i z}\;K_{-\frac{1}{2}}(-i z)\right)$$

Involving Jacobi functions

01.06.26.0071.01

$$\sin(z)=\operatorname{cd}\left(\frac{\pi}{2}-z\,\middle|\,0\right)$$

01.06.26.0072.01

$$\sin(z)=\operatorname{cn}\left(\frac{\pi}{2}-z\,\middle|\,0\right)$$

01.06.26.0073.01

$$\sin(z)=\frac{1}{\operatorname{cn}\left(\frac{\pi i}{2}-i z\,\middle|\,1\right)}$$

01.06.26.0074.01

$$\sin(z)=-\frac{i}{\operatorname{cs}(i z\,|\,1)}$$

01.06.26.0075.01

$$\sin(z)=\frac{1}{\operatorname{dc}\left(\frac{\pi}{2}-z\,\middle|\,0\right)}$$

01.06.26.0076.01

$$\sin(z) = \frac{1}{\operatorname{dn}\left(\frac{\pi i}{2} - i z \,\middle|\, 1\right)}$$

01.06.26.0077.01

$$\sin(z) = \frac{1}{\operatorname{ds}(z \mid 0)}$$

01.06.26.0078.01

$$\sin(z) = -\frac{i}{\operatorname{ds}(i z \mid 1)}$$

01.06.26.0079.01

$$\sin(z) = \frac{1}{\operatorname{nc}\left(\frac{\pi}{2} - z \,\middle|\, 0\right)}$$

01.06.26.0080.01

$$\sin(z) = \operatorname{nc}\left(\frac{\pi i}{2} - i z \,\middle|\, 1\right)$$

01.06.26.0081.01

$$\sin(z) = \operatorname{nd}\left(\frac{\pi i}{2} - i z \,\middle|\, 1\right)$$

01.06.26.0082.01

$$\sin(z) = \frac{1}{\operatorname{ns}(z \mid 0)}$$

01.06.26.0083.01

$$\sin(z) = -i \operatorname{sc}(i z \mid 1)$$

01.06.26.0084.01

$$\sin(z) = -i \operatorname{sd}(i z \mid 1)$$

01.06.26.0085.01

$$\sin(z) = \operatorname{sd}(z \mid 0)$$

01.06.26.0086.01

$$\sin(z) = \operatorname{sn}(z \mid 0)$$

Involving Mathieu functions

01.06.26.0087.01

$$\sin\left(\sqrt{a}\, z\right) = \operatorname{Se}(a, 0, z)$$

01.06.26.0088.01

$$\sin\left(\sqrt{a}\, z\right) = -\frac{1}{\sqrt{a}} \operatorname{Ce}_z(a, 0, z)$$

Involving some elliptic-type functions

01.06.26.0089.01

$$\sin(z) = E(z \mid 1) \;/;\; |\operatorname{Re}(z)| \leq \frac{\pi}{2}$$

01.06.26.0090.01

$$\sin(z) = \sqrt{\frac{3}{2}}\, e^{-\frac{z^2}{6}}\, \sigma\!\left(\sqrt{\frac{2}{3}}\, z; 3, 1\right)$$

Involving some hypergeometric-type functions

01.06.26.0091.01

$$\sin(\pi z) = \frac{\pi}{\Gamma(z)\,\Gamma(1-z)}$$

01.06.26.0092.01

$$\sin(z) = \sqrt{\frac{\pi z}{2}}\, \boldsymbol{H}_{-\frac{1}{2}}(z)$$

01.06.26.0093.01

$$\sin(z) = -i \sqrt{\frac{\pi i z}{2}}\, \boldsymbol{L}_{-\frac{1}{2}}(i z)$$

01.06.26.0094.01

$$\sin(n z) = \sin(z)\, U_{n-1}(\cos(z))$$

Representations through equivalent functions

With inverse function

01.06.27.0001.01

$$\sin\left(\sin^{-1}(z)\right) = z$$

01.06.27.0002.02

$$\sin^{-1}(\sin(z)) = z \;/;\; -\frac{\pi}{2} < \mathrm{Re}(z) < \frac{\pi}{2} \bigvee \mathrm{Re}(z) = -\frac{\pi}{2} \bigwedge \mathrm{Im}(z) \geq 0 \bigvee \mathrm{Re}(z) = \frac{\pi}{2} \bigwedge \mathrm{Im}(z) \leq 0$$

