

# HypergeometricU

View the online version at

● [functions.wolfram.com](https://functions.wolfram.com)

Download the

● PDF File

## Notations

---

### Traditional name

Tricomi confluent hypergeometric function

### Traditional notation

$U(a, b, z)$

### Mathematica StandardForm notation

HypergeometricU[ $a, b, z$ ]

## Primary definition

---

07.33.02.0001.01

$$U(a, b, z) = \frac{\Gamma(b-1)}{\Gamma(a)} z^{1-b} {}_1F_1(a-b+1; 2-b; z) + \frac{\Gamma(1-b)}{\Gamma(a-b+1)} {}_1F_1(a; b; z) ; b \notin \mathbb{Z}$$

07.33.02.0002.01

$$U(a, b, z) = \lim_{\beta \rightarrow b} U(a, \beta, z) ; b \in \mathbb{Z}$$

## Specific values

---

### Specialized values

#### For fixed $a, b$

07.33.03.0001.01

$$U(a, b, 0) = \frac{\Gamma(1-b)}{\Gamma(a-b+1)} ; \operatorname{Re}(b) < 1$$

07.33.03.0002.01

$$U(a, b, 0) = \infty ; \operatorname{Re}(b) > 1$$

#### For fixed $a, z$

07.33.03.0003.01

$$U(a, a, z) = e^z \Gamma(1-a, z)$$

07.33.03.0004.01

$$U(a, a, z) = z^{1-a} e^z E_a(z)$$

07.33.03.0005.01

$$U(a, a + 1, z) = z^{-a}$$

07.33.03.0027.01

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

07.33.03.0028.01

$$U(a, a - n, z) = (-1)^n \Gamma(1 - a) e^z L_n^{a-n-1}(-z) - \frac{z^{-a+n+1} \Gamma(a - n)}{n! \Gamma(a)} \frac{\partial^n (e^z z^{a-1} (\Gamma(-a + n + 1) - \Gamma(-a + n + 1, z)))}{\partial z^n} /; n \in \mathbb{N}$$

07.33.03.0029.01

$$U(a, a + n, z) = z^{-a} \sum_{k=0}^{n-1} \binom{n-1}{-k+n-1} (a)_k z^{-k} /; n \in \mathbb{N}^+$$

07.33.03.0030.01

$$U(a, a - 1, z) = \frac{z^{2-a}}{a-1} (e^z (a + z - 1) E_{a-1}(z) - 1)$$

07.33.03.0006.01

$$U(a, 2a - 1, z) = \frac{z^{\frac{3}{2}-a}}{2(a-1)\sqrt{\pi}} e^{z/2} \left( K_{a-\frac{1}{2}}\left(\frac{z}{2}\right) - K_{a-\frac{3}{2}}\left(\frac{z}{2}\right) \right)$$

07.33.03.0007.01

$$U(a, 2a, z) = \frac{z^{\frac{1}{2}-a}}{\sqrt{\pi}} e^z K_{a-\frac{1}{2}}\left(\frac{z}{2}\right)$$

07.33.03.0008.01

$$U(a, 2a + 1, z) = \frac{z^{\frac{1}{2}-a}}{2\sqrt{\pi}} e^{z/2} \left( K_{\frac{1}{2}-a}\left(\frac{z}{2}\right) + K_{-a-\frac{1}{2}}\left(\frac{z}{2}\right) \right)$$

07.33.03.0009.01

$$U(a, 2a - n, z) = \frac{e^{z/2} z^{n-a+\frac{1}{2}}}{\sqrt{\pi} (1-2a)_{n+1}} \sum_{k=0}^n \frac{(1-2a+2k)(1-2a)_k (-n)_{n-k}}{(2-2a+n)_k (n-k)!} K_{a-k-\frac{1}{2}}\left(\frac{z}{2}\right) /; n \in \mathbb{N}$$

07.33.03.0010.01

$$U(a, 2a + n, z) = \frac{(a)_n}{\sqrt{\pi}} z^{\frac{1}{2}-a} e^{z/2} \sum_{k=0}^n \frac{(-1)^{k+n} (2a+2k-1)(-n)_{n-k}}{(n-k)!(2a+k-1)_{n+1}} K_{-a-k+\frac{1}{2}}\left(\frac{z}{2}\right) /; n \in \mathbb{N}$$

**For fixed  $b, z$**

07.33.03.0011.01

$$U(-2, b, z) = b(b+1) - 2(b+1)z + z^2$$

07.33.03.0012.01

$$U(-1, b, z) = z - b$$

07.33.03.0013.01

$$U(0, b, z) = 1$$

07.33.03.0014.01

$$U(1, b, z) = e^z z^{1-b} \Gamma(b-1, z)$$

07.33.03.0015.01

$$U(2, b, z) = \frac{1}{b-2} (1 - e^z z^{1-b} (2-b+z) \Gamma(b-1, z))$$

07.33.03.0016.01

$$U(-n, b, z) = (-1)^n n! L_n^{b-1}(z) ; n \in \mathbb{N}$$

07.33.03.0017.01

$$U\left(-\frac{n}{2}, \frac{1}{2}, z\right) = 2^{-n} H_n(\sqrt{z}) ; n \in \mathbb{N}$$

07.33.03.0018.01

$$U\left(\frac{1-n}{2}, \frac{3}{2}, z\right) = \frac{2^{-n}}{\sqrt{z}} H_n(\sqrt{z}) ; n \in \mathbb{N}$$

07.33.03.0019.01

$$U(n, b, z) = \frac{1}{(n-1)! (2-b)_{n-1}} \frac{\partial^{n-1} (z^{n-b} e^z \Gamma(b-1, z))}{\partial z^{n-1}} ; n \in \mathbb{N}^+$$

07.33.03.0031.01

$$U(n, b, z) = e^z (1-b) \sum_{p=0}^{n-1} \sum_{k=0}^{n-1} \sum_{q=k}^{n-1} \frac{(-1)^q z^{-b+n-p-q} \Gamma(-b+k+1) \Gamma(b-k+q-1, z)}{k! p! (n-p-q-1)! \Gamma(-k+q+1) \Gamma(-b+n-p+1)} ; n \in \mathbb{N}^+$$

07.33.03.0032.01

$$U(n, b, z) = \frac{1}{(2-b)_{n-1}} \left( \Gamma(b-1, z) z^{1-b} e^z L_{n-1}^{1-b}(-z) - \sum_{k=1}^{n-1} \frac{1}{k} L_{-k+n-1}^{-b+k+1}(-z) L_{k-1}^{b-k-1}(z) \right) ; n \in \mathbb{N}^+$$

Brychkov Yu.A. (2006)

07.33.03.0033.01

$$U(b-n, b, z) = z^{n-b} \sum_{k=0}^{n-1} \binom{n-1}{n-k-1} (b-n)_k z^{-k} ; n \in \mathbb{N}^+$$

**For fixed  $z$  and with symbolical integers in parameters**

**For fixed  $z$  and  $a = n, b = \pm m$**

07.33.03.0020.01

$$U(1, m, z) = (m-2)! z^{1-m} \sum_{k=0}^{m-2} \frac{z^k}{k!} ; m-1 \in \mathbb{N}^+$$

07.33.03.0021.01

$$U(2, m, z) = \frac{1}{m-2} \left( 1 - z^{1-m} (-m+z+2) (m-2)! \sum_{k=0}^{m-2} \frac{z^k}{k!} \right) ; m-2 \in \mathbb{N}^+$$

07.33.03.0034.01

$$U(n, m, z) = \frac{(m-2)!}{(n-1)! (2-m)_{n-1}} \sum_{k=0}^{m-2} \frac{(k-m+2)_{n-1} z^{k-m+1}}{k!} ; n \in \mathbb{N}^+ \wedge m \in \mathbb{Z} \wedge m > n$$

07.33.03.0035.01

$$U(n, m, z) = e^z (m-1) \sum_{p=0}^{n-m} \sum_{q=0}^{n-m} \sum_{k=0}^q \frac{(-1)^q z^{n-m-p-q} (k+m-2)!}{p! k! (n-m-p-q)! (n-p-1)! (q-k)!} \left( \frac{(-1)^{q-k+m}}{(k+m-q-1)!} (\text{Chi}(z) - \text{Shi}(z)) + e^{-z} \sum_{j=0}^{q-k-m} \frac{z^j}{(q-k-m+1)_{j+k+m-q}} - e^{-z} \sum_{j=q-k-m+1}^{-1} \frac{z^j}{(q-k-m+1)_{j+k+m-q}} \right); n \in \mathbb{Z} \wedge n > 1 \wedge m \in \mathbb{Z} \wedge 1 < m \leq n$$

07.33.03.0036.01

$$U(n, m, z) = -\frac{1}{((n-1)!)^2} \sum_{k=0}^{m-1} \left(-\frac{1}{z}\right)^k \binom{m-1}{k} (k+n-1)! \left( e^z L_{k+n-1}^{-k}(-z) (\text{Chi}(z) - \text{Shi}(z)) + \sum_{p=1}^{k+n-1} \frac{1}{p} L_{k+n-p-1}^{p-k}(-z) L_{p-1}^{-p}(z) \right); n \in \mathbb{N}^+ \wedge m \in \mathbb{N}^+$$

07.33.03.0037.01

$$U(n, n+1, z) = \frac{(-1)^{n-1}}{(n-1)!} \sum_{k=0}^{n-1} \frac{(k-n+1)_{n-1} z^{k-n}}{k!}; n \in \mathbb{N}^+$$

07.33.03.0038.01

$$U(n, -m, z) = e^z (m+1) \sum_{p=0}^{n-1} \sum_{q=0}^{n-1} \sum_{k=0}^q \frac{(-1)^q z^{m+n-p-q} (k+m)!}{p! k! (n-p-q-1)! (m+n-p)! (q-k)!} \left( \frac{(-1)^{q-k+m}}{(k+m-q+1)!} (\text{Chi}(z) - \text{Shi}(z)) + e^{-z} \sum_{j=0}^{-k-m+q-2} \frac{z^j}{(q-k-m-1)_{j+k+m-q+2}} - e^{-z} \sum_{j=-k-m+q-1}^{-1} \frac{z^j}{(q-k-m-1)_{j+k+m-q+2}} \right); n \in \mathbb{N}^+ \wedge m \in \mathbb{N}$$

07.33.03.0039.01

$$U(n, -m, z) = \frac{(-1)^m z^{m-1}}{(m+n)!} L_{n-1}^{m+1}(-z) \left( e^z \text{Chi}(z) z^2 - e^z \text{Shi}(z) z^2 + z - \sum_{k=0}^{m-1} \left(-\frac{1}{z}\right)^k (k+1)! \right) - \frac{(m+1)!}{(m+n)!} \sum_{k=1}^{n-1} \frac{1}{k} L_{k-1}^{-k-m-1}(z) L_{-k+n-1}^{k+m+1}(-z); n \in \mathbb{N}^+ \wedge m \in \mathbb{N}$$

### For fixed $z$ and $a = -n, b = \pm m$

07.33.03.0040.01

$$U(-n, m, z) = (-1)^n (m+n-1)! \sum_{k=0}^n \frac{(-n)_k z^k}{(k+m-1)! k!}; n \in \mathbb{N} \wedge m \in \mathbb{Z} \wedge m > -n$$

07.33.03.0041.01

$$U(-n, -n, z) = e^z \Gamma(n+1, z); n \in \mathbb{N}$$

07.33.03.0042.01

$$U(-n, -n, z) = n! \sum_{k=0}^n \frac{z^k}{k!}; n \in \mathbb{N}$$

07.33.03.0022.01

$$U(-n, -2n, z) = \frac{z^{n+\frac{1}{2}}}{\sqrt{\pi}} e^{z/2} K_{n+\frac{1}{2}}\left(\frac{z}{2}\right); n \in \mathbb{N}$$

07.33.03.0043.01

$$U(-n, -m, z) = \frac{m!}{(m-n)!(-m)_{m-n}} \sum_{k=0}^m \frac{(k-m)_{m-n} z^k}{k!} ; n \in \mathbb{N} \wedge m \in \mathbb{Z} \wedge m \geq n$$

07.33.03.0044.01

$$U(-n, -m, z) = (-1)^n (-m+n-1)! \sum_{k=0}^n \frac{(-n)_k z^k}{(k-m-1)! k!} ; n \in \mathbb{N} \wedge m \in \mathbb{Z} \wedge m < n$$

**For fixed  $z$  and  $a = \frac{1}{2} \pm n, b = m$**

07.33.03.0045.01

$$U\left(\frac{1}{2} - n, m, z\right) = \frac{2^{1-m}}{\sqrt{\pi}} e^{z/2} \sum_{k=0}^n 2^{-k} z^k \binom{n}{k} \left(-m-n+\frac{3}{2}\right)_{n-k} \sum_{p=0}^{k+m-1} 2^{-p} \binom{k+m-1}{p} \sum_{j=0}^p \binom{p}{j} K_{p-2j}\left(\frac{z}{2}\right) ; n \in \mathbb{N} \wedge m \in \mathbb{N}^+$$

Brychkov Yu.A. (2006)

07.33.03.0046.01

$$U\left(n + \frac{1}{2}, m, z\right) = \frac{(-1)^{m-1} (m-1)!}{\sqrt{\pi} \left(\frac{1}{2}\right)_n} z^{1-m} e^{z/2} \sum_{k=0}^{m-1} \frac{(k+n)!}{k!} L_{-k+m-1}^{k-m+\frac{3}{2}}(z) \sum_{p=0}^{k+n} \frac{(-1)^p 2^{-2p} z^p}{p!} L_{k+n-p}^{-k+p-\frac{1}{2}}\left(-\frac{z}{2}\right) \sum_{j=0}^p \binom{p}{j} K_{p-2j}\left(\frac{z}{2}\right) ;$$

$$n \in \mathbb{N} \wedge m \in \mathbb{N}^+$$

Brychkov Yu.A. (2006)

**For fixed  $z$  and  $a = \frac{1}{2} \pm n, b = -m$**

07.33.03.0047.01

$$U\left(\frac{1}{2} - n, -m, z\right) = \frac{1}{\sqrt{\pi}} \left( 2^{-m-1} e^{z/2} z^{n+1} \sum_{k=0}^{-m+n-1} 2^{-k} z^k \binom{-m+n-1}{k} \left(\frac{1}{2} - n\right)_{-k-m+n-1} \sum_{p=0}^{k+m+1} 2^{-p} \binom{k+m+1}{p} \sum_{j=0}^p K_{p-2j}\left(\frac{z}{2}\right) \binom{p}{j} \right) ;$$

$$n \in \mathbb{Z} \wedge n > m \wedge m \in \mathbb{Z} \wedge m \geq -1$$

Brychkov Yu.A. (2006)

07.33.03.0048.01

$$U\left(\frac{1}{2} - n, -m, z\right) = \frac{(-1)^n n! z}{\sqrt{\pi} \left(\frac{3}{2}\right)_m} e^{z/2} \sum_{k=0}^n \frac{(-1)^k (k+m)!}{k!} L_{n-k}^{k-\frac{1}{2}}(z) \sum_{p=0}^{k+m} (-1)^p \sum_{j=0}^p \frac{(-1)^j 2^{-2j} z^j}{j!} L_{p-j}^{j-p+1}\left(-\frac{z}{2}\right) \sum_{i=0}^j \binom{j}{i} \left( K_{j-2i-1}\left(\frac{z}{2}\right) - K_{j-2i}\left(\frac{z}{2}\right) \right) ; n \in \mathbb{N} \wedge m \in \mathbb{N}$$

Brychkov Yu.A. (2006)

07.33.03.0049.01

$$U\left(n + \frac{1}{2}, -m, z\right) = \frac{(-1)^{m-1} (m+1)!}{\sqrt{\pi} \left(\frac{1}{2}\right)_{m+n+1}^2} e^{z/2}$$

$$\sum_{k=0}^{m+1} \frac{(k+m+n+1)!}{k!} L_{-k+m+1}^{k-m-\frac{1}{2}}(z) \sum_{p=0}^{k+m+n+1} \frac{(-1)^p 2^{-2p} z^p}{p!} L_{k+m+n-p+1}^{-k+p-\frac{1}{2}}\left(-\frac{z}{2}\right) \sum_{j=0}^p \binom{p}{j} K_{p-2j}\left(\frac{z}{2}\right) /; n \in \mathbb{N} \wedge m \in \mathbb{Z} \wedge m \geq -1$$

Brychkov Yu.A. (2006)

**For fixed  $z$  and  $a = -n, b = \frac{1}{2} \pm m$**

07.33.03.0050.01

$$U\left(-n, \frac{1}{2}, z\right) = 2^{-2n} H_{2n}(\sqrt{z}) /; n \in \mathbb{N}$$