01.06.27.0065.01

$$\sin^{-1}(\sin(z)) = -z - \pi \;/;\; -\frac{3\pi}{2} < \mathrm{Re}(z) < -\frac{\pi}{2} \bigvee \mathrm{Re}(z) = -\frac{3\pi}{2} \bigwedge \mathrm{Im}(z) \geq 0 \bigvee \mathrm{Re}(z) = -\frac{\pi}{2} \bigwedge \mathrm{Im}(z) \leq 0$$

01.06.27.0066.01

$$\sin^{-1}(\sin(z)) = \pi - z \;/;\; \frac{\pi}{2} < \mathrm{Re}(z) < \frac{3\pi}{2} \bigvee \mathrm{Re}(z) = \frac{\pi}{2} \bigwedge \mathrm{Im}(z) \geq 0 \bigvee \mathrm{Re}(z) = \frac{3\pi}{2} \bigwedge \mathrm{Im}(z) \leq 0$$

01.06.27.0067.01

$$\sin^{-1}(\sin(z)) = (-1)^k (z - \pi k) \;/;$$
$$\left(k\pi - \frac{\pi}{2} < \mathrm{Re}(z) < \pi k + \frac{\pi}{2} \bigvee \mathrm{Re}(z) = k\pi - \frac{\pi}{2} \bigwedge \mathrm{Im}(z) \geq 0 \bigvee \mathrm{Re}(z) = \pi k + \frac{\pi}{2} \bigwedge \mathrm{Im}(z) \leq 0\right) \bigwedge k \in \mathbb{Z}$$

01.06.27.0003.01

$$\sin^{-1}(\sin(z)) =$$
$$(-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} - \frac{1}{2} \right\rfloor} \left(\left(1 + (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} + \frac{1}{2} \right\rfloor - \left\lceil \frac{\mathrm{Re}(z)}{\pi} + \frac{1}{2} \right\rceil}\right) \theta(-\mathrm{Im}(z)) - 1\right) \left(z - \pi \left\lfloor \frac{\mathrm{Re}(z)}{\pi} - \frac{1}{2} \right\rfloor + \frac{\pi}{2} \left(1 + (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} + \frac{1}{2} \right\rfloor - \left\lceil \frac{\mathrm{Re}(z)}{\pi} + \frac{1}{2} \right\rceil}\right) \theta(-\mathrm{Im}(z)) - \pi\right)$$

01.06.27.0068.01

$$\sin^{-1}(\sin(z)) = \begin{cases} (-1)^{\left\lfloor \frac{2\,\mathrm{Re}(z)+\pi}{2\pi} \right\rfloor} \left(\pi \left\lfloor \frac{2\,\mathrm{Re}(z)-\pi}{2\pi} \right\rfloor - z\right) & \frac{2\,\mathrm{Re}(z)+\pi}{2\pi} \in \mathbb{Z} \bigwedge \mathrm{Im}(z) \leq 0 \\ (-1)^{\left\lfloor \frac{2\,\mathrm{Re}(z)+\pi}{2\pi} \right\rfloor} \left(z - \pi \left\lfloor \frac{2\,\mathrm{Re}(z)+\pi}{2\pi} \right\rfloor\right) & \mathrm{True} \end{cases}$$

With related functions

Involving exp

01.06.27.0004.01

$$\sin(z) = \frac{e^{i z} - e^{-i z}}{2 i}$$

Involving cos

01.06.27.0005.01

$$\sin(z) = \cos\left(\frac{\pi}{2} - z\right)$$

01.06.27.0006.01

$$\sin(z) = -\cos\left(\frac{\pi}{2} + z\right)$$

01.06.27.0007.01

$$\sin(z) = -\frac{\sqrt{-z^2}}{z} \sqrt{\frac{\cos(2 z) - 1}{2}} \;/;\; \mathrm{Im}(z) \neq 0 \bigwedge |\mathrm{Re}(z)| < \frac{\pi}{2}$$

01.06.27.0008.01

$$\sin(z) = \frac{\sqrt{z^2}}{z} \sqrt{\frac{1 - \cos(2 z)}{2}} \;/;\; |\mathrm{Re}(z)| < \pi$$

01.06.27.0009.01

$$\sin(z) = \sqrt{\frac{1 - \cos(2 z)}{2}} \;/;\; 0 < \mathrm{Re}(z) < \pi$$

01.06.27.0010.01

$$\sin(z) = (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} \right\rfloor} \sqrt{\frac{1 - \cos(2 z)}{2}} \left(1 - \left(1 + (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} \right\rfloor + \left\lfloor -\frac{\mathrm{Re}(z)}{\pi} \right\rfloor}\right) \theta(-\mathrm{Im}(z))\right)$$