07.33.03.0051.01

$$U\left(-n, \frac{3}{2}, z\right) = \frac{2^{-2n-1}}{\sqrt{z}} H_{2n+1}(\sqrt{z}) /; n \in \mathbb{N}$$

07.33.03.0052.01

$$U\left(-n, m + \frac{1}{2}, z\right) = (-1)^n n! L_n^{m-\frac{1}{2}}(z) /; n \in \mathbb{N} \wedge m \in \mathbb{Z}$$

**For fixed  $z$  and  $a = n, b = \frac{1}{2} \pm m$**

07.33.03.0053.01

$$U\left(n, \frac{1}{2}, z\right) =$$

$$\frac{1}{\left(\frac{1}{2}\right)_n} \left( \frac{\sqrt{\pi}}{2\sqrt{z}} e^z \operatorname{erf}(\sqrt{z}) \left( L_{n-\frac{1}{2}}^{-\frac{1}{2}}(-z) + 2n L_{n-\frac{3}{2}}^{-\frac{3}{2}}(-z) \right) + \frac{1}{2} \sum_{p=0}^{n-2} \frac{1}{p+1} L_{n-p-2}^{p+\frac{1}{2}}(-z) L_p^{-p-\frac{1}{2}}(z) + n \sum_{p=0}^{n-1} \frac{1}{p+1} L_{n-p-1}^{p-\frac{1}{2}}(-z) L_p^{-p-\frac{1}{2}}(z) \right) -$$

$$(-1)^n e^z \sqrt{z} \Gamma\left(\frac{1}{2} - n\right) L_{n-1}^{\frac{1}{2}}(-z) /; n \in \mathbb{N}^+$$

Brychkov Yu.A. (2006)

07.33.03.0054.01

$$U\left(n, \frac{3}{2}, z\right) = \frac{e^z}{\sqrt{z}} \left( -(-1)^n \Gamma\left(\frac{3}{2} - n\right) L_{n-1}^{-\frac{1}{2}}(-z) - \frac{\pi}{\Gamma\left(n - \frac{1}{2}\right)} \sum_{k=0}^{n-1} \frac{(-1)^k \left(\frac{1}{2}\right)_k}{k!} L_{-k+n-1}^k(-z) \left( 1 - Q\left(k + \frac{1}{2}, z\right) \right) \right) /; n \in \mathbb{N}^+$$

Brychkov Yu.A. (2006)

07.33.03.0055.01

$$U\left(n, \frac{1}{2} - m, z\right) = -z^{m+\frac{1}{2}} e^z \left( (-1)^n \Gamma\left(-m-n+\frac{1}{2}\right) L_{n-1}^{m+\frac{1}{2}}(-z) + \frac{1}{\left(m+\frac{3}{2}\right)_{n-1}} \sum_{k=0}^{n-1} \frac{(-1)^k}{k!} \left( \Gamma\left(k-m-\frac{1}{2}\right) - \Gamma\left(k-m-\frac{1}{2}, z\right) \right) L_{-k+n-1}^k(-z) \right) /;$$

$n \in \mathbb{N}^+ \wedge m \in \mathbb{Z}$

Brychkov Yu.A. (2006)

07.33.03.0056.01

$$U\left(n, \frac{1}{2} - m, z\right) = e^z z^{m+\frac{1}{2}} \left( \frac{1}{\left(m+\frac{3}{2}\right)_{n-1}} \sum_{k=0}^{n-1} \frac{(-1)^k}{k!} L_{-k+n-1}^k(-z) \left( -\operatorname{erf}(\sqrt{z}) \Gamma\left(k-m-\frac{1}{2}\right) + e^{-z} \sum_{j=0}^{k-m-2} \frac{z^{j+\frac{1}{2}}}{\left(k-m-\frac{1}{2}\right)_{j-k+m+2}} - e^{-z} \sum_{j=k-m-1}^{-1} \frac{z^{j+\frac{1}{2}}}{\left(k-m-\frac{1}{2}\right)_{j-k+m+2}} \right) - (-1)^n \Gamma\left(-m-n+\frac{1}{2}\right) L_{n-1}^{m+\frac{1}{2}}(-z) \right) /; n \in \mathbb{N}^+ \wedge m \in \mathbb{Z}$$

Brychkov Yu.A. (2006)

07.33.03.0057.01

$$U\left(n, \frac{1}{2} - m, z\right) = \frac{(-1)^m 2^{2(m+n)} \Gamma(m+2)}{\Gamma(2m+2n+1)} \left( \frac{\sqrt{\pi} e^z \operatorname{erf}(\sqrt{z})}{\sqrt{z}} \sum_{k=0}^{m+1} \frac{(k+m+n)!}{k!} L_{-k+m+1}^{k-m-\frac{1}{2}}(z) L_{k+m+n}^{-k-\frac{1}{2}}(-z) + \sum_{k=0}^{m+1} \frac{(k+m+n)!}{k!} L_{-k+m+1}^{k-m-\frac{1}{2}}(z) \sum_{p=1}^{k+m+n} \frac{1}{p} L_{k+m+n-p}^{-k+p-\frac{1}{2}}(-z) L_{p-1}^{\frac{1}{2}-p}(z) \right) - (-1)^n e^z z^{m+\frac{1}{2}} \Gamma\left(\frac{1}{2} - m - n\right) L_{n-1}^{m+\frac{1}{2}}(-z) /; n \in \mathbb{Z} \wedge n \geq -m \wedge m \in \mathbb{N}$$

07.33.03.0058.01

$$U\left(n, m + \frac{1}{2}, z\right) = -z^{\frac{1}{2}-m} e^z \left( (-1)^n \Gamma\left(m-n+\frac{1}{2}\right) L_{n-1}^{\frac{1}{2}-m}(-z) + \frac{1}{\left(\frac{3}{2}-m\right)_{n-1}} \sum_{k=0}^{n-1} \frac{(-1)^k}{k!} \left( \Gamma\left(k+m-\frac{1}{2}\right) - \Gamma\left(k+m-\frac{1}{2}, z\right) \right) L_{-k+n-1}^k(-z) \right) /; n \in \mathbb{N}^+ \wedge m \in \mathbb{Z}$$

Brychkov Yu.A. (2006)

07.33.03.0059.01

$$U\left(n, m + \frac{1}{2}, z\right) = -z^{\frac{1}{2}-m} e^z \left( (-1)^n \Gamma\left(m - n + \frac{1}{2}\right) L_{n-1}^{\frac{1}{2}-m}(-z) + \frac{1}{\left(\frac{3}{2} - m\right)_{n-1}} \sum_{k=0}^{n-1} \frac{(-1)^k}{k!} \left( \operatorname{erf}(\sqrt{z}) \Gamma\left(k + m - \frac{1}{2}\right) - e^{-z} \sum_{j=0}^{k+m-2} \frac{z^{j+\frac{1}{2}}}{\left(k + m - \frac{1}{2}\right)_{j-k-m+2}} + e^{-z} \sum_{j=k+m-1}^{-1} \frac{z^{j+\frac{1}{2}}}{\left(k + m - \frac{1}{2}\right)_{j-k-m+2}} \right) L_{-k+n-1}^k(-z) \right); n \in \mathbb{N}^+ \wedge m \in \mathbb{Z}$$

Brychkov Yu.A. (2006)

07.33.03.0060.01

$$U\left(n, m + \frac{1}{2}, z\right) = e^{-z} z^{\frac{1}{2}-m} \left( \frac{(-1)^n \sqrt{\pi}}{(n-1)!} z^{n-1} \operatorname{erf}(\sqrt{z}) \sum_{p=0}^{n-1} (-z)^{-p} \binom{n-1}{p} \left(\frac{1}{2}\right)_{m-n+p} - (-1)^n \Gamma\left(m - n + \frac{1}{2}\right) L_{n-1}^{\frac{1}{2}-m}(-z) - \frac{2(-1)^n}{(n-1)!} e^{-z} z^{m-\frac{1}{2}} \sum_{p=0}^{n-1} \frac{(-1)^p \binom{n-1}{p}}{2m-2n+2p+1} \sum_{k=1}^{m-n+p} (-z)^{-k} \left(-m+n-p-\frac{1}{2}\right)_k \right); n \in \mathbb{N}^+ \wedge m \in \mathbb{Z} \wedge m \geq n$$

07.33.03.0061.01

$$U\left(n, m + \frac{1}{2}, z\right) = \frac{\sqrt{\pi} (-1)^m}{\Gamma\left(-m+n+\frac{1}{2}\right)} \left( z^{1-m} \sum_{k=0}^{n-m} \binom{n-m}{k} \sum_{p=1}^{k+m-1} \frac{1}{p} L_{k+m-p-1}^{-k-m+p+\frac{1}{2}}(-z) L_{p-1}^{\frac{1}{2}-p}(z) + e^z \sqrt{\pi} \operatorname{erf}(\sqrt{z}) z^{\frac{1}{2}-m} \sum_{k=0}^{n-m} \binom{n-m}{k} L_{k+m-1}^{-k-m+\frac{1}{2}}(-z) \right) - (-1)^n e^z z^{\frac{1}{2}-m} \Gamma\left(m-n+\frac{1}{2}\right) L_{n-1}^{\frac{1}{2}-m}(-z); n \in \mathbb{N}^+ \wedge m \in \mathbb{N}^+ \wedge m \leq n$$

**For fixed  $z$  and  $a = n + \frac{1}{2}$ ,  $b = m + \frac{1}{2}$**

07.33.03.0062.01

$$U\left(n + \frac{1}{2}, \frac{1}{2}, z\right) = e^z \left( (-1)^n \Gamma\left(\frac{1}{2} - n\right) L_n^{-\frac{1}{2}}(-z) - \frac{\pi}{\Gamma\left(n + \frac{1}{2}\right)} \sum_{k=0}^n \frac{(-1)^k \left(\frac{1}{2}\right)_k}{k!} \left(1 - \mathcal{Q}\left(k + \frac{1}{2}, z\right)\right) L_{n-k}^k(-z) \right); n \in \mathbb{N}^+$$

Brychkov Yu.A. (2006)

07.33.03.0063.01

$$U\left(n + \frac{1}{2}, \frac{3}{2}, z\right) = \frac{1}{\left(\frac{1}{2}\right)_n} \left( \frac{\sqrt{\pi}}{2z} e^z \operatorname{erf}(\sqrt{z}) \left( L_{n-1}^{-\frac{1}{2}}(-z) + 2n L_n^{-\frac{3}{2}}(-z) \right) + \frac{n}{\sqrt{z}} \sum_{p=0}^{n-1} \frac{1}{p+1} L_{n-p-1}^{p-\frac{1}{2}}(-z) L_p^{-p-\frac{1}{2}}(z) + \frac{1}{2\sqrt{z}} \sum_{p=0}^{n-2} \frac{1}{p+1} L_{n-p-2}^{p+\frac{1}{2}}(-z) L_p^{-p-\frac{1}{2}}(z) \right) - (-1)^n e^z \Gamma\left(\frac{1}{2} - n\right) L_{n-1}^{\frac{1}{2}}(-z); n \in \mathbb{N}^+$$



Brychkov Yu.A. (2006)

07.33.03.0064.01

$$U\left(n + \frac{1}{2}, m + \frac{1}{2}, z\right) = e^z \left( (-1)^{m+n} \Gamma\left(\frac{1}{2} - n\right) L_{n-\frac{m}{2}}^{m-\frac{1}{2}}(-z) - \frac{1}{\left(m + \frac{1}{2}\right)_{n-m}} \sum_{k=0}^{n-m} \frac{(-1)^k}{k!} \left( \Gamma\left(k - m + \frac{1}{2}\right) - \Gamma\left(k - m + \frac{1}{2}, z\right) \right) L_{-k-m+n}^k(-z) \right); n \in \mathbb{Z} \wedge n \geq m \wedge m \in \mathbb{Z}$$

Brychkov Yu.A. (2006)

07.33.03.0065.01

$$U\left(n + \frac{1}{2}, m + \frac{1}{2}, z\right) = e^z \left( (-1)^{m+n} \Gamma\left(\frac{1}{2} - n\right) L_{n-\frac{m}{2}}^{m-\frac{1}{2}}(-z) + \frac{1}{\left(m + \frac{1}{2}\right)_{n-m}} \sum_{k=0}^{n-m} \frac{(-1)^k}{k!} L_{-k-m+n}^k(-z) \left( -\operatorname{erf}(\sqrt{z}) \Gamma\left(k - m + \frac{1}{2}\right) + e^{-z} \sum_{j=0}^{k-m-1} \frac{z^{j+\frac{1}{2}}}{\left(k - m + \frac{1}{2}\right)_{j-k+m+1}} - e^{-z} \sum_{j=k-m}^{-1} \frac{z^{j+\frac{1}{2}}}{\left(k - m + \frac{1}{2}\right)_{j-k+m+1}} \right) \right); n \in \mathbb{Z} \wedge n \geq m \wedge m \in \mathbb{Z}$$

Brychkov Yu.A. (2006)

07.33.03.0066.01

$$U\left(n + \frac{1}{2}, m + \frac{1}{2}, z\right) = (-1)^{m+n} \Gamma\left(\frac{1}{2} - n\right) e^z L_{n-\frac{m}{2}}^{m-\frac{1}{2}}(-z) + \frac{(-1)^{m-1} 2^{2n} m! z^{\frac{1}{2}-m}}{(2n)!} \left( \frac{\sqrt{\pi}}{\sqrt{z}} e^z \operatorname{erf}(\sqrt{z}) \sum_{k=0}^m \frac{(k+n)!}{k!} L_{m-k}^{k-m+\frac{1}{2}}(z) L_{k+n}^{-k-\frac{1}{2}}(-z) + \sum_{k=0}^m \frac{(k+n)!}{k!} L_{m-k}^{k-m+\frac{1}{2}}(z) \sum_{p=1}^{k+n} \frac{1}{p} L_{k+n-p}^{-k+p-\frac{1}{2}}(-z) L_{p-1}^{\frac{1}{2}-p}(z) \right); n \in \mathbb{N} \wedge m \in \mathbb{N}$$

**For fixed  $z$  and  $a = n + \frac{1}{2}$ ,  $b = \frac{1}{2} - m$**

07.33.03.0067.01

$$U\left(n + \frac{1}{2}, \frac{1}{2} - m, z\right) = e^z \left( (-1)^{m+n} \Gamma\left(\frac{1}{2} - n\right) L_{m+n}^{-m-\frac{1}{2}}(-z) - \frac{1}{\left(\frac{1}{2} - m\right)_{m+n}} \sum_{k=0}^{m+n} \frac{(-1)^k}{k!} \left( \Gamma\left(k + m + \frac{1}{2}\right) - \Gamma\left(k + m + \frac{1}{2}, z\right) \right) L_{-k+m+n}^k(-z) \right); n \in \mathbb{Z} \wedge n \geq -m \wedge m \in \mathbb{Z}$$

Brychkov Yu.A. (2006)

07.33.03.0068.01

$$U\left(n + \frac{1}{2}, \frac{1}{2} - m, z\right) = e^z \left( (-1)^{m+n} \Gamma\left(\frac{1}{2} - n\right) L_{m+n}^{-m-\frac{1}{2}}(-z) - \frac{1}{\left(\frac{1}{2} - m\right)_{m+n}} \sum_{k=0}^{m+n} \frac{(-1)^k}{k!} L_{-k+m+n}^k(-z) \left( \Gamma\left(k + m + \frac{1}{2}\right) \operatorname{erf}(\sqrt{z}) - e^{-z} \sum_{j=0}^{k+m-1} \frac{z^{j+\frac{1}{2}}}{\left(k + m + \frac{1}{2}\right)_{j-k-m+1}} + e^{-z} \sum_{j=k+m}^{-1} \frac{z^{j+\frac{1}{2}}}{\left(k + m + \frac{1}{2}\right)_{j-k-m+1}} \right) \right) /; n \in \mathbb{Z} \wedge n \geq -m \wedge m \in \mathbb{Z}$$

Brychkov Yu.A. (2006)

07.33.03.0069.01

$$U\left(n + \frac{1}{2}, \frac{1}{2} - m, z\right) = (-1)^{m+n} e^z \Gamma\left(\frac{1}{2} - n\right) L_{m+n}^{-m-\frac{1}{2}}(-z) - \frac{(-1)^m \sqrt{\pi}}{\Gamma\left(n + \frac{1}{2}\right)} \left( e^z \sqrt{\pi} \operatorname{erf}(\sqrt{z}) \sum_{k=0}^n \binom{n}{k} L_{k+m}^{-k-m-\frac{1}{2}}(-z) + \sqrt{z} \sum_{k=0}^n \binom{n}{k} \sum_{p=1}^{k+m} \frac{1}{p} L_{k+m-p}^{-k-m+p-\frac{1}{2}}(-z) L_{p-1}^{\frac{1}{2}-p}(z) \right) /; n \in \mathbb{N} \wedge m \in \mathbb{N}$$

For fixed  $z$  and  $a = \frac{1}{2} - n$ ,  $b = m + \frac{1}{2}$

07.33.03.0070.01

$$U\left(\frac{1}{2} - n, \frac{1}{2}, z\right) = 2^{1-2n} H_{2n-1}(\sqrt{z}) /; n \in \mathbb{Z}$$

07.33.03.0071.01

$$U\left(\frac{1}{2} - n, \frac{3}{2}, z\right) = \frac{2^{-2n}}{\sqrt{z}} H_{2n}(\sqrt{z}) /; n \in \mathbb{N}$$

07.33.03.0072.01

$$U\left(\frac{1}{2} - n, \frac{3}{2}, z\right) = \frac{(-1)^n \left(\frac{1}{2}\right)_n}{\sqrt{z}} \sum_{k=0}^n \frac{(-n)_k z^k}{\left(\frac{1}{2}\right)_k k!} /; n \in \mathbb{N}$$

07.33.03.0073.01

$$U\left(\frac{1}{2} - n, m + \frac{1}{2}, z\right) = (-1)^{m+n-1} z^{\frac{1}{2}-m} (m+n-1)! L_{m+n-1}^{\frac{1}{2}-m}(z) /; n \in \mathbb{Z} \wedge m \in \mathbb{Z} \wedge (m > -n \vee m > n \geq 0)$$

07.33.03.0074.01

$${}_1F_1\left(\frac{1}{2} - n; m + \frac{1}{2}; z\right) = \left(m - \frac{1}{2}\right) (-z)^{\frac{1}{2}-m} \sum_{k=0}^{m+n-1} \frac{(-1)^k}{k!} \left( \Gamma\left(k + m - \frac{1}{2}\right) - \Gamma\left(k + m - \frac{1}{2}, -z\right) \right) L_{-k+m+n-1}^k(z) /; n \in \mathbb{Z} \wedge n > -m \wedge m \in \mathbb{Z}$$

For fixed  $z$  and  $a = \frac{1}{2} - n$ ,  $b = \frac{1}{2} - m$

07.33.03.0075.01

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

07.33.03.0076.01

$$U\left(\frac{1}{2} - n, \frac{1}{2} - m, z\right) = (-1)^{n-m-1} (n-m-1)! z^{m+\frac{1}{2}} L_{-m+n-1}^{m+\frac{1}{2}}(z) + \frac{(-1)^m \sqrt{\pi} (m+1)!}{(m-n)! n!} \left( \frac{\sqrt{\pi} \operatorname{erfi}(\sqrt{z})}{\sqrt{z}} \sum_{k=0}^{m+1} \frac{(k+n)!}{k!} L_{-k+m+1}^{k-m-\frac{1}{2}}(-z) L_{k+n}^{-k-\frac{1}{2}}(z) + e^z \sum_{k=0}^{m+1} \frac{(k+n)!}{k!} L_{-k+m+1}^{k-m-\frac{1}{2}}(-z) \sum_{p=1}^{k+n} \frac{1}{p} L_{k+n-p}^{-k+p-\frac{1}{2}}(z) L_{p-1}^{\frac{1}{2}-p}(-z) \right); n \in \mathbb{N} \wedge m \in \mathbb{N} \wedge m < n$$

Brychkov Yu.A. (2006)

07.33.03.0077.01

$$U\left(\frac{1}{2} - n, \frac{1}{2} - m, z\right) = (-1)^{m+n-1} z^{m+\frac{1}{2}} \Gamma(n-m) L_{n-m-1}^{m+\frac{1}{2}}(z); n \in \mathbb{Z} \wedge n > m \wedge m \in \mathbb{Z}$$

07.33.03.0078.01

$$U\left(\frac{1}{2} - n, \frac{1}{2} - m, z\right) = (-1)^{m+n} e^z \left( \Gamma\left(n + \frac{1}{2}\right) L_{m-n}^{-m-\frac{1}{2}}(-z) - \frac{\sqrt{\pi} z^{m-n}}{(m-n)!} \operatorname{erf}(\sqrt{z}) \sum_{p=0}^{m-n} (-z)^{-p} \binom{m-n}{p} \left(\frac{1}{2}\right)_{n+p} + \frac{2 e^{-z} z^{m+\frac{1}{2}}}{(m-n)!} \sum_{p=0}^{m-n} \frac{(-1)^p \binom{m-n}{p}}{2n+2p+1} \sum_{k=1}^{n+p} (-z)^{-k} \left(-n-p-\frac{1}{2}\right)_k \right); n \in \mathbb{N} \wedge m \in \mathbb{Z} \wedge m \geq n$$

Brychkov Yu.A. (2006)

**For fixed z**

**For fixed z and  $a = -\frac{11}{2}$**

07.33.03.0079.01

$$U\left(-\frac{11}{2}, -6, z\right) = \frac{1}{8\sqrt{\pi}} \left( e^{z/2} z \left( z \left( z \left( z \left( 4z^2 + 30z + 159 \right) + 600 \right) + 1440 \right) K_0\left(\frac{z}{2}\right) + \left( z \left( z \left( z \left( 4z^2 + 34z + 195 \right) + 816 \right) + 2400 \right) + 5760 \right) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0080.01

$$U\left(-\frac{11}{2}, -6, -z\right) = \frac{1}{8\sqrt{\pi}} \left( e^{-z/2} z \left( z \left( z \left( z \left( 4z^2 - 30z + 159 \right) - 600 \right) + 1440 \right) K_0\left(\frac{z}{2}\right) + \left( z \left( z \left( z \left( -4z^2 + 34z - 195 \right) + 816 \right) - 2400 \right) + 5760 \right) K_1\left(\frac{z}{2}\right) - \left( z \left( z \left( z \left( 4z^2 - 30z + 159 \right) - 600 \right) + 1440 \right) I_0\left(\frac{z}{2}\right) + \left( z \left( z \left( z \left( 4z^2 - 34z + 195 \right) - 816 \right) + 2400 \right) - 5760 \right) I_1\left(\frac{z}{2}\right) \right) \right) \left( \log(-z) - \log(z) \right) \right)$$

07.33.03.0081.01

$$U\left(-\frac{11}{2}, -\frac{11}{2}, z\right) = \frac{1}{64} \left( 2\sqrt{z} (2z(2z(2z(4z^2 + 22z + 99) + 693) + 3465) + 10395) + 10395 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0082.01

$$U\left(-\frac{11}{2}, -\frac{11}{2}, -z\right) = \frac{1}{64\sqrt{-z}} \left( e^{-z} (2e^z z (2z(2z(2z(4z^2 - 22z + 99) - 693) + 3465) - 10395) + 10395\sqrt{\pi}\sqrt{z} \operatorname{erfi}(\sqrt{z}) + 10395\sqrt{\pi}\sqrt{-z}) \right)$$

07.33.03.0083.01

$$U\left(-\frac{11}{2}, -5, z\right) = \frac{e^{z/2} z (z(z(z(4z(z+2) + 27) + 72) + 120) K_0\left(\frac{z}{2}\right) + (z(z(z+3)(4z^2 + 41) + 288) + 480) K_1\left(\frac{z}{2}\right))}{8\sqrt{\pi}}$$

07.33.03.0084.01

$$U\left(-\frac{11}{2}, -5, -z\right) = \frac{1}{8\sqrt{\pi}} \left( e^{-z/2} z (z(z(z(4(z-2)z + 27) - 72) + 120) K_0\left(\frac{z}{2}\right) + (z(-(z-3)z(4z^2 + 41) - 288) + 480) K_1\left(\frac{z}{2}\right) - (z(z(z(4(z-2)z + 27) - 72) + 120) I_0\left(\frac{z}{2}\right) + (z((z-3)z(4z^2 + 41) + 288) - 480) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)$$

07.33.03.0085.01

$$U\left(-\frac{11}{2}, -\frac{9}{2}, z\right) = z^{11/2}$$

07.33.03.0086.01

$$U\left(-\frac{11}{2}, -4, z\right) = \frac{1}{16\sqrt{\pi}} \left( e^{z/2} z (z(z(4z(z(2z-7) - 3) - 21) - 24) K_0\left(\frac{z}{2}\right) + (z(z(4z(z+1)(2z-7) - 51) - 84) - 96) K_1\left(\frac{z}{2}\right)) \right)$$

07.33.03.0087.01

$$U\left(-\frac{11}{2}, -4, -z\right) = \frac{1}{16\sqrt{\pi}} \left( e^{-z/2} z (z(z(4z(z(2z+7) - 3) + 21) - 24) K_0\left(\frac{z}{2}\right) - (z(z(4(z-1)z(2z+7) + 51) - 84) + 96) K_1\left(\frac{z}{2}\right) - (z(z(4z(z(2z+7) - 3) + 21) - 24) I_0\left(\frac{z}{2}\right) + (z(z(4(z-1)z(2z+7) + 51) - 84) + 96) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)$$

07.33.03.0088.01

$$U\left(-\frac{11}{2}, -\frac{7}{2}, z\right) = \frac{1}{2} z^{9/2} (2z - 11)$$

07.33.03.0089.01

$$U\left(-\frac{11}{2}, -3, z\right) = \frac{e^{z/2} z (z(4z(2z((z-9)z + 15) + 3) + 9) K_0\left(\frac{z}{2}\right) + 4((z-2)z(z(2(z-6)z - 9) - 6) + 9) K_1\left(\frac{z}{2}\right))}{16\sqrt{\pi}}$$

07.33.03.0090.01

$$U\left(-\frac{11}{2}, -3, -z\right) = \frac{1}{16\sqrt{\pi}} \left( e^{-z/2} z (z(4z(2z(z(z+9) + 15) - 3) + 9) K_0\left(\frac{z}{2}\right) - 4(z(z+2)(z(2z(z+6) - 9) + 6) - 9) K_1\left(\frac{z}{2}\right) - (z(4z(2z(z(z+9) + 15) - 3) + 9) I_0\left(\frac{z}{2}\right) + 4(z(z+2)(z(2z(z+6) - 9) + 6) - 9) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)$$

07.33.03.0091.01

$$U\left(-\frac{11}{2}, -\frac{5}{2}, z\right) = \frac{1}{4} z^{7/2} (4(z-11)z + 99)$$

07.33.03.0092.01

$$U\left(-\frac{11}{2}, -2, z\right) = \frac{1}{32\sqrt{\pi}} \left( e^{z/2} z \left( z(4z(z(4z^2 - 58z + 225) - 225) - 15) K_0\left(\frac{z}{2}\right) + (z(4z(z(4z^2 - 54z + 173) - 75) - 135) - 60) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0093.01

$$U\left(-\frac{11}{2}, -2, -z\right) = \frac{1}{32\sqrt{\pi}} \left( e^{-z/2} z \left( z(4z(z(4z^2 + 58z + 225) + 225) - 15) K_0\left(\frac{z}{2}\right) - (z(4z(z(4z^2 + 54z + 173) + 75) - 135) + 60) K_1\left(\frac{z}{2}\right) - (z(4z(z(4z^2 + 58z + 225) + 225) - 15) I_0\left(\frac{z}{2}\right) + (z(4z(z(4z^2 + 54z + 173) + 75) - 135) + 60) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0094.01

$$U\left(-\frac{11}{2}, -\frac{3}{2}, z\right) = \frac{1}{8} z^{5/2} (2z(4z^2 - 66z + 297) - 693)$$

07.33.03.0095.01

$$U\left(-\frac{11}{2}, -1, z\right) = \frac{1}{32\sqrt{\pi}} \left( e^{z/2} z \left( z(4z(z(4(z-20)z + 489) - 1050) + 2625) K_0\left(\frac{z}{2}\right) + (z(4(z-3)z(4(z-16)z + 223) + 525) + 105) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0096.01

$$U\left(-\frac{11}{2}, -1, -z\right) = \frac{1}{32\sqrt{\pi}} \left( e^{-z/2} z \left( z(4z(z(4z(z+20) + 489) + 1050) + 2625) K_0\left(\frac{z}{2}\right) - (z(4z(z+3)(4z(z+16) + 223) + 525) - 105) K_1\left(\frac{z}{2}\right) - (z(4z(z(4z(z+20) + 489) + 1050) + 2625) I_0\left(\frac{z}{2}\right) + (z(4z(z+3)(4z(z+16) + 223) + 525) - 105) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0097.01

$$U\left(-\frac{11}{2}, -\frac{1}{2}, z\right) = \frac{1}{16} z^{3/2} (8z(z(2(z-22)z + 297) - 693) + 3465)$$

07.33.03.0098.01

$$U\left(-\frac{11}{2}, 0, z\right) = \frac{1}{64\sqrt{\pi}} \left( e^{z/2} z \left( (2z(2z(4z(z(2z-51) + 426) - 5631) + 14175) - 10395) K_0\left(\frac{z}{2}\right) + (2z(2z(4z(z(2z-49) + 378) - 4209) + 6927) - 945) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0099.01

$$U\left(-\frac{11}{2}, 0, -z\right) = \frac{1}{64\sqrt{\pi}} \left( e^{-z/2} z \left( (2z(2z(4z(z(2z+51)+426)+5631)+14175)+10395) K_0\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. (2z(2z(4z(z(2z+49)+378)+4209)+6927)+945) K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. \left( (2z(2z(4z(z(2z+51)+426)+5631)+14175)+10395) I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\ \left. \left. \left. (2z(2z(4z(z(2z+49)+378)+4209)+6927)+945) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0100.01

$$U\left(-\frac{11}{2}, \frac{1}{2}, z\right) = \frac{1}{32} \sqrt{z} \left( (2z(4z(2z(z(2z-55)+495)-3465)+17325)-10395) \right)$$

07.33.03.0101.01

$$U\left(-\frac{11}{2}, 1, z\right) = \frac{1}{64\sqrt{\pi}} \left( e^{z/2} \left( (2z(z(8z(z(2(z-31)z+657)-2934)+44337)-31185)+10395) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. 2z(z(16z(z((z-30)z+299)-1182)+27387)-9762) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0102.01

$$U\left(-\frac{11}{2}, 1, -z\right) = \frac{1}{64\sqrt{\pi}} \left( e^{-z/2} \left( (2z(z(8z(z(2z(z+31)+657)+2934)+44337)+31185)+10395) K_0\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. 2z(z(16z(z(z(z+30)+299)+1182)+27387)+9762) K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. \left( (2z(z(8z(z(2z(z+31)+657)+2934)+44337)+31185)+10395) I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\ \left. \left. \left. 2z(z(16z(z(z(z+30)+299)+1182)+27387)+9762) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0103.01

$$U\left(-\frac{11}{2}, \frac{3}{2}, z\right) = \frac{4z(z(4z(z(4(z-33)z+1485)-6930)+51975)-31185)+10395}{64\sqrt{z}}$$

07.33.03.0104.01

$$U\left(-\frac{11}{2}, 2, z\right) = \frac{1}{128\sqrt{\pi}} \left( e^{z/2} \left( (2z(4z(2z(z(2z(2z-73)+1875)-10554)+53139)-218295)+135135) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (2z(4z(2z(z(2z(2z-71)+1735)-8886)+36843)-95721)+10395) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0105.01

$$U\left(-\frac{11}{2}, 2, -z\right) = \frac{1}{128\sqrt{\pi}} \left( e^{-z/2} \left( (2z(4z(2z(z(2z(2z+73)+1875)+10554)+53139)+218295)+135135) K_0\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. (2z(4z(2z(z(2z(2z+71)+1735)+8886)+36843)+95721)+10395) K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. \left( (2z(4z(2z(z(2z(2z+73)+1875)+10554)+53139)+218295)+135135) I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\ \left. \left. \left. (2z(4z(2z(z(2z(2z+71)+1735)+8886)+36843)+95721)+10395) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0106.01

$$U\left(-\frac{11}{2}, \frac{5}{2}, z\right) = \frac{2z(2z(2z(2z(2z(2z(2z-77)+2079)-24255)+121275)-218295)+72765)+10395}{128z^{3/2}}$$

07.33.03.0107.01

$$U\left(-\frac{11}{2}, 3, z\right) = \frac{1}{128\sqrt{\pi}z} \left( e^{z/2} \left( z(8z(z(2z(z(4(z-42)z+2535)-17220)+108315)-145530)+509355) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(8z(z(2z(z(4(z-41)z+2373)-14925)+80535)-76095)+72765)+10395) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0108.01

$$U\left(-\frac{11}{2}, 3, -z\right) = \frac{1}{128\sqrt{\pi}z} \left( e^{-z/2} \left( z(8z(z(2z(z(4z(z+42)+2535)+17220)+108315)+145530)+509355) K_0\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. (z(8z(z(2z(z(4z(z+41)+2373)+14925)+80535)+76095)+72765)-10395) K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. \left( z(8z(z(2z(z(4z(z+42)+2535)+17220)+108315)+145530)+509355) I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\ \left. \left. \left. (z(8z(z(2z(z(4z(z+41)+2373)+14925)+80535)+76095)+72765)-10395) \right. \right. \right. \\ \left. \left. \left. I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0109.01

$$U\left(-\frac{11}{2}, \frac{7}{2}, z\right) = \frac{16z(z(2z(z(8z(z((z-44)z+693)-4851)+121275)-145530)+72765)+10395)+31185}{256z^{5/2}}$$