01.06.27.0011.01

$$\sin(z) = -\frac{\sqrt{-z^2}}{z} \sqrt{\cos^2(z) - 1} \;/;\; \mathrm{Im}(z) \neq 0 \bigwedge |\mathrm{Re}(z)| < \frac{\pi}{2}$$

01.06.27.0012.01

$$\sin(z) = \frac{\sqrt{z^2}}{z} \sqrt{1 - \cos^2(z)} \;/;\; |\mathrm{Re}(z)| < \pi$$

01.06.27.0013.01

$$\sin(z) = \sqrt{1 - \cos^2(z)} \;/;\; 0 < \mathrm{Re}(z) < \pi \lor \mathrm{Re}(z) = 0 \land \mathrm{Im}(z) \geq 0 \lor \mathrm{Re}(z) = \pi \land \mathrm{Im}(z) \leq 0$$

01.06.27.0014.01

$$\sin(z) = \sqrt{1 - \cos^2(z)}\, (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} \right\rfloor} \left(1 - \left(1 + (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} \right\rfloor + \left\lfloor -\frac{\mathrm{Re}(z)}{\pi} \right\rfloor}\right) \theta(-\mathrm{Im}(z))\right)$$

01.06.27.0015.01

$$\sin^2(z) = \frac{1-\cos(2\,z)}{2}$$

01.06.27.0016.01

$$\sin^2(z) = 1-\cos^2(z)$$

01.06.27.0017.01

$$\sin^2(z)+\cos^2(z) = 1$$

01.06.27.0018.01

$$\sin^2(z)-\cos^2(z) = -\cos(2\,z)$$

01.06.27.0019.01

$$\sin(z)+i\cos(z) = i\,e^{-i\,z}$$

01.06.27.0020.01

$$\sin(z)-i\cos(z) = -i\,e^{i\,z}$$

01.06.27.0021.01

$$\sin(z)+\cos(z) = \sqrt{2}\,\sin\left(z+\frac{\pi}{4}\right)$$

01.06.27.0022.01

$$\sin(z)-\cos(z) = \sqrt{2}\,\sin\left(z-\frac{\pi}{4}\right)$$

01.06.27.0023.01

$$a\sin(z)+b\cos(z) = \sqrt{\frac{a^2}{b^2}+1}\;b\cos\left(z-\tan^{-1}\left(\frac{a}{b}\right)\right)$$

01.06.27.0024.01

$$\sin\left(\frac{\pi}{2}+z\right) = \cos(z)$$

01.06.27.0025.01

$$\sin\left(\frac{\pi}{2}-z\right) = \cos(z)$$

Involving tan

01.06.27.0026.01

$$\sin(z) = \frac{2\tan\left(\frac{z}{2}\right)}{\tan^2\left(\frac{z}{2}\right)+1}$$

01.06.27.0027.01

$$\sin(z) = \frac{\tan(z)}{\sqrt{\tan^2(z)+1}} \;/;\; |\mathrm{Re}(z)| < \frac{\pi}{2}$$

01.06.27.0028.01

$$\sin(z) = \frac{\tan(z)}{\sqrt{\tan^2(z)+1}}\,(-1)^{\left\lfloor \frac{1}{2}-\frac{\mathrm{Re}(z)}{\pi}\right\rfloor}\left(1-\left(1+(-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi}-\frac{1}{2}\right\rfloor+\left\lfloor \frac{1}{2}-\frac{\mathrm{Re}(z)}{\pi}\right\rfloor}\right)\theta(-\mathrm{Im}(z))\right)$$

01.06.27.0029.01

$$\sin^2(z) = \frac{\tan^2(z)}{\tan^2(z)+1}$$

Involving cot

01.06.27.0030.01

$$\sin(z) = \frac{2\cot\left(\frac{z}{2}\right)}{\cot^2\left(\frac{z}{2}\right)+1}$$

01.06.27.0031.01

$$\sin(z) = \frac{1}{\sqrt{1+\cot^2(z)}} \;/;\; 0 < \operatorname{Re}(z) < \pi$$

01.06.27.0032.01

$$\sin(z) = \frac{1}{\sqrt{1+\cot^2(z)}} (-1)^{\left\lfloor \frac{\operatorname{Re}(z)}{\pi} \right\rfloor} \left(1 - \left(1 + (-1)^{\left\lfloor \frac{\operatorname{Re}(z)}{\pi} \right\rfloor + \left\lfloor -\frac{\operatorname{Re}(z)}{\pi} \right\rfloor}\right) \theta(\operatorname{Im}(z))\right)$$