07.33.03.0110.01

$$U\left(-\frac{11}{2}, 4, z\right) = \frac{1}{256\sqrt{\pi}z^2} \left( e^{z/2} \left( z(8z(z(2z(z(4z(z(2z-95)+1647)-52425)+197745)-654885)+363825)+10395) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(8z(z(2z(z(4z(z(2z-93)+1555)-46383)+154125)-382695)+72765)+155925)+41580) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0111.01

$$U\left(-\frac{11}{2}, 4, -z\right) = \frac{1}{256\sqrt{\pi}z^2} \left( e^{-z/2} \left( z(8z(z(2z(z(4z(z(2z+95)+1647)+52425)+197745)+654885)+363825)-10395) K_0\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. (z(8z(z(2z(z(4z(z(2z+93)+1555)+46383)+154125)+382695)+72765)-155925)+41580) K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. \left( z(8z(z(2z(z(4z(z(2z+95)+1647)+52425)+197745)+654885)+363825)-10395) I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\ \left. \left. \left. (z(8z(z(2z(z(4z(z(2z+93)+1555)+46383)+154125)+382695)+72765)-155925)+41580) \right. \right. \right. \\ \left. \left. \left. I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0112.01

$$U\left(-\frac{11}{2}, \frac{9}{2}, z\right) = \frac{1}{512z^{7/2}} \\ (2z(8z(2z(z(2z(4z(z(z(2z-99)+1782)-14553)+218295)-654885)+218295)+93555)+280665)+155925)$$

07.33.03.0113.01

$$U\left(-\frac{11}{2}, 5, z\right) = \frac{1}{256 \sqrt{\pi} z^3} \left( e^{z/2} \left( z(8z(2z(z(2z(2z((z-53)z+1038) - 18939) + 166605) - 654885) + 436590) + 10395) + 31185) K_0\left(\frac{z}{2}\right) + 4(2z(z(z(2z(z(4z(z(2(z-52)z+1973) - 17016) + 268701) - 413520) + 218295) + 83160) + 41580) + 31185) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0114.01

$$U\left(-\frac{11}{2}, 5, -z\right) = \frac{1}{256 \sqrt{\pi} z^3} \left( e^{-z/2} \left( z(8z(2z(z(2z(2z(z(z+53) + 1038) + 18939) + 166605) + 654885) + 436590) - 10395) + 31185) K_0\left(\frac{z}{2}\right) - 4(2z(z(z(2z(z(4z(z(2z(z+52) + 1973) + 17016) + 268701) + 413520) + 218295) - 83160) + 41580) - 31185) K_1\left(\frac{z}{2}\right) - \left( z(8z(2z(z(2z(2z(z(z+53) + 1038) + 18939) + 166605) + 654885) + 436590) - 10395) + 31185) I_0\left(\frac{z}{2}\right) + 4(2z(z(z(2z(z(4z(z(2z(z+52) + 1973) + 17016) + 268701) + 413520) + 218295) - 83160) + 41580) - 31185) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0115.01

$$U\left(-\frac{11}{2}, \frac{11}{2}, z\right) = \frac{1}{1024 z^{9/2}} (4z(z(8z(z(4z(z(2z(z(4(z-55)z+4455) - 41580) + 363825) - 654885) + 1091475) + 311850) + 1403325) + 779625) + 1091475)$$

07.33.03.0116.01

$$U\left(-\frac{11}{2}, 6, z\right) = \frac{1}{512 \sqrt{\pi} z^4} \left( e^{z/2} \left( z(z(8z(z(2z(z(4z(z(4z^2 - 234z + 5109) - 52563) + 1056447) - 2401245) + 3711015) + 93555) + 530145) + 249480) K_0\left(\frac{z}{2}\right) + (z(z(8z(z(2z(z(4z(z(4z^2 - 230z + 4881) - 47793) + 874167) - 1605807) + 1091475) + 530145) + 3024945) + 2120580) + 997920) K_1\left(\frac{z}{2}\right) \right) \right)$$



07.33.03.0117.01

$$U\left(-\frac{11}{2}, 6, -z\right) = \frac{1}{512 \sqrt{\pi} z^4} \left( e^{-z/2} \left( z(z(8z(z(2z(z(4z(4z^2 + 234z + 5109) + 52563) + 1056447) + 2401245) + 3711015) - 93555) + 530145) - 249480) K_0\left(\frac{z}{2}\right) - (z(z(8z(z(2z(z(4z(4z^2 + 230z + 4881) + 47793) + 874167) + 1605807) + 1091475) - 530145) + 3024945) - 2120580) + 997920) K_1\left(\frac{z}{2}\right) - (z(z(8z(z(2z(z(4z(4z^2 + 234z + 5109) + 52563) + 1056447) + 2401245) + 3711015) - 93555) + 530145) - 249480) I_0\left(\frac{z}{2}\right) + (z(z(8z(z(2z(z(4z(4z^2 + 230z + 4881) + 47793) + 874167) + 1605807) + 1091475) - 530145) + 3024945) - 2120580) + 997920) I_1\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right)$$

**For fixed  $z$  and  $a = -\frac{9}{2}$**

07.33.03.0118.01

$$U\left(-\frac{9}{2}, -6, z\right) = \frac{e^{z/2} z \left( z(z(z(2z + 21) + 120) + 480) K_0\left(\frac{z}{2}\right) + (z(z(z(2z + 23) + 144) + 480) + 1920) K_1\left(\frac{z}{2}\right) \right)}{4 \sqrt{\pi}}$$

07.33.03.0119.01

$$U\left(-\frac{9}{2}, -6, -z\right) = \frac{1}{4 \sqrt{\pi}} \left( e^{-z/2} z \left( z(z((21 - 2z)z - 120) + 480) K_0\left(\frac{z}{2}\right) + (z(z(z(2z - 23) + 144) - 480) + 1920) K_1\left(\frac{z}{2}\right) + (z(z(z(2z - 21) + 120) - 480) I_0\left(\frac{z}{2}\right) + (z(z(z(2z - 23) + 144) - 480) + 1920) I_1\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0120.01

$$U\left(-\frac{9}{2}, -\frac{11}{2}, z\right) = \frac{1}{64} \left( 2 \sqrt{z} (8z(z(4z(z + 9) + 189) + 630) + 10395) - 945 e^z \sqrt{\pi} (2z - 11) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0121.01

$$U\left(-\frac{9}{2}, -\frac{11}{2}, -z\right) = \frac{1}{64 \sqrt{z}} \left( e^{-z} \left( \sqrt{z} (945 \sqrt{\pi} (2z + 11) + 2 e^z \sqrt{-z} (8z(z(4(z - 9)z + 189) - 630) + 10395) - 945 \sqrt{\pi} \sqrt{-z} (2z + 11) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0122.01

$$U\left(-\frac{9}{2}, -5, z\right) = \frac{e^{z/2} z \left( 2z(z(z(z + 6) + 24) + 60) K_0\left(\frac{z}{2}\right) + (z(z(2z(z + 7) + 63) + 192) + 480) K_1\left(\frac{z}{2}\right) \right)}{4 \sqrt{\pi}}$$

07.33.03.0123.01

$$U\left(-\frac{9}{2}, -5, -z\right) = \frac{1}{4 \sqrt{\pi}} \left( e^{-z/2} z \left( -2z(z((z - 6)z + 24) - 60) K_0\left(\frac{z}{2}\right) + (z(z(2(z - 7)z + 63) - 192) + 480) K_1\left(\frac{z}{2}\right) + (2z(z((z - 6)z + 24) - 60) I_0\left(\frac{z}{2}\right) + (z(z(2(z - 7)z + 63) - 192) + 480) I_1\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0124.01

$$U\left(-\frac{9}{2}, -\frac{9}{2}, z\right) = \frac{1}{32} \left( 2\sqrt{z} (2z(2z(2z(2z+9)+63)+315)+945) + 945 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0125.01

$$U\left(-\frac{9}{2}, -\frac{9}{2}, -z\right) = \frac{e^{-z} \left( -2e^z z(2z(2z(2z(2z-9)+63)-315)+945) + 945\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 945\sqrt{\pi} \sqrt{-z} \right)}{32\sqrt{-z}}$$

07.33.03.0126.01

$$U\left(-\frac{9}{2}, -4, z\right) = \frac{e^{z/2} z \left( z(4z^2+6z+15)+24 \right) K_0\left(\frac{z}{2}\right) + \left( z(z(2z(2z+5)+27)+60)+96 \right) K_1\left(\frac{z}{2}\right)}{8\sqrt{\pi}}$$

07.33.03.0127.01

$$U\left(-\frac{9}{2}, -4, -z\right) = \frac{1}{8\sqrt{\pi}} \left( e^{-z/2} z \left( z(z(-4z^2+6z-15)+24) K_0\left(\frac{z}{2}\right) + \left( z(z(2z(2z-5)+27)-60)+96 \right) K_1\left(\frac{z}{2}\right) + \left( z(z(4z^2-6z+15)-24) I_0\left(\frac{z}{2}\right) + \left( z(z(2z(2z-5)+27)-60)+96 \right) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0128.01

$$U\left(-\frac{9}{2}, -\frac{7}{2}, z\right) = z^{9/2}$$

07.33.03.0129.01

$$U\left(-\frac{9}{2}, -3, z\right) = \frac{e^{z/2} z \left( z(z(4(z-3)z-3)-3) K_0\left(\frac{z}{2}\right) + \left( z(z(4(z-2)z-9)-12)-12 \right) K_1\left(\frac{z}{2}\right) \right)}{8\sqrt{\pi}}$$

07.33.03.0130.01

$$U\left(-\frac{9}{2}, -3, -z\right) = \frac{1}{8\sqrt{\pi}} \left( e^{-z/2} z \left( -z(z(4z(z+3)-3)+3) K_0\left(\frac{z}{2}\right) + \left( z(z(4z(z+2)-9)+12)-12 \right) K_1\left(\frac{z}{2}\right) + \left( z(z(4z(z+3)-3)+3) I_0\left(\frac{z}{2}\right) + \left( z(z(4z(z+2)-9)+12)-12 \right) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0131.01

$$U\left(-\frac{9}{2}, -\frac{5}{2}, z\right) = \frac{1}{2} z^{7/2} (2z-9)$$

07.33.03.0132.01

$$U\left(-\frac{9}{2}, -2, z\right) = \frac{e^{z/2} z \left( z(4z(z(2z-15)+21)+3) K_0\left(\frac{z}{2}\right) + \left( z(4z(z(2z-13)+9)+21)+12 \right) K_1\left(\frac{z}{2}\right) \right)}{16\sqrt{\pi}}$$

07.33.03.0133.01

$$U\left(-\frac{9}{2}, -2, -z\right) = \frac{1}{16\sqrt{\pi}} \left( e^{-z/2} z \left( -z(4z(z(2z+15)+21)-3) K_0\left(\frac{z}{2}\right) + \left( z(4z(z(2z+13)+9)-21)+12 \right) K_1\left(\frac{z}{2}\right) + \left( z(4z(z(2z+15)+21)-3) I_0\left(\frac{z}{2}\right) + \left( z(4z(z(2z+13)+9)-21)+12 \right) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0134.01

$$U\left(-\frac{9}{2}, -\frac{3}{2}, z\right) = \frac{1}{4} z^{5/2} (4(z-9)z+63)$$

07.33.03.0135.01

$$U\left(-\frac{9}{2}, -1, z\right) = \frac{e^{z/2} z (4z(z(2(z-12)z+75)-60)K_0\left(\frac{z}{2}\right) + (4z(2z((z-11)z+27)-15)-15)K_1\left(\frac{z}{2}\right))}{16\sqrt{\pi}}$$

07.33.03.0136.01

$$U\left(-\frac{9}{2}, -1, -z\right) = \frac{1}{16\sqrt{\pi}} \left( e^{-z/2} z \left( -4z(z(2z(z+12)+75)+60)K_0\left(\frac{z}{2}\right) + (4z(2z(z(z+11)+27)+15)-15)K_1\left(\frac{z}{2}\right) + \left(4z(z(2z(z+12)+75)+60)I_0\left(\frac{z}{2}\right) + (4z(2z(z(z+11)+27)+15)-15)I_1\left(\frac{z}{2}\right)\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0137.01

$$U\left(-\frac{9}{2}, -\frac{1}{2}, z\right) = \frac{1}{8} z^{3/2} (2z(4z^2 - 54z + 189) - 315)$$

07.33.03.0138.01

$$U\left(-\frac{9}{2}, 0, z\right) = \frac{1}{32\sqrt{\pi}} \left( e^{z/2} z \left( (2z-9)(2z(4(z-12)z+105)-105)K_0\left(\frac{z}{2}\right) + (4z(z(4z^2-62z+261)-291)+105)K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0139.01

$$U\left(-\frac{9}{2}, 0, -z\right) = \frac{1}{32\sqrt{\pi}} \left( e^{-z/2} z \left( -(2z+9)(2z(4z(z+12)+105)+105)K_0\left(\frac{z}{2}\right) + (4z(z(4z^2+62z+261)+291)+105)K_1\left(\frac{z}{2}\right) + \left( (2z+9)(2z(4z(z+12)+105)+105)I_0\left(\frac{z}{2}\right) + (4z(z(4z^2+62z+261)+291)+105)I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0140.01

$$U\left(-\frac{9}{2}, \frac{1}{2}, z\right) = \frac{1}{16} \sqrt{z} (8z(z(2(z-18)z+189)-315) + 945)$$

07.33.03.0141.01

$$U\left(-\frac{9}{2}, 1, z\right) = \frac{1}{32\sqrt{\pi}} \left( e^{z/2} \left( (z(4z(z(4(z-21)z+555)-1371)+4725)-945)K_0\left(\frac{z}{2}\right) + z(4z(z(4(z-20)z+477)-930)+1689)K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0142.01

$$U\left(-\frac{9}{2}, 1, -z\right) = \frac{1}{32\sqrt{\pi}} \left( e^{-z/2} \left( -(z(4z(z(4z(z+21)+555)+1371)+4725)+945)K_0\left(\frac{z}{2}\right) + z(4z(z(4z(z+20)+477)+930)+1689)K_1\left(\frac{z}{2}\right) + \left( (z(4z(z(4z(z+21)+555)+1371)+4725)+945)I_0\left(\frac{z}{2}\right) + z(4z(z(4z(z+20)+477)+930)+1689)I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0143.01

$$U\left(-\frac{9}{2}, \frac{3}{2}, z\right) = \frac{2z(4z(2z(2z-45)+315)-1575)+4725-945}{32\sqrt{z}}$$

07.33.03.0144.01

$$U\left(-\frac{9}{2}, 2, z\right) = \frac{1}{64\sqrt{\pi}} \left( e^{z/2} \left( (2z(2z(4z(z(2z-51)+426) - 5631) + 14175) - 10395) K_0\left(\frac{z}{2}\right) + (2z(2z(4z(z(2z-49) + 378) - 4209) + 6927) - 945) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0145.01

$$U\left(-\frac{9}{2}, 2, -z\right) = \frac{1}{64\sqrt{\pi}} \left( e^{-z/2} \left( -(2z(2z(4z(z(2z+51) + 426) + 5631) + 14175) + 10395) K_0\left(\frac{z}{2}\right) + (2z(2z(4z(z(2z+49) + 378) + 4209) + 6927) + 945) K_1\left(\frac{z}{2}\right) + \left( (2z(2z(4z(z(2z+51) + 426) + 5631) + 14175) + 10395) I_0\left(\frac{z}{2}\right) + (2z(2z(4z(z(2z+49) + 378) + 4209) + 6927) + 945) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0146.01

$$U\left(-\frac{9}{2}, \frac{5}{2}, z\right) = \frac{4z(z(4z(z(4(z-27)z + 945) - 3150) + 14175) - 2835) - 945}{64z^{3/2}}$$