01.06.27.0033.01

$$\sin^2(z) = \frac{1}{\cot^2(z)+1}$$

Involving csc

01.06.27.0034.01

$$\sin(z) = \frac{1}{\csc(z)}$$

Involving sec

01.06.27.0035.01

$$\sin(z) = \frac{1}{\sec\left(\frac{\pi}{2} - z\right)}$$

01.06.27.0036.01

$$\sin(z) = -\frac{1}{\sec\left(\frac{\pi}{2} + z\right)}$$

01.06.27.0037.01

$$\sin(z) = \frac{\sqrt{z^2}}{z} \frac{\sqrt{\sec^2(z)-1}}{\sec(z)} \;/;\; |\operatorname{Re}(z)| < \frac{\pi}{2}$$

01.06.27.0038.01

$$\sin(z) = z\sqrt{-\frac{1}{z^2}} \frac{\sqrt{1-\sec^2(z)}}{\sec(z)} \;/;\; \operatorname{Im}(z) \neq 0$$

01.06.27.0039.01

$$\sin^2(z) = \frac{\sec^2(z)-1}{\sec^2(z)}$$

Involving sinh

01.06.27.0040.01

$$\sin(z) = -i \sinh(i z)$$

01.06.27.0041.01

$$\sin(i z) = i \sinh(z)$$

Involving cosh

01.06.27.0042.01

$$\sin(z) = \cosh\left(\frac{\pi i}{2} - i z\right)$$

01.06.27.0043.01

$$\sin(z) = -\cosh\left(\frac{\pi i}{2} + i z\right)$$

01.06.27.0044.01

$$\sin(z) = \frac{\sqrt{z^2}}{z} \sqrt{\frac{1 - \cosh(2 i z)}{2}} \;/;\; |\mathrm{Re}(z)| < \pi$$

01.06.27.0045.01

$$\sin(z) = \sqrt{\frac{1 - \cosh(2 i z)}{2}} \;/;\; 0 < \mathrm{Re}(z) < \pi$$

01.06.27.0046.01

$$\sin(z) = \sqrt{\frac{1 - \cosh(2 i z)}{2}} \, (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} \right\rfloor} \left(1 - \left(1 + (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} \right\rfloor + \left\lfloor -\frac{\mathrm{Re}(z)}{\pi} \right\rfloor}\right) \theta(-\mathrm{Im}(z))\right)$$

01.06.27.0047.01

$$\sin(z) = \frac{\sqrt{z^2}}{z} \sqrt{1 - \cosh^2(i z)} \;/;\; |\mathrm{Re}(z)| < \pi$$

01.06.27.0048.01

$$\sin(z) = \sqrt{1 - \cosh^2(i z)} \;/;\; 0 < \mathrm{Re}(z) < \pi$$

01.06.27.0049.01

$$\sin(z) = \sqrt{1 - \cosh^2(i z)} \, (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} \right\rfloor} \left(1 - \left(1 + (-1)^{\left\lfloor \frac{\mathrm{Re}(z)}{\pi} \right\rfloor + \left\lfloor -\frac{\mathrm{Re}(z)}{\pi} \right\rfloor}\right) \theta(-\mathrm{Im}(z))\right)$$

01.06.27.0050.01

$$\sin^2(z) = 1 - \cosh^2(i z)$$

Involving tanh

01.06.27.0051.01

$$\sin(z) = \frac{2 i \tanh\left(\frac{z i}{2}\right)}{\tanh^2\left(\frac{z i}{2}\right) - 1}$$

01.06.27.0052.01

$$\sin(z) = -\frac{i \tanh(i z)}{\sqrt{1 - \tanh^2(i z)}} \;/;\; |\mathrm{Re}(z)| < \frac{\pi}{2}$$

01.06.27.0053.01

$$\sin(z) == \frac{i \tanh(i z)}{\sqrt{1-\tanh^2(i z)}} (-1)^{\left\lfloor -\frac{1}{2}-\frac{\text{Re}(z)}{\pi} \right\rfloor} \left(1-\left(1+(-1)^{\left\lfloor \frac{\text{Re}(z)}{\pi}-\frac{1}{2} \right\rfloor+\left\lfloor \frac{1}{2}-\frac{\text{Re}(z)}{\pi} \right\rfloor}\right) \theta(-\text{Im}(z))\right)$$