07.33.03.0147.01

$$U\left(-\frac{9}{2}, 3, z\right) = \frac{1}{64\sqrt{\pi}z} \left( e^{z/2} \left( 2z(2z-9)(z(2z(2z(2z-51) + 753) - 3255) + 1890) K_0\left(\frac{z}{2}\right) + (2z(z(8z(z(2(z-29)z + 549) - 1986) + 18969) - 2835) - 945) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0148.01

$$U\left(-\frac{9}{2}, 3, -z\right) = \frac{1}{64\sqrt{\pi}z} \left( e^{-z/2} \left( -2z(2z+9)(z(2z(2z(2z+51) + 753) + 3255) + 1890) K_0\left(\frac{z}{2}\right) + (2z(z(8z(z(2z(z+29) + 549) + 1986) + 18969) + 2835) - 945) K_1\left(\frac{z}{2}\right) + \left( 2z(2z+9)(z(2z(2z(2z+51) + 753) + 3255) + 1890) I_0\left(\frac{z}{2}\right) + (2z(z(8z(z(2z(z+29) + 549) + 1986) + 18969) + 2835) - 945) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0149.01

$$U\left(-\frac{9}{2}, \frac{7}{2}, z\right) = \frac{2z(2z(2z(2z(2z(2z-63) + 1323) - 11025) + 33075) - 19845) - 6615) - 2835}{128z^{5/2}}$$

07.33.03.0150.01

$$U\left(-\frac{9}{2}, 4, z\right) = \frac{1}{128\sqrt{\pi}z^2} \left( e^{z/2} \left( z(2z(4z(2z(z(2z(2z-69) + 1635) - 8130) + 33075) - 85995) - 945) K_0\left(\frac{z}{2}\right) + (z(2z(4z(2z(z(2z(2z-67) + 1503) - 6690) + 20955) - 19845) - 12285) - 3780) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0151.01

$$U\left(-\frac{9}{2}, 4, -z\right) = \frac{1}{128\sqrt{\pi}z^2} \left( e^{-z/2} \left( -z(2z(4z(2z(z(2z(2z+69)+1635)+8130)+33075)+85995)-945) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(2z(4z(2z(z(2z(2z+67)+1503)+6690)+20955)+19845)-12285)+3780) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. \left( z(2z(4z(2z(z(2z(2z+69)+1635)+8130)+33075)+85995)-945) I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\ \left. \left. \left. (z(2z(4z(2z(z(2z(2z+67)+1503)+6690)+20955)+19845)-12285)+3780) \right. \right. \right. \\ \left. \left. \left. I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0152.01

$$U\left(-\frac{9}{2}, \frac{9}{2}, z\right) = \frac{16z(z(2z(z(8z(z((z-36)z+441)-2205)+33075)-13230)-6615)-2835)-14175}{256z^{7/2}}$$

07.33.03.0153.01

$$U\left(-\frac{9}{2}, 5, z\right) = \frac{1}{128\sqrt{\pi}z^3} \left( e^{z/2} \left( z(z(8z(z(2z(z(4(z-39)z+2121)-12315)+59535)-46305)-6615)-2835) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(z(8z(z(2z(z(4(z-38)z+1971)-10416)+40395)-13230)-46305)-26460)-11340) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0154.01

$$U\left(-\frac{9}{2}, 5, -z\right) = \\ \frac{1}{128\sqrt{\pi}z^3} \left( e^{-z/2} \left( -z(z(8z(z(2z(z(4z(z+39)+2121)+12315)+59535)+46305)-6615)+2835) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(z(8z(z(2z(z(4z(z+38)+1971)+10416)+40395)+13230)-46305)+26460)-11340) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. \left( z(z(8z(z(2z(z(4z(z+39)+2121)+12315)+59535)+46305)-6615)+2835) I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\ \left. \left. \left. (z(z(8z(z(2z(z(4z(z+38)+1971)+10416)+40395)+13230)-46305)+26460)-11340) \right. \right. \right. \\ \left. \left. \left. I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0155.01

$$U\left(-\frac{9}{2}, \frac{11}{2}, z\right) = \\ \frac{1}{512z^{9/2}} (2z(8z(2z(z(2z(4(z-21)z(z(2z-39)+315)+59535)-59535)-19845)-25515)-127575)-99225)$$

07.33.03.0156.01

$$U\left(-\frac{9}{2}, 6, z\right) = \frac{1}{256\sqrt{\pi}z^4} \\ \left( e^{z/2} \left( z(z(8z(z(2z(z(4z(z(2z-87)+1335)-35457)+99225)-178605)-6615)-42525)-22680) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(z(8z(z(2z(z(4z(z(2z-85)+1251)-30615)+70797)-59535)-33075)-214515)-170100)-90720) \right. \right. \\ \left. \left. K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0157.01

$$U\left(-\frac{9}{2}, 6, -z\right) = \frac{1}{256 \sqrt{\pi} z^4} \left( e^{-z/2} \left( -z (z (8 z (z (2 z (z (4 z (z (2 z + 87) + 1335) + 35 457) + 99 225) + 178 605) - 6615) + 42 525) - 22 680) K_0\left(\frac{z}{2}\right) + (z (z (8 z (z (2 z (z (4 z (z (2 z + 85) + 1251) + 30 615) + 70 797) + 59 535) - 33 075) + 214 515) - 170 100) + 90 720) K_1\left(\frac{z}{2}\right) + (z (z (8 z (z (2 z (z (4 z (z (2 z + 87) + 1335) + 35 457) + 99 225) + 178 605) - 6615) + 42 525) - 22 680) I_0\left(\frac{z}{2}\right) + (z (z (8 z (z (2 z (z (4 z (z (2 z + 85) + 1251) + 30 615) + 70 797) + 59 535) - 33 075) + 214 515) - 170 100) + 90 720) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

For fixed  $z$  and  $a = -\frac{7}{2}$

07.33.03.0158.01

$$U\left(-\frac{7}{2}, -6, z\right) = \frac{e^{z/2} z (z (z (z + 8) + 96) K_0\left(\frac{z}{2}\right) + (z (z (z + 16) + 32) + 384) K_1\left(\frac{z}{2}\right))}{2 \sqrt{\pi}}$$

07.33.03.0159.01

$$U\left(-\frac{7}{2}, -6, -z\right) = \frac{1}{2 \sqrt{\pi}} \left( e^{-z/2} z (z ((z - 8) z + 96) K_0\left(\frac{z}{2}\right) - (z ((z - 16) z + 32) - 384) K_1\left(\frac{z}{2}\right) - (z ((z - 8) z + 96) I_0\left(\frac{z}{2}\right) + (z ((z - 16) z + 32) - 384) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)$$

07.33.03.0160.01

$$U\left(-\frac{7}{2}, -\frac{11}{2}, z\right) = \frac{1}{128} \left( 2 \sqrt{z} (2 z (16 z (2 z + 21) + 1575) + 10 395) + 105 e^z \sqrt{\pi} (4 (z - 9) z + 99) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0161.01

$$U\left(-\frac{7}{2}, -\frac{11}{2}, -z\right) = \frac{1}{128 \sqrt{z}} \left( e^{-z} \left( \sqrt{z} (105 \sqrt{\pi} (4 z (z + 9) + 99) - 2 e^z \sqrt{-z} (2 z (16 z (2 z - 21) + 1575) - 10 395) \right) - 105 \sqrt{\pi} \sqrt{-z} (4 z (z + 9) + 99) \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0162.01

$$U\left(-\frac{7}{2}, -5, z\right) = \frac{e^{z/2} z (z (z (z + 8) + 40) K_0\left(\frac{z}{2}\right) + (z (z (z + 9) + 32) + 160) K_1\left(\frac{z}{2}\right))}{2 \sqrt{\pi}}$$

07.33.03.0163.01

$$U\left(-\frac{7}{2}, -5, -z\right) = \frac{1}{2 \sqrt{\pi}} \left( e^{-z/2} z (z ((z - 8) z + 40) K_0\left(\frac{z}{2}\right) - (z ((z - 9) z + 32) - 160) K_1\left(\frac{z}{2}\right) - (z ((z - 8) z + 40) I_0\left(\frac{z}{2}\right) + (z ((z - 9) z + 32) - 160) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)$$

07.33.03.0164.01

$$U\left(-\frac{7}{2}, -\frac{9}{2}, z\right) = \frac{1}{32} \left( 2 \sqrt{z} (4 z (4 z (z + 7) + 105) + 945) - 105 e^z \sqrt{\pi} (2 z - 9) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0165.01

$$U\left(-\frac{7}{2}, -\frac{9}{2}, -z\right) = \frac{1}{32\sqrt{z}} \left( e^{-z} \left( \sqrt{z} (105\sqrt{\pi} (2z+9) - 2e^z \sqrt{-z} (4z(4(z-7)z+105) - 945)) - 105\sqrt{\pi} \sqrt{-z} (2z+9) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0166.01

$$U\left(-\frac{7}{2}, -4, z\right) = \frac{e^{z/2} z \left( z(z(2z+9) + 24) K_0\left(\frac{z}{2}\right) + (z+4)(z(2z+3) + 24) K_1\left(\frac{z}{2}\right) \right)}{4\sqrt{\pi}}$$

07.33.03.0167.01

$$U\left(-\frac{7}{2}, -4, -z\right) = \frac{1}{4\sqrt{\pi}} \left( e^{-z/2} z \left( z(z(2z-9) + 24) K_0\left(\frac{z}{2}\right) - (z-4)(z(2z-3) + 24) K_1\left(\frac{z}{2}\right) - \left( z(z(2z-9) + 24) I_0\left(\frac{z}{2}\right) + (z-4)(z(2z-3) + 24) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0168.01

$$U\left(-\frac{7}{2}, -\frac{7}{2}, z\right) = \frac{1}{16} \left( 2\sqrt{z} (2z(2z(2z+7) + 35) + 105) + 105 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0169.01

$$U\left(-\frac{7}{2}, -\frac{7}{2}, -z\right) = \frac{e^{-z} \left( 2e^z z (2z(2z(2z-7) + 35) - 105) + 105\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 105\sqrt{\pi} \sqrt{-z} \right)}{16\sqrt{-z}}$$

07.33.03.0170.01

$$U\left(-\frac{7}{2}, -3, z\right) = \frac{e^{z/2} z \left( z(2z(z+1) + 3) K_0\left(\frac{z}{2}\right) + 2(z(z(z+2) + 4) + 6) K_1\left(\frac{z}{2}\right) \right)}{4\sqrt{\pi}}$$

07.33.03.0171.01

$$U\left(-\frac{7}{2}, -3, -z\right) = \frac{1}{4\sqrt{\pi}} \left( e^{-z/2} z \left( z(2(z-1)z + 3) K_0\left(\frac{z}{2}\right) - 2(z((z-2)z + 4) - 6) K_1\left(\frac{z}{2}\right) - \left( z(2(z-1)z + 3) I_0\left(\frac{z}{2}\right) + 2(z((z-2)z + 4) - 6) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0172.01

$$U\left(-\frac{7}{2}, -\frac{5}{2}, z\right) = z^{7/2}$$

07.33.03.0173.01

$$U\left(-\frac{7}{2}, -2, z\right) = \frac{e^{z/2} z \left( z(2z(2z-5) - 1) K_0\left(\frac{z}{2}\right) + (z(4z^2 - 6z - 5) - 4) K_1\left(\frac{z}{2}\right) \right)}{8\sqrt{\pi}}$$

07.33.03.0174.01

$$U\left(-\frac{7}{2}, -2, -z\right) = \frac{1}{8\sqrt{\pi}} \left( e^{-z/2} z \left( z(2z(2z+5) - 1) K_0\left(\frac{z}{2}\right) - (z(4z^2 + 6z - 5) + 4) K_1\left(\frac{z}{2}\right) - \left( z(2z(2z+5) - 1) I_0\left(\frac{z}{2}\right) + (z(4z^2 + 6z - 5) + 4) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0175.01

$$U\left(-\frac{7}{2}, -\frac{3}{2}, z\right) = \frac{1}{2} z^{5/2} (2z-7)$$

07.33.03.0176.01

$$U\left(-\frac{7}{2}, -1, z\right) = \frac{e^{z/2} z (4(z-6)z + 27) K_0\left(\frac{z}{2}\right) + (z(4(z-5)z + 9) + 3) K_1\left(\frac{z}{2}\right)}{8\sqrt{\pi}}$$

07.33.03.0177.01

$$U\left(-\frac{7}{2}, -1, -z\right) = \frac{1}{8\sqrt{\pi}} \left( e^{-z/2} z (z(2z+3)(2z+9) K_0\left(\frac{z}{2}\right) - (z(4z(z+5)+9) - 3) K_1\left(\frac{z}{2}\right) - (z(2z+3)(2z+9) I_0\left(\frac{z}{2}\right) + (z(4z(z+5)+9) - 3) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z))) \right)$$

07.33.03.0178.01

$$U\left(-\frac{7}{2}, -\frac{1}{2}, z\right) = \frac{1}{4} z^{3/2} (4(z-7)z + 35)$$

07.33.03.0179.01

$$U\left(-\frac{7}{2}, 0, z\right) = \frac{e^{z/2} z (4(z-5)z(2z-9) - 105) K_0\left(\frac{z}{2}\right) + (4z(z(2z-17) + 29) - 15) K_1\left(\frac{z}{2}\right)}{16\sqrt{\pi}}$$

07.33.03.0180.01

$$U\left(-\frac{7}{2}, 0, -z\right) = \frac{1}{16\sqrt{\pi}} \left( e^{-z/2} z (4z(z+5)(2z+9) + 105) K_0\left(\frac{z}{2}\right) - (4z(z(2z+17) + 29) + 15) K_1\left(\frac{z}{2}\right) - (4z(z+5)(2z+9) + 105) I_0\left(\frac{z}{2}\right) + (4z(z(2z+17) + 29) + 15) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)$$

07.33.03.0181.01

$$U\left(-\frac{7}{2}, \frac{1}{2}, z\right) = \frac{1}{8} \sqrt{z} (8z^3 - 84z^2 + 210z - 105)$$

07.33.03.0182.01

$$U\left(-\frac{7}{2}, 1, z\right) = \frac{e^{z/2} ((4z(2z((z-13)z + 47) - 105) + 105) K_0\left(\frac{z}{2}\right) + 4z(z(2(z-12)z + 71) - 44) K_1\left(\frac{z}{2}\right))}{16\sqrt{\pi}}$$

07.33.03.0183.01

$$U\left(-\frac{7}{2}, 1, -z\right) = \frac{1}{16\sqrt{\pi}} \left( e^{-z/2} ((4z(2z(z(z+13) + 47) + 105) + 105) K_0\left(\frac{z}{2}\right) - 4z(z(2z(z+12) + 71) + 44) K_1\left(\frac{z}{2}\right) - (4z(2z(z(z+13) + 47) + 105) + 105) I_0\left(\frac{z}{2}\right) + 4z(z(2z(z+12) + 71) + 44) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)$$

07.33.03.0184.01

$$U\left(-\frac{7}{2}, \frac{3}{2}, z\right) = \frac{8z(z(2(z-14)z + 105) - 105) + 105}{16\sqrt{z}}$$

07.33.03.0185.01

$$U\left(-\frac{7}{2}, 2, z\right) = \frac{1}{32\sqrt{\pi}} \left( e^{z/2} ((2z-9)(2z(4(z-12)z + 105) - 105) K_0\left(\frac{z}{2}\right) + (4z(z(4z^2 - 62z + 261) - 291) + 105) K_1\left(\frac{z}{2}\right)) \right)$$

07.33.03.0186.01

$$U\left(-\frac{7}{2}, 2, -z\right) = \frac{1}{32\sqrt{\pi}} \left( e^{-z/2} ((2z+9)(2z(4z(z+12) + 105) + 105) K_0\left(\frac{z}{2}\right) - (4z(z(4z^2 + 62z + 261) + 291) + 105) K_1\left(\frac{z}{2}\right) - ((2z+9)(2z(4z(z+12) + 105) + 105) I_0\left(\frac{z}{2}\right) + (4z(z(4z^2 + 62z + 261) + 291) + 105) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)$$



$$07.33.03.0187.01$$

$$U\left(-\frac{7}{2}, \frac{5}{2}, z\right) = \frac{2z(4z(2z(z(2z-35)+175)-525)+525)+105}{32z^{3/2}}$$

$$07.33.03.0188.01$$

$$U\left(-\frac{7}{2}, 3, z\right) = \frac{1}{32\sqrt{\pi}z} \left( e^{z/2} \left( z(4z(z(4(z-20)z+489)-1050)+2625) K_0\left(\frac{z}{2}\right) + (z(4(z-3)z(4(z-16)z+223)+525)+105) K_1\left(\frac{z}{2}\right) \right) \right)$$

$$07.33.03.0189.01$$

$$U\left(-\frac{7}{2}, 3, -z\right) = \frac{1}{32\sqrt{\pi}z} \left( e^{-z/2} \left( z(4z(z(4z(z+20)+489)+1050)+2625) K_0\left(\frac{z}{2}\right) - (z(4z(z+3)(4z(z+16)+223)+525)-105) K_1\left(\frac{z}{2}\right) - (z(4z(z(4z(z+20)+489)+1050)+2625) I_0\left(\frac{z}{2}\right) + (z(4z(z+3)(4z(z+16)+223)+525)-105) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

$$07.33.03.0190.01$$

$$U\left(-\frac{7}{2}, \frac{7}{2}, z\right) = \frac{4z(z(4z(z(4(z-21)z+525)-1050)+1575)+315)+315}{64z^{5/2}}$$

$$07.33.03.0191.01$$

$$U\left(-\frac{7}{2}, 4, z\right) = \frac{1}{64\sqrt{\pi}z^2} \left( e^{z/2} \left( z(2z(2z(4z(z(2z-47)+346)-3675)+5775)+105) K_0\left(\frac{z}{2}\right) + (z(2z(2z(4z(z(2z-45)+302)-2549)+1575)+1155)+420) K_1\left(\frac{z}{2}\right) \right) \right)$$

$$07.33.03.0192.01$$

$$U\left(-\frac{7}{2}, 4, -z\right) = \frac{1}{64\sqrt{\pi}z^2} \left( e^{-z/2} \left( z(2z(2z(4z(z(2z+47)+346)+3675)+5775)-105) K_0\left(\frac{z}{2}\right) - (z(2z(2z(4z(z(2z+45)+302)+2549)+1575)-1155)+420) K_1\left(\frac{z}{2}\right) - (z(2z(2z(4z(z(2z+47)+346)+3675)+5775)-105) I_0\left(\frac{z}{2}\right) + (z(2z(2z(4z(z(2z+45)+302)+2549)+1575)-1155)+420) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

$$07.33.03.0193.01$$

$$U\left(-\frac{7}{2}, \frac{9}{2}, z\right) = \frac{2z(2z(2z(2z(4z^2-98z+735)-3675)+3675)+2205)+2205+1575}{128z^{7/2}}$$

$$07.33.03.0194.01$$

$$U\left(-\frac{7}{2}, 5, z\right) = \frac{1}{64\sqrt{\pi}z^3} \left( e^{z/2} \left( z(2z(z(8z(z(2(z-27)z+465)-1470)+11025)+315)+315) K_0\left(\frac{z}{2}\right) + 2(z(z(z(16z(z((z-26)z+207)-540)+3675)+1890)+1260)+630) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0195.01

$$U\left(-\frac{7}{2}, 5, -z\right) = \frac{1}{64 \sqrt{\pi} z^3} \left( e^{-z/2} \left( z(2z(z(8z(z(2z(z+27)+465)+1470)+11025)-315)+315) K_0\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. 2(z(z(z(16z(z(z+26)+207)+540)+3675)-1890)+1260)-630) K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. \left( z(2z(z(8z(z(2z(z+27)+465)+1470)+11025)-315)+315) I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\ \left. \left. \left. 2(z(z(z(16z(z(z+26)+207)+540)+3675)-1890)+1260)-630) I_1\left(\frac{z}{2}\right) \right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0196.01

$$U\left(-\frac{7}{2}, \frac{11}{2}, z\right) = \frac{16z(z(2z(z(8z(z((z-28)z+245)-735)+3675)+1470)+2205)+1575)+11025}{256 z^{9/2}}$$

07.33.03.0197.01

$$U\left(-\frac{7}{2}, 6, z\right) = \frac{1}{128 \sqrt{\pi} z^4} \left( e^{z/2} \left( z(z(2z(4z(2z(z(2z(2z-61)+1203)-4410)+9555)+2205)+4095)+2520) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(z(2z(4z(2z(z(2z(2z-59)+1087)-3378)+3675)+9555)+17955)+16380)+10080) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0198.01

$$U\left(-\frac{7}{2}, 6, -z\right) = \frac{1}{128 \sqrt{\pi} z^4} \left( e^{-z/2} \left( z(z(2z(4z(2z(z(2z(2z+61)+1203)+4410)+9555)-2205)+4095)-2520) K_0\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. (z(z(2z(4z(2z(z(2z(2z+59)+1087)+3378)+3675)-9555)+17955)-16380)+10080) K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. \left( z(z(2z(4z(2z(z(2z(2z+61)+1203)+4410)+9555)-2205)+4095)-2520) I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\ \left. \left. \left. (z(z(2z(4z(2z(z(2z(2z+59)+1087)+3378)+3675)-9555)+17955)-16380)+10080) \right. \right. \right. \\ \left. \left. \left. I_1\left(\frac{z}{2}\right) \right) \right) (\log(-z) - \log(z)) \right)$$

**For fixed  $z$  and  $a = -\frac{5}{2}$**

07.33.03.0199.01

$$U\left(-\frac{5}{2}, -6, z\right) = \frac{e^{z/2} z \left( (z-8)z+96 \right) K_0\left(\frac{z}{2}\right) - (z((z-16)z+32)-384) K_1\left(\frac{z}{2}\right)}{7 \sqrt{\pi}}$$

07.33.03.0200.01

$$U\left(-\frac{5}{2}, -6, -z\right) = \frac{1}{7 \sqrt{\pi}} \left( e^{-z/2} z \left( z(z(z+8)+96) K_0\left(\frac{z}{2}\right) + (z(z(z+16)+32)+384) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. \left( (z(z(z+16)+32)+384) I_1\left(\frac{z}{2}\right) - z(z(z+8)+96) I_0\left(\frac{z}{2}\right) \right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0201.01

$$U\left(-\frac{5}{2}, -\frac{11}{2}, z\right) = \frac{1}{128} \left( 42 \sqrt{z} (4z(z+5)+165) - 5 e^z \sqrt{\pi} (8z^3 - 84z^2 + 378z - 693) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0202.01

$$U\left(-\frac{5}{2}, -\frac{11}{2}, -z\right) = \frac{1}{128 \sqrt{z}} \left( e^{-z} \left( \sqrt{z} (42 e^z \sqrt{-z} (4(z-5)z+165) + 5 \sqrt{\pi} (8z^3 + 84z^2 + 378z + 693)) - \right. \right. \\ \left. \left. 5 \sqrt{\pi} \sqrt{-z} (8z^3 + 84z^2 + 378z + 693) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0203.01

$$U\left(-\frac{5}{2}, -5, z\right) = \frac{e^{z/2} z^3 K_3\left(\frac{z}{2}\right)}{\sqrt{\pi}}$$

07.33.03.0204.01

$$U\left(-\frac{5}{2}, -5, -z\right) = \frac{e^{-z/2} z^3 \left(K_3\left(\frac{z}{2}\right) + I_3\left(\frac{z}{2}\right)\right) (\log(-z) - \log(z))}{\sqrt{\pi}}$$

07.33.03.0205.01

$$U\left(-\frac{5}{2}, -\frac{9}{2}, z\right) = \frac{1}{64} \left(2\sqrt{z} (32z^2 + 210z + 945) + 15e^z \sqrt{\pi} (4(z-7)z + 63) \operatorname{erfc}(\sqrt{z})\right)$$

07.33.03.0206.01

$$U\left(-\frac{5}{2}, -\frac{9}{2}, -z\right) = \frac{1}{64\sqrt{z}} \left(e^{-z} \left(\sqrt{z} (2e^z \sqrt{-z} (32z^2 - 210z + 945) + 15\sqrt{\pi} (4z(z+7) + 63)) - 15\sqrt{\pi} \sqrt{-z} (4z(z+7) + 63) \operatorname{erfi}(\sqrt{z})\right)\right)$$

07.33.03.0207.01

$$U\left(-\frac{5}{2}, -4, z\right) = \frac{e^{z/2} z \left(z(z+8) K_0\left(\frac{z}{2}\right) + (z(z+4) + 32) K_1\left(\frac{z}{2}\right)\right)}{2\sqrt{\pi}}$$

07.33.03.0208.01

$$U\left(-\frac{5}{2}, -4, -z\right) = -\frac{1}{2\sqrt{\pi}} \left(e^{-z/2} z \left((z-8)z K_0\left(\frac{z}{2}\right) - ((z-4)z + 32) K_1\left(\frac{z}{2}\right) - \left((z-8)z I_0\left(\frac{z}{2}\right) + ((z-4)z + 32) I_1\left(\frac{z}{2}\right)\right) (\log(-z) - \log(z))\right)\right)$$

07.33.03.0209.01

$$U\left(-\frac{5}{2}, -\frac{7}{2}, z\right) = \frac{1}{16} \left(2\sqrt{z} (8z(z+5) + 105) - 15e^z \sqrt{\pi} (2z-7) \operatorname{erfc}(\sqrt{z})\right)$$

07.33.03.0210.01

$$U\left(-\frac{5}{2}, -\frac{7}{2}, -z\right) = \frac{e^{-z} \left(\sqrt{z} (15\sqrt{\pi} (2z+7) + 2e^z \sqrt{-z} (8(z-5)z + 105)) - 15\sqrt{\pi} \sqrt{-z} (2z+7) \operatorname{erfi}(\sqrt{z})\right)}{16\sqrt{z}}$$

07.33.03.0211.01

$$U\left(-\frac{5}{2}, -3, z\right) = \frac{e^{z/2} z \left(z(z+3) K_0\left(\frac{z}{2}\right) + (z(z+4) + 12) K_1\left(\frac{z}{2}\right)\right)}{2\sqrt{\pi}}$$

07.33.03.0212.01

$$U\left(-\frac{5}{2}, -3, -z\right) = -\frac{1}{2\sqrt{\pi}} \left(e^{-z/2} z \left((z-3)z K_0\left(\frac{z}{2}\right) - ((z-4)z + 12) K_1\left(\frac{z}{2}\right) - \left((z-3)z I_0\left(\frac{z}{2}\right) + ((z-4)z + 12) I_1\left(\frac{z}{2}\right)\right) (\log(-z) - \log(z))\right)\right)$$

07.33.03.0213.01

$$U\left(-\frac{5}{2}, -\frac{5}{2}, z\right) = \frac{1}{8} \left(2\sqrt{z} (2z(2z+5) + 15) + 15e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z})\right)$$

07.33.03.0214.01

$$U\left(-\frac{5}{2}, -\frac{5}{2}, -z\right) = \frac{e^{-z} \left(-2 e^z z (2z(2z-5) + 15) + 15 \sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 15 \sqrt{\pi} \sqrt{-z}\right)}{8 \sqrt{-z}}$$

07.33.03.0215.01

$$U\left(-\frac{5}{2}, -2, z\right) = \frac{e^{z/2} z \left(z(2z+1) K_0\left(\frac{z}{2}\right) + (z(2z+3) + 4) K_1\left(\frac{z}{2}\right)\right)}{4 \sqrt{\pi}}$$

07.33.03.0216.01

$$U\left(-\frac{5}{2}, -2, -z\right) = -\frac{1}{4 \sqrt{\pi}} \left( e^{-z/2} z \left( z(2z-1) K_0\left(\frac{z}{2}\right) + ((3-2z)z-4) K_1\left(\frac{z}{2}\right) - \left( z(2z-1) I_0\left(\frac{z}{2}\right) + (z(2z-3) + 4) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0217.01

$$U\left(-\frac{5}{2}, -\frac{3}{2}, z\right) = z^{5/2}$$

07.33.03.0218.01

$$U\left(-\frac{5}{2}, -1, z\right) = \frac{e^{z/2} z \left( 2(z-2)z K_0\left(\frac{z}{2}\right) + (2(z-1)z-1) K_1\left(\frac{z}{2}\right) \right)}{4 \sqrt{\pi}}$$

07.33.03.0219.01

$$U\left(-\frac{5}{2}, -1, -z\right) = -\frac{1}{4 \sqrt{\pi}} \left( e^{-z/2} z \left( 2z(z+2) K_0\left(\frac{z}{2}\right) + (1-2z(z+1)) K_1\left(\frac{z}{2}\right) - \left( 2z(z+2) I_0\left(\frac{z}{2}\right) + (2z(z+1)-1) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0220.01

$$U\left(-\frac{5}{2}, -\frac{1}{2}, z\right) = \frac{1}{2} z^{3/2} (2z-5)$$

07.33.03.0221.01

$$U\left(-\frac{5}{2}, 0, z\right) = \frac{e^{z/2} z \left( (2z(2z-9) + 15) K_0\left(\frac{z}{2}\right) + (2z(2z-7) + 3) K_1\left(\frac{z}{2}\right) \right)}{8 \sqrt{\pi}}$$

07.33.03.0222.01

$$U\left(-\frac{5}{2}, 0, -z\right) = -\frac{1}{8 \sqrt{\pi}} \left( e^{-z/2} z \left( (2z(2z+9) + 15) K_0\left(\frac{z}{2}\right) - (2z(2z+7) + 3) K_1\left(\frac{z}{2}\right) - \left( (2z(2z+9) + 15) I_0\left(\frac{z}{2}\right) + (2z(2z+7) + 3) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0223.01

$$U\left(-\frac{5}{2}, \frac{1}{2}, z\right) = \frac{1}{4} \sqrt{z} (4(z-5)z + 15)$$

07.33.03.0224.01

$$U\left(-\frac{5}{2}, 1, z\right) = \frac{e^{z/2} \left( (z(4(z-7)z + 45) - 15) K_0\left(\frac{z}{2}\right) + z(4(z-6)z + 23) K_1\left(\frac{z}{2}\right) \right)}{8 \sqrt{\pi}}$$

07.33.03.0225.01

$$U\left(-\frac{5}{2}, 1, -z\right) = \frac{1}{8\sqrt{\pi}} \left( e^{-z/2} \left( -(z(2z+5)(2z+9)+15) K_0\left(\frac{z}{2}\right) + z(4z(z+6)+23) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(2z+5)(2z+9)+15) I_0\left(\frac{z}{2}\right) + z(4z(z+6)+23) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0226.01

$$U\left(-\frac{5}{2}, \frac{3}{2}, z\right) = \frac{8z^3 - 60z^2 + 90z - 15}{8\sqrt{z}}$$

07.33.03.0227.01

$$U\left(-\frac{5}{2}, 2, z\right) = \frac{e^{z/2} \left( (4(z-5)z(2z-9) - 105) K_0\left(\frac{z}{2}\right) + (4z(z(2z-17)+29) - 15) K_1\left(\frac{z}{2}\right) \right)}{16\sqrt{\pi}}$$

07.33.03.0228.01

$$U\left(-\frac{5}{2}, 2, -z\right) = \frac{1}{16\sqrt{\pi}} \left( e^{-z/2} \left( -(4z(z+5)(2z+9)+105) K_0\left(\frac{z}{2}\right) + (4z(z(2z+17)+29)+15) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (4z(z+5)(2z+9)+105) I_0\left(\frac{z}{2}\right) + (4z(z(2z+17)+29)+15) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0229.01

$$U\left(-\frac{5}{2}, \frac{5}{2}, z\right) = \frac{8z(z(2(z-10)z+45)-15)-15}{16z^{3/2}}$$

07.33.03.0230.01

$$U\left(-\frac{5}{2}, 3, z\right) = \frac{e^{z/2} \left( 4z(z(2(z-12)z+75)-60) K_0\left(\frac{z}{2}\right) + (4z(2z((z-11)z+27)-15)-15) K_1\left(\frac{z}{2}\right) \right)}{16\sqrt{\pi} z}$$

07.33.03.0231.01

$$U\left(-\frac{5}{2}, 3, -z\right) = \frac{1}{16\sqrt{\pi} z} \left( e^{-z/2} \left( -4z(z(2z(z+12)+75)+60) K_0\left(\frac{z}{2}\right) + (4z(2z(z(z+11)+27)+15)-15) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (4z(z(2z(z+12)+75)+60) I_0\left(\frac{z}{2}\right) + (4z(2z(z(z+11)+27)+15)-15) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0232.01

$$U\left(-\frac{5}{2}, \frac{7}{2}, z\right) = \frac{2z(4z(2(z-5)z(2z-15)-75)-75)-45}{32z^{5/2}}$$

07.33.03.0233.01

$$U\left(-\frac{5}{2}, 4, z\right) = \frac{1}{32\sqrt{\pi} z^2} \left( e^{z/2} \left( z(4z(z(4z^2-58z+225)-225)-15) K_0\left(\frac{z}{2}\right) + (z(4z(z(4z^2-54z+173)-75)-135)-60) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0234.01

$$U\left(-\frac{5}{2}, 4, -z\right) = \frac{1}{32\sqrt{\pi}z^2} \left( e^{-z/2} \left( -z(4z(z(4z^2 + 58z + 225) + 225) - 15) K_0\left(\frac{z}{2}\right) + (z(4z(z(4z^2 + 54z + 173) + 75) - 135) + 60) K_1\left(\frac{z}{2}\right) + (z(4z(z(4z^2 + 58z + 225) + 225) - 15) I_0\left(\frac{z}{2}\right) + (z(4z(z(4z^2 + 54z + 173) + 75) - 135) + 60) I_1\left(\frac{z}{2}\right)) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0235.01

$$U\left(-\frac{5}{2}, \frac{9}{2}, z\right) = \frac{4z(z(4z((15 - 2z)^2 z - 150) - 225) - 135) - 225}{64z^{7/2}}$$