01.06.27.0054.01

$$\sin^2(z) == \frac{\tanh^2(i z)}{\tanh^2(i z)-1}$$

Involving coth

01.06.27.0055.01

$$\sin(z) == \frac{2 i \coth\left(\frac{i z}{2}\right)}{1-\coth^2\left(\frac{i z}{2}\right)}$$

01.06.27.0056.01

$$\sin(z) == \frac{1}{\sqrt{1-\coth^2(i z)}} \;/;\; 0 < \text{Re}(z) < \pi$$

01.06.27.0057.01

$$\sin(z) == \frac{1}{\sqrt{1-\coth^2(i z)}} (-1)^{\left\lfloor \frac{\text{Re}(z)}{\pi} \right\rfloor} \left(1-\left(1+(-1)^{\left\lfloor \frac{\text{Re}(z)}{\pi} \right\rfloor+\left\lfloor -\frac{\text{Re}(z)}{\pi} \right\rfloor}\right) \theta(\text{Im}(z))\right)$$

01.06.27.0058.01

$$\sin^2(z) == \frac{1}{1-\coth^2(i z)}$$

Involving csch

01.06.27.0059.01

$$\sin(z) == -\frac{i}{\text{csch}(i z)}$$

Involving sech

01.06.27.0060.01

$$\sin(z) == \frac{1}{\text{sech}\left(\frac{\pi i}{2}-i z\right)}$$

01.06.27.0061.01

$$\sin(z) == -\frac{1}{\text{sech}\left(\frac{\pi i}{2}+i z\right)}$$

01.06.27.0062.01

$$\sin(z) == \frac{\sqrt{z^2}}{z} \frac{\sqrt{\text{sech}^2(i z)-1}}{\text{sech}(i z)} \;/;\; |\text{Re}(z)| < \frac{\pi}{2}$$

01.06.27.0063.01

$$\sin(z) == -\frac{\sqrt{-z^2}}{z} \frac{\sqrt{1-\text{sech}^2(i z)}}{\text{sech}(i z)} \;/;\; \text{Im}(z) \neq 0$$

01.06.27.0064.01

$$\sin^2(z) = \frac{\operatorname{sech}^2(i z) - 1}{\operatorname{sech}^2(i z)}$$

Inequalities

01.06.29.0001.01

$$\frac{\sin(x)}{x} > \frac{2}{\pi} \;/;\; -\frac{\pi}{2} < x < \frac{\pi}{2}$$

01.06.29.0002.01

$$\sin(x) \leq x \;/;\; x \geq 0$$

01.06.29.0003.01

$$\sin(x) > x \cos(x) \;/;\; 0 < x < 4.493409$$

01.06.29.0004.01

$$\sin(x) \geq x \left(1 - \frac{x}{\pi}\right) /;\; 0 \leq x \leq \pi$$

01.06.29.0005.01

$$\sin(x) \leq \frac{4 x}{\pi} \left(1 - \frac{x}{\pi}\right) /;\; 0 \leq x \leq \pi$$

01.06.29.0006.01

$$|\sin(x)| \leq 1 \;/;\; x \in \mathbb{R}$$

01.06.29.0007.01

$$|\sin(x)| \leq |x| \;/;\; x \in \mathbb{R}$$

01.06.29.0008.01

$$|\sin(z)| \leq \sinh(|z|)$$

01.06.29.0009.01

$$|\sin(z)| \leq \cosh(\operatorname{Im}(z))$$

01.06.29.0010.01

$$|\sin(z)| \geq |\sinh(\operatorname{Im}(z))|$$

01.06.29.0011.01

$$\frac{x (\pi - x)}{\pi} < \sin(x) < x \frac{(\pi - x)(2 \pi - x)}{\pi^2} \;/;\; x \in \mathbb{R} \land 0 < x < \pi$$

Zeros

01.06.30.0001.01

$$\sin(z) = 0 \;/;\; z = \pi k \bigwedge k \in \mathbb{Z}$$

Theorems

Fourier sin transforms

$$\hat{f}(y) == \int_0^\infty f(x)\sin(x\,y)\,dx \Leftrightarrow f(x) == \frac{2}{\pi}\int_0^\infty \hat{f}(y)\sin(x\,y)\,dy.$$