07.33.03.0236.01

$$U\left(-\frac{5}{2}, 5, z\right) = \frac{1}{32\sqrt{\pi}z^3} \left( e^{z/2} \left( z(z(4(z-5)z(4(z-12)z + 75) - 75) - 45) K_0\left(\frac{z}{2}\right) + (z(z(4z(z(4(z-16)z + 253) - 150) - 375) - 300) - 180) K_1\left(\frac{z}{2}\right)) \right)$$

07.33.03.0237.01

$$U\left(-\frac{5}{2}, 5, -z\right) = \frac{1}{32\sqrt{\pi}z^3} \left( e^{-z/2} \left( -z(z(4z(z+5)(4z(z+12)+75)-75)+45) K_0\left(\frac{z}{2}\right) + (z(z(4z(z(4z(z+16)+253)+150)-375)+300)-180) K_1\left(\frac{z}{2}\right) + (z(z(4z(z+5)(4z(z+12)+75)-75)+45) I_0\left(\frac{z}{2}\right) + (z(z(4z(z(4z(z+16)+253)+150)-375)+300)-180) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)$$

07.33.03.0238.01

$$U\left(-\frac{5}{2}, \frac{11}{2}, z\right) = \frac{2z(2z(2z(2z(2z(4z^2 - 70z + 315) - 525) - 525) - 945) - 1575) - 1575}{128z^{9/2}}$$

07.33.03.0239.01

$$U\left(-\frac{5}{2}, 6, z\right) = \frac{1}{64\sqrt{\pi}z^4} \left( e^{z/2} \left( z(z(2z(2z(4z(z(2z-39)+210)-1155)-225)-495)-360) K_0\left(\frac{z}{2}\right) + (z(z(2z(2z(4z(z(2z-37)+174)-525)-825)-1845)-1980)-1440) K_1\left(\frac{z}{2}\right)) \right)$$

07.33.03.0240.01

$$U\left(-\frac{5}{2}, 6, -z\right) = \frac{1}{64\sqrt{\pi}z^4} \left( e^{-z/2} \left( -z(z(2z(2z(4z(z(2z+39)+210)+1155)-225)+495)-360) K_0\left(\frac{z}{2}\right) + (z(z(2z(2z(4z(z(2z+37)+174)+525)-825)+1845)-1980)+1440) K_1\left(\frac{z}{2}\right) + (z(z(2z(2z(4z(z(2z+39)+210)+1155)-225)+495)-360) I_0\left(\frac{z}{2}\right) + (z(z(2z(2z(4z(z(2z+37)+174)+525)-825)+1845)-1980)+1440) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)$$

For fixed  $z$  and  $a = -\frac{3}{2}$

07.33.03.0241.01

$$U\left(-\frac{3}{2}, -6, z\right) = -\frac{1}{315\sqrt{\pi}} \left( 2e^{z/2} z \left( z(z(z(2z-21)+120) - 480) K_0\left(\frac{z}{2}\right) + (z(z((23-2z)z - 144) + 480) - 1920) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0242.01

$$U\left(-\frac{3}{2}, -6, -z\right) = \frac{1}{315\sqrt{\pi}} \left( 2e^{-z/2} z \left( z(z(z(2z+21)+120) + 480) K_0\left(\frac{z}{2}\right) + (z(z(z(2z+23)+144) + 480) + 1920) K_1\left(\frac{z}{2}\right) + \left( (z(z(z(2z+23)+144) + 480) + 1920) I_1\left(\frac{z}{2}\right) - z(z(z(2z+21)+120) + 480) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0243.01

$$U\left(-\frac{3}{2}, -\frac{11}{2}, z\right) = \frac{1}{512} \left( 2\sqrt{z} (-8z^3 + 84z^2 - 210z + 3465) + e^z \sqrt{\pi} (8z(z(2(z-10)z + 105) - 315) + 3465) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0244.01

$$U\left(-\frac{3}{2}, -\frac{11}{2}, -z\right) = \frac{1}{512\sqrt{z}} \left( e^{-z} \left( \sqrt{z} (2e^z \sqrt{-z} (8z^3 + 84z^2 + 210z + 3465) + \sqrt{\pi} (8z(z(2z(z+10) + 105) + 315) + 3465)) - \sqrt{\pi} \sqrt{-z} (8z(z(2z(z+10) + 105) + 315) + 3465) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0245.01

$$U\left(-\frac{3}{2}, -5, z\right) = \frac{2e^{z/2} z \left( z((z-8)z + 40) K_0\left(\frac{z}{2}\right) - (z((z-9)z + 32) - 160) K_1\left(\frac{z}{2}\right) \right)}{35\sqrt{\pi}}$$

07.33.03.0246.01

$$U\left(-\frac{3}{2}, -5, -z\right) = \frac{1}{35\sqrt{\pi}} \left( 2e^{-z/2} z \left( z(z(z+8) + 40) K_0\left(\frac{z}{2}\right) + (z(z(z+9) + 32) + 160) K_1\left(\frac{z}{2}\right) + \left( (z(z(z+9) + 32) + 160) I_1\left(\frac{z}{2}\right) - z(z(z+8) + 40) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0247.01

$$U\left(-\frac{3}{2}, -\frac{9}{2}, z\right) = \frac{1}{64} \left( 2\sqrt{z} (4z^2 + 315) - e^z \sqrt{\pi} (8z^3 - 60z^2 + 210z - 315) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0248.01

$$U\left(-\frac{3}{2}, -\frac{9}{2}, -z\right) = \frac{1}{64\sqrt{z}} \left( e^{-z} \left( \sqrt{z} (2e^z \sqrt{-z} (4z^2 + 315) + \sqrt{\pi} (8z^3 + 60z^2 + 210z + 315)) - \sqrt{\pi} \sqrt{-z} (8z^3 + 60z^2 + 210z + 315) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0249.01

$$U\left(-\frac{3}{2}, -4, z\right) = \frac{e^{z/2} z \left( ((z-4)z + 32) K_1\left(\frac{z}{2}\right) - (z-8)z K_0\left(\frac{z}{2}\right) \right)}{5\sqrt{\pi}}$$

07.33.03.0250.01

$$U\left(-\frac{3}{2}, -4, -z\right) = \frac{1}{5\sqrt{\pi}} \left( e^{-z/2} z \left( z(z+8) K_0\left(\frac{z}{2}\right) + (z(z+4) + 32) K_1\left(\frac{z}{2}\right) + \left( (z(z+4) + 32) I_1\left(\frac{z}{2}\right) - z(z+8) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0251.01

$$U\left(-\frac{3}{2}, -\frac{7}{2}, z\right) = \frac{1}{32} \left( 10\sqrt{z} (2z+21) + 3e^z \sqrt{\pi} (4(z-5)z + 35) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0252.01

$$U\left(-\frac{3}{2}, -\frac{7}{2}, -z\right) = \frac{1}{32\sqrt{z}} \left( e^{-z} \left( \sqrt{z} (3\sqrt{\pi} (4z(z+5) + 35) - 10e^z \sqrt{-z} (2z-21)) - 3\sqrt{\pi} \sqrt{-z} (4z(z+5) + 35) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0253.01

$$U\left(-\frac{3}{2}, -3, z\right) = \frac{e^{z/2} z^2 K_2\left(\frac{z}{2}\right)}{\sqrt{\pi}}$$

07.33.03.0254.01

$$U\left(-\frac{3}{2}, -3, -z\right) = \frac{e^{-z/2} z^2 \left( K_2\left(\frac{z}{2}\right) + I_2\left(\frac{z}{2}\right) (\log(z) - \log(-z)) \right)}{\sqrt{\pi}}$$

07.33.03.0255.01

$$U\left(-\frac{3}{2}, -\frac{5}{2}, z\right) = \frac{1}{8} \left( 2\sqrt{z} (4z+15) - 3e^z \sqrt{\pi} (2z-5) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0256.01

$$U\left(-\frac{3}{2}, -\frac{5}{2}, -z\right) = \frac{e^{-z} \left( \sqrt{z} (3\sqrt{\pi} (2z+5) - 2e^z \sqrt{-z} (4z-15)) - 3\sqrt{\pi} \sqrt{-z} (2z+5) \operatorname{erfi}(\sqrt{z}) \right)}{8\sqrt{z}}$$

07.33.03.0257.01

$$U\left(-\frac{3}{2}, -2, z\right) = \frac{e^{z/2} z \left( z K_0\left(\frac{z}{2}\right) + (z+4) K_1\left(\frac{z}{2}\right) \right)}{2\sqrt{\pi}}$$

07.33.03.0258.01

$$U\left(-\frac{3}{2}, -2, -z\right) = \frac{e^{-z/2} z \left( z K_0\left(\frac{z}{2}\right) - (z-4) K_1\left(\frac{z}{2}\right) - \left( z I_0\left(\frac{z}{2}\right) + (z-4) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)}{2\sqrt{\pi}}$$

07.33.03.0259.01

$$U\left(-\frac{3}{2}, -\frac{3}{2}, z\right) = \frac{1}{2} \sqrt{z} (2z+3) + \frac{3}{4} e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z})$$

07.33.03.0260.01

$$U\left(-\frac{3}{2}, -\frac{3}{2}, -z\right) = \frac{e^{-z} \left( 2e^z z (2z-3) + 3\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 3\sqrt{\pi} \sqrt{-z} \right)}{4\sqrt{-z}}$$



07.33.03.0261.01

$$U\left(-\frac{3}{2}, -1, z\right) = \frac{e^{z/2} z \left( z K_0\left(\frac{z}{2}\right) + (z+1) K_1\left(\frac{z}{2}\right) \right)}{2 \sqrt{\pi}}$$

07.33.03.0262.01

$$U\left(-\frac{3}{2}, -1, -z\right) = \frac{e^{-z/2} z \left( z K_0\left(\frac{z}{2}\right) - (z-1) K_1\left(\frac{z}{2}\right) - \left( z I_0\left(\frac{z}{2}\right) + (z-1) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)}{2 \sqrt{\pi}}$$

07.33.03.0263.01

$$U\left(-\frac{3}{2}, -\frac{1}{2}, z\right) = z^{3/2}$$

07.33.03.0264.01

$$U\left(-\frac{3}{2}, 0, z\right) = \frac{e^{z/2} z \left( (2z-3) K_0\left(\frac{z}{2}\right) + (2z-1) K_1\left(\frac{z}{2}\right) \right)}{4 \sqrt{\pi}}$$

07.33.03.0265.01

$$U\left(-\frac{3}{2}, 0, -z\right) = \frac{e^{-z/2} z \left( (2z+3) K_0\left(\frac{z}{2}\right) - (2z+1) K_1\left(\frac{z}{2}\right) - \left( (2z+3) I_0\left(\frac{z}{2}\right) + (2z+1) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)}{4 \sqrt{\pi}}$$

07.33.03.0266.01

$$U\left(-\frac{3}{2}, \frac{1}{2}, z\right) = \frac{1}{2} \sqrt{z} (2z-3)$$

07.33.03.0267.01

$$U\left(-\frac{3}{2}, 1, z\right) = \frac{e^{z/2} \left( (2(z-3)z+3) K_0\left(\frac{z}{2}\right) + 2(z-2)z K_1\left(\frac{z}{2}\right) \right)}{4 \sqrt{\pi}}$$

07.33.03.0268.01

$$U\left(-\frac{3}{2}, 1, -z\right) = \frac{1}{4 \sqrt{\pi}} \left( e^{-z/2} \left( (2z(z+3)+3) K_0\left(\frac{z}{2}\right) - 2z(z+2) K_1\left(\frac{z}{2}\right) - \left( (2z(z+3)+3) I_0\left(\frac{z}{2}\right) + 2z(z+2) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0269.01

$$U\left(-\frac{3}{2}, \frac{3}{2}, z\right) = \frac{4(z-3)z+3}{4 \sqrt{z}}$$

07.33.03.0270.01

$$U\left(-\frac{3}{2}, 2, z\right) = \frac{e^{z/2} \left( (2z(2z-9)+15) K_0\left(\frac{z}{2}\right) + (2z(2z-7)+3) K_1\left(\frac{z}{2}\right) \right)}{8 \sqrt{\pi}}$$

07.33.03.0271.01

$$U\left(-\frac{3}{2}, 2, -z\right) = \frac{1}{8 \sqrt{\pi}} \left( e^{-z/2} \left( (2z(2z+9)+15) K_0\left(\frac{z}{2}\right) - \left( (2z(2z+7)+3) K_1\left(\frac{z}{2}\right) - \left( (2z(2z+9)+15) I_0\left(\frac{z}{2}\right) + (2z(2z+7)+3) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right) \right)$$

07.33.03.0272.01

$$U\left(-\frac{3}{2}, \frac{5}{2}, z\right) = \frac{2z(2z(2z-9)+9)+3}{8 z^{3/2}}$$

07.33.03.0273.01

$$U\left(-\frac{3}{2}, 3, z\right) = \frac{e^{z/2} \left( z(4(z-6)z+27) K_0\left(\frac{z}{2}\right) + (z(4(z-5)z+9)+3) K_1\left(\frac{z}{2}\right) \right)}{8\sqrt{\pi} z}$$

07.33.03.0274.01

$$U\left(-\frac{3}{2}, 3, -z\right) = \frac{1}{8\sqrt{\pi} z} \left( e^{-z/2} \left( z(2z+3)(2z+9) K_0\left(\frac{z}{2}\right) - (z(4z(z+5)+9)-3) K_1\left(\frac{z}{2}\right) - \left( z(2z+3)(2z+9) I_0\left(\frac{z}{2}\right) + (z(4z(z+5)+9)-3) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0275.01

$$U\left(-\frac{3}{2}, \frac{7}{2}, z\right) = \frac{8z(z(2(z-6)z+9)+3)+9}{16z^{5/2}}$$

07.33.03.0276.01

$$U\left(-\frac{3}{2}, 4, z\right) = \frac{e^{z/2} \left( z(4z(z(2z-15)+21)+3) K_0\left(\frac{z}{2}\right) + (z(4z(z(2z-13)+9)+21)+12) K_1\left(\frac{z}{2}\right) \right)}{16\sqrt{\pi} z^2}$$

07.33.03.0277.01

$$U\left(-\frac{3}{2}, 4, -z\right) = \frac{1}{16\sqrt{\pi} z^2} \left( e^{-z/2} \left( z(4z(z(2z+15)+21)-3) K_0\left(\frac{z}{2}\right) - (z(4z(z(2z+13)+9)-21)+12) K_1\left(\frac{z}{2}\right) - \left( z(4z(z(2z+15)+21)-3) I_0\left(\frac{z}{2}\right) + (z(4z(z(2z+13)+9)-21)+12) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0278.01

$$U\left(-\frac{3}{2}, \frac{9}{2}, z\right) = \frac{2z(4z(2z(z(2z-15)+15)+15)+45)+45}{32z^{7/2}}$$

07.33.03.0279.01

$$U\left(-\frac{3}{2}, 5, z\right) = \frac{e^{z/2} \left( z(4z(2z((z-9)z+15)+3)+9) K_0\left(\frac{z}{2}\right) + 4((z-2)z(z(2(z-6)z-9)-6)+9) K_1\left(\frac{z}{2}\right) \right)}{16\sqrt{\pi} z^3}$$

07.33.03.0280.01

$$U\left(-\frac{3}{2}, 5, -z\right) = \frac{1}{16\sqrt{\pi} z^3} \left( e^{-z/2} \left( z(4z(2z(z(z+9)+15)-3)+9) K_0\left(\frac{z}{2}\right) - 4(z(z+2)(z(2z(z+6)-9)+6)-9) K_1\left(\frac{z}{2}\right) - \left( z(4z(2z(z(z+9)+15)-3)+9) I_0\left(\frac{z}{2}\right) + 4(z(z+2)(z(2z(z+6)-9)+6)-9) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0281.01

$$U\left(-\frac{3}{2}, \frac{11}{2}, z\right) = \frac{4z(z(4z(z(4(z-9)z+45)+30)+135)+135)+315}{64z^{9/2}}$$