Fourier series

$$f(x) \sim \frac{a_0}{2} + \sum_{k=1}^{\infty} a_k \cos\left(\frac{\pi\,k\,x}{r}\right) + b_k \sin\left(\frac{\pi\,k\,x}{r}\right) /;\ a_k == \frac{1}{r}\int_{-r}^{r} f(t)\cos\left(\frac{\pi\,k\,t}{r}\right) dt \bigwedge b_k == \frac{1}{r}\int_{-r}^{r} f(t)\sin\left(\frac{\pi\,k\,t}{r}\right) dt$$

De Moivre's theorem

$$(\cos(z) + i\sin(z))^n == \cos(n\,z) + i\sin(n\,z) /;\quad n \in \mathbb{N}$$

The law of sines

For a triangle in the Euclidean plane with edges a, b, c and opposite angles α, β, γ, the following holds:

$$\frac{\sin(\alpha)}{a} == \frac{\sin(\beta)}{b} == \frac{\sin(\gamma)}{c}.$$

Logistic equation solution

$y_n == \sin^2((c\,2^n \bmod 1)\,\pi)$ is a closed form for the chaos-exhibiting logistic equation $y_{n+1} == 4\,y_n(1 - y_n)$.

Weierstrass-Riemann function $\Omega(x)$

Weierstrass-Riemann function $\Omega(x)$, which is continuous everywhere but not differentiable at a dense set of points, has the following representation:

$$\Omega(x) == \sum_{k=1}^{\infty} \frac{\sin(k^2\,\pi\,x)}{k^2\,\pi} == \frac{\pi}{4\,q^2}\sum_{k=1}^{q-1}\sin\left(\frac{k^2\,p\,\pi}{q}\right) \Big/ \sin^2\left(\frac{k\,\pi}{2\,q}\right) /;\ x == \frac{p}{q} \bigwedge p, q \in \mathbb{N} \bigwedge \gcd(p, q) == 1.$$

Coriolis force

The closed form solution of the vector equation $\frac{\partial^2 \boldsymbol{r}(t)}{\partial t^2} == \boldsymbol{g} - 2\,\boldsymbol{\omega} \times \frac{\partial \boldsymbol{r}(t)}{\partial t}$, describing the movement of a mass point $\boldsymbol{r}(t)$ under the gravitational force $m\,\boldsymbol{g}$ and the Coriolis force $2\,m\,\boldsymbol{\omega} \times \frac{\partial \boldsymbol{r}(t)}{\partial t}$ and initial conditions $\boldsymbol{r}(t) == \boldsymbol{r}_0$ and $\partial \boldsymbol{r}(t) / \partial t\,|_{t==0} == \boldsymbol{v}_0$, is given by

$$\boldsymbol{r}(t) == \boldsymbol{r}_0 + \boldsymbol{v}_0\,t + \boldsymbol{g}\,\frac{t^2}{2} - \boldsymbol{\omega} \times \left(\frac{2\sin^2(\omega\,t)}{2\,\omega^2}\,\boldsymbol{v}_0 + \frac{2\,\omega\,t - \sin(2\,\omega\,t)}{4\,\omega^3}\,\boldsymbol{g}\right) + \boldsymbol{\omega} \times \left(\boldsymbol{\omega} \times \left(\frac{2\,\omega\,t - \sin(2\,\omega\,t)}{2\,\omega^3}\,\boldsymbol{v}_0 + \frac{2\,\omega^2\,t^2 - 2\sin^2(\omega\,t)}{4\,\omega^4}\,\boldsymbol{g}\right)\right).$$

Other information

Value properties

01.06.33.0001.01

$$(x \in \mathbb{Q} \bigwedge \sin(x^\circ) \in \mathbb{Q}) \Rightarrow \left(\sin(x) == 0 \bigvee \sin(x) == \frac{1}{2} \bigvee \sin(x) == -\frac{1}{2} \bigvee \sin(x) == 1 \bigvee \sin(x) == -1\right)$$

History

– K. Ptolemaeus
– Brahmagupta (c. 630)
– R.de Chesters (1140) translated Abu Ja'far Muhammed ibn Musa al-Khwarizme's works and used the word "sine" (in Latin, "sinus"; al-Khwarisme's name is the source of the word "algorithm")
– J. M. Regiomontanus (1464) and A. Dürer (1525)
– F. Maurolyco (1555) used the notation "sinus"
– E. Gunter (1624) used the notation "sin"
– I. Newton (1665) found a series expansion for sin
– L. Euler (1734) found a product representation
– T. Simpson (1750)

The function sin is encountered often in mathematics and the natural sciences.

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