07.33.03.0282.01

$$U\left(-\frac{3}{2}, 6, z\right) = \frac{1}{32\sqrt{\pi} z^4} \left( e^{z/2} \left( z(z(4z(z(4z^2-42z+81)+15)+81)+72) K_0\left(\frac{z}{2}\right) + (z(z(4z(z(4z^2-38z+45)+45)+249)+324)+288) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0283.01

$$U\left(-\frac{3}{2}, 6, -z\right) = \frac{1}{32 \sqrt{\pi} z^4} \left( e^{-z/2} \left( z(z(4z(z(4z^2 + 42z + 81) - 15) + 81) - 72) K_0\left(\frac{z}{2}\right) - (z(z(4z(z(4z^2 + 38z + 45) - 45) + 249) - 324) + 288) K_1\left(\frac{z}{2}\right) - (z(z(4z(z(4z^2 + 42z + 81) - 15) + 81) - 72) I_0\left(\frac{z}{2}\right) + (z(z(4z(z(4z^2 + 38z + 45) - 45) + 249) - 324) + 288) I_1\left(\frac{z}{2}\right)) \right) (\log(-z) - \log(z)) \right)$$

For fixed  $z$  and  $a = -\frac{1}{2}$

07.33.03.0284.01

$$U\left(-\frac{1}{2}, -6, z\right) = \frac{1}{10395 \sqrt{\pi}} \left( 4 e^{z/2} z \left( z(z(z(4z^2 - 30z + 159) - 600) + 1440) K_0\left(\frac{z}{2}\right) + (z(z(z(-4z^2 + 34z - 195) + 816) - 2400) + 5760) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0285.01

$$U\left(-\frac{1}{2}, -6, -z\right) = \frac{1}{10395 \sqrt{\pi}} \left( 4 e^{-z/2} z \left( z(z(z(4z^2 + 30z + 159) + 600) + 1440) K_0\left(\frac{z}{2}\right) + (z(z(z(4z^2 + 34z + 195) + 816) + 2400) + 5760) K_1\left(\frac{z}{2}\right) + (z(z(z(4z^2 + 34z + 195) + 816) + 2400) + 5760) I_1\left(\frac{z}{2}\right) - z(z(z(4z^2 + 30z + 159) + 600) + 1440) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0286.01

$$U\left(-\frac{1}{2}, -\frac{11}{2}, z\right) = \frac{1}{7680} \left( 2 \sqrt{z} (8z(2z((z-8)z + 42) - 315) + 10395) - e^z \sqrt{\pi} (2z(4z(2z(z(2z-15) + 75) - 525) + 4725) - 10395) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0287.01

$$U\left(-\frac{1}{2}, -\frac{11}{2}, -z\right) = \frac{1}{7680 \sqrt{z}} \left( e^{-z} \left( \sqrt{z} (2 e^z \sqrt{-z} (8z(2z(z(z+8) + 42) + 315) + 10395) + \sqrt{\pi} (2z(4z(2z(z(2z+15) + 75) + 525) + 4725) + 10395) - \sqrt{\pi} \sqrt{-z} (2z(4z(2z(z(2z+15) + 75) + 525) + 4725) + 10395) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0288.01

$$U\left(-\frac{1}{2}, -5, z\right) = \frac{4 e^{z/2} z \left( (z(z(2(z-7)z + 63) - 192) + 480) K_1\left(\frac{z}{2}\right) - 2z(z((z-6)z + 24) - 60) K_0\left(\frac{z}{2}\right) \right)}{945 \sqrt{\pi}}$$

07.33.03.0289.01

$$U\left(-\frac{1}{2}, -5, -z\right) = \frac{1}{945 \sqrt{\pi}} \left( 4 e^{-z/2} z \left( 2z(z(z(z+6) + 24) + 60) K_0\left(\frac{z}{2}\right) + (z(z(2z(z+7) + 63) + 192) + 480) K_1\left(\frac{z}{2}\right) + (z(z(2z(z+7) + 63) + 192) + 480) I_1\left(\frac{z}{2}\right) - 2z(z(z(z+6) + 24) + 60) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

$$07.33.03.0290.01$$

$$U\left(-\frac{1}{2}, -\frac{9}{2}, z\right) = \frac{1}{768} \left( 2\sqrt{z} (-8z^3 + 52z^2 - 210z + 945) + e^z \sqrt{\pi} (8z(z(2(z-6)z + 45) - 105) + 945) \operatorname{erfc}(\sqrt{z}) \right)$$

$$07.33.03.0291.01$$

$$U\left(-\frac{1}{2}, -\frac{9}{2}, -z\right) = \frac{1}{768\sqrt{z}} \left( e^{-z} \left( \sqrt{z} (2e^z \sqrt{-z} (8z^3 + 52z^2 + 210z + 945) + \sqrt{\pi} (8z(z(2z(z+6) + 45) + 105) + 945)) - \sqrt{\pi} \sqrt{-z} (8z(z(2z(z+6) + 45) + 105) + 945) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

$$07.33.03.0292.01$$

$$U\left(-\frac{1}{2}, -4, z\right) = \frac{2e^{z/2} z \left( z(z(2z-9) + 24) K_0\left(\frac{z}{2}\right) - (z-4)(z(2z-3) + 24) K_1\left(\frac{z}{2}\right) \right)}{105\sqrt{\pi}}$$

$$07.33.03.0293.01$$

$$U\left(-\frac{1}{2}, -4, -z\right) = \frac{1}{105\sqrt{\pi}} \left( 2e^{-z/2} z \left( z(z(2z+9) + 24) K_0\left(\frac{z}{2}\right) + (z+4)(z(2z+3) + 24) K_1\left(\frac{z}{2}\right) \right) + \left( (z+4)(z(2z+3) + 24) I_1\left(\frac{z}{2}\right) - z(z(2z+9) + 24) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

$$07.33.03.0294.01$$

$$U\left(-\frac{1}{2}, -\frac{7}{2}, z\right) = \frac{1}{96} \left( 2\sqrt{z} (4(z-5)z + 105) - e^z \sqrt{\pi} (2z(2z(2z-9) + 45) - 105) \operatorname{erfc}(\sqrt{z}) \right)$$

$$07.33.03.0295.01$$

$$U\left(-\frac{1}{2}, -\frac{7}{2}, -z\right) = \frac{1}{96\sqrt{z}} \left( e^{-z} \left( \sqrt{z} (2e^z \sqrt{-z} (4z(z+5) + 105) + \sqrt{\pi} (2z(2z(2z+9) + 45) + 105)) - \sqrt{\pi} \sqrt{-z} (2z(2z(2z+9) + 45) + 105) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

$$07.33.03.0296.01$$

$$U\left(-\frac{1}{2}, -3, z\right) = \frac{2e^{z/2} z \left( (z-4)z + 12 \right) K_1\left(\frac{z}{2}\right) - (z-3)z K_0\left(\frac{z}{2}\right)}{15\sqrt{\pi}}$$

$$07.33.03.0297.01$$

$$U\left(-\frac{1}{2}, -3, -z\right) = \frac{1}{15\sqrt{\pi}} \left( 2e^{-z/2} z \left( z(z+3) K_0\left(\frac{z}{2}\right) + (z(z+4) + 12) K_1\left(\frac{z}{2}\right) + \left( (z(z+4) + 12) I_1\left(\frac{z}{2}\right) - z(z+3) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

$$07.33.03.0298.01$$

$$U\left(-\frac{1}{2}, -\frac{5}{2}, z\right) = \frac{1}{16} \left( 2\sqrt{z} (15-2z) + e^z \sqrt{\pi} (4(z-3)z + 15) \operatorname{erfc}(\sqrt{z}) \right)$$

$$07.33.03.0299.01$$

$$U\left(-\frac{1}{2}, -\frac{5}{2}, -z\right) = \frac{e^{-z} \left( \sqrt{z} (2e^z \sqrt{-z} (2z+15) + \sqrt{\pi} (4z(z+3) + 15)) - \sqrt{\pi} \sqrt{-z} (4z(z+3) + 15) \operatorname{erfi}(\sqrt{z}) \right)}{16\sqrt{z}}$$

07.33.03.0300.01

$$U\left(-\frac{1}{2}, -2, z\right) = \frac{e^{z/2} z \left( z K_0\left(\frac{z}{2}\right) - (z-4) K_1\left(\frac{z}{2}\right) \right)}{3 \sqrt{\pi}}$$

07.33.03.0301.01

$$U\left(-\frac{1}{2}, -2, -z\right) = \frac{e^{-z/2} z \left( z K_0\left(\frac{z}{2}\right) + (z+4) K_1\left(\frac{z}{2}\right) + ((z+4) I_1\left(\frac{z}{2}\right) - z I_0\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)}{3 \sqrt{\pi}}$$

07.33.03.0302.01

$$U\left(-\frac{1}{2}, -\frac{3}{2}, z\right) = \frac{1}{4} \left( 6 \sqrt{z} - e^z \sqrt{\pi} (2z-3) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0303.01

$$U\left(-\frac{1}{2}, -\frac{3}{2}, -z\right) = \frac{e^{-z} \left( \sqrt{z} \left( \sqrt{\pi} (2z+3) + 6 e^z \sqrt{-z} \right) - \sqrt{\pi} \sqrt{-z} (2z+3) \operatorname{erfi}(\sqrt{z}) \right)}{4 \sqrt{z}}$$

07.33.03.0304.01

$$U\left(-\frac{1}{2}, -1, z\right) = \frac{e^{z/2} z K_1\left(\frac{z}{2}\right)}{\sqrt{\pi}}$$

07.33.03.0305.01

$$U\left(-\frac{1}{2}, -1, -z\right) = \frac{e^{-z/2} z \left( K_1\left(\frac{z}{2}\right) + I_1\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right)}{\sqrt{\pi}}$$

07.33.03.0306.01

$$U\left(-\frac{1}{2}, -\frac{1}{2}, z\right) = \frac{1}{2} e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) + \sqrt{z}$$

07.33.03.0307.01

$$U\left(-\frac{1}{2}, -\frac{1}{2}, -z\right) = e^{-z} \left( \frac{1}{2} \sqrt{\pi} \left( \frac{\sqrt{z} \operatorname{erfi}(\sqrt{z})}{\sqrt{-z}} + 1 \right) + e^z \sqrt{-z} \right)$$

07.33.03.0308.01

$$U\left(-\frac{1}{2}, 0, z\right) = \frac{e^{z/2} z \left( K_0\left(\frac{z}{2}\right) + K_1\left(\frac{z}{2}\right) \right)}{2 \sqrt{\pi}}$$

07.33.03.0309.01

$$U\left(-\frac{1}{2}, 0, -z\right) = \frac{e^{-z/2} z \left( -K_0\left(\frac{z}{2}\right) + K_1\left(\frac{z}{2}\right) + \left( I_0\left(\frac{z}{2}\right) + I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)}{2 \sqrt{\pi}}$$

07.33.03.0310.01

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

07.33.03.0311.01

$$U\left(-\frac{1}{2}, 1, z\right) = \frac{e^{z/2} \left( (z-1) K_0\left(\frac{z}{2}\right) + z K_1\left(\frac{z}{2}\right) \right)}{2 \sqrt{\pi}}$$

07.33.03.0312.01

$$U\left(-\frac{1}{2}, 1, -z\right) = \frac{e^{-z/2} \left( -(z+1) K_0\left(\frac{z}{2}\right) + z K_1\left(\frac{z}{2}\right) + \left( (z+1) I_0\left(\frac{z}{2}\right) + z I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)}{2\sqrt{\pi}}$$

07.33.03.0313.01

$$U\left(-\frac{1}{2}, \frac{3}{2}, z\right) = \frac{2z-1}{2\sqrt{z}}$$

07.33.03.0314.01

$$U\left(-\frac{1}{2}, 2, z\right) = \frac{e^{z/2} \left( (2z-3) K_0\left(\frac{z}{2}\right) + (2z-1) K_1\left(\frac{z}{2}\right) \right)}{4\sqrt{\pi}}$$

07.33.03.0315.01

$$U\left(-\frac{1}{2}, 2, -z\right) = \frac{e^{-z/2} \left( -(2z+3) K_0\left(\frac{z}{2}\right) + (2z+1) K_1\left(\frac{z}{2}\right) + \left( (2z+3) I_0\left(\frac{z}{2}\right) + (2z+1) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)}{4\sqrt{\pi}}$$

07.33.03.0316.01

$$U\left(-\frac{1}{2}, \frac{5}{2}, z\right) = \frac{4(z-1)z-1}{4z^{3/2}}$$

07.33.03.0317.01

$$U\left(-\frac{1}{2}, 3, z\right) = \frac{e^{z/2} \left( 2(z-2)z K_0\left(\frac{z}{2}\right) + (2(z-1)z-1) K_1\left(\frac{z}{2}\right) \right)}{4\sqrt{\pi} z}$$

07.33.03.0318.01

$$U\left(-\frac{1}{2}, 3, -z\right) = \frac{1}{4\sqrt{\pi} z} \left( e^{-z/2} \left( -2z(z+2) K_0\left(\frac{z}{2}\right) + (2z(z+1)-1) K_1\left(\frac{z}{2}\right) + \left( 2z(z+2) I_0\left(\frac{z}{2}\right) + (2z(z+1)-1) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0319.01

$$U\left(-\frac{1}{2}, \frac{7}{2}, z\right) = \frac{2z(4z^2-6z-3)-3}{8z^{5/2}}$$

07.33.03.0320.01

$$U\left(-\frac{1}{2}, 4, z\right) = \frac{e^{z/2} \left( z(2z(2z-5)-1) K_0\left(\frac{z}{2}\right) + (z(4z^2-6z-5)-4) K_1\left(\frac{z}{2}\right) \right)}{8\sqrt{\pi} z^2}$$

07.33.03.0321.01

$$U\left(-\frac{1}{2}, 4, -z\right) = \frac{1}{8\sqrt{\pi} z^2} \left( e^{-z/2} \left( z(1-2z(2z+5)) K_0\left(\frac{z}{2}\right) + (z(4z^2+6z-5)+4) K_1\left(\frac{z}{2}\right) + \left( z(2z(2z+5)-1) I_0\left(\frac{z}{2}\right) + (z(4z^2+6z-5)+4) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0322.01

$$U\left(-\frac{1}{2}, \frac{9}{2}, z\right) = \frac{8z(z(2(z-2)z-3)-3)-15}{16z^{7/2}}$$

07.33.03.0323.01

$$U\left(-\frac{1}{2}, 5, z\right) = \frac{e^{z/2} \left( z(z(4(z-3)z-3)-3) K_0\left(\frac{z}{2}\right) + (z(z(4(z-2)z-9)-12)-12) K_1\left(\frac{z}{2}\right) \right)}{8\sqrt{\pi} z^3}$$

07.33.03.0324.01

$$U\left(-\frac{1}{2}, 5, -z\right) = \frac{1}{8\sqrt{\pi}z^3} \left( e^{-z/2} \left( -z(z(4z(z+3)-3)+3)K_0\left(\frac{z}{2}\right) + (z(z(4z(z+2)-9)+12)-12)K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(z(4z(z+3)-3)+3)I_0\left(\frac{z}{2}\right) + (z(z(4z(z+2)-9)+12)-12)I_1\left(\frac{z}{2}\right)) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0325.01

$$U\left(-\frac{1}{2}, \frac{11}{2}, z\right) = \frac{2z(4z(2z(z(2z-5)-5)-15)-75)-105}{32z^{9/2}}$$

07.33.03.0326.01

$$U\left(-\frac{1}{2}, 6, z\right) = \frac{1}{16\sqrt{\pi}z^4} \left( e^{z/2} \left( z(z(4z(z(2z-7)-3)-21)-24)K_0\left(\frac{z}{2}\right) + (z(z(4z(z+1)(2z-7)-51)-84)-96)K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0327.01

$$U\left(-\frac{1}{2}, 6, -z\right) = \\ \frac{1}{16\sqrt{\pi}z^4} \left( e^{-z/2} \left( z(24-z(4z(z(2z+7)-3)+21))K_0\left(\frac{z}{2}\right) + (z(z(4(z-1)z(2z+7)+51)-84)+96)K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(z(4z(z(2z+7)-3)+21)-24)I_0\left(\frac{z}{2}\right) + (z(z(4(z-1)z(2z+7)+51)-84)+96)I_1\left(\frac{z}{2}\right)) \right) (\log(-z) - \log(z)) \right)$$

**For fixed  $z$  and  $a = \frac{1}{2}$**

07.33.03.0328.01

$$U\left(\frac{1}{2}, -6, z\right) = -\frac{1}{135135\sqrt{\pi}} \left( 8e^{z/2}z \left( z(z(z(4z(z(2z-5)+21)-303)+840)-1440)K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(z(z(441-4z(z(2z-7)+29))-1392)+3360)-5760)K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0329.01

$$U\left(\frac{1}{2}, -6, -z\right) = \frac{1}{135135\sqrt{\pi}} \left( 8e^{-z/2}z \right. \\ \left. (z(z(z(4z(z(2z+5)+21)+303)+840)+1440)K_0\left(\frac{z}{2}\right) + (z(z(z(4z(z(2z+7)+29)+441)+1392)+3360)+5760) \right. \\ \left. K_1\left(\frac{z}{2}\right) + (z(z(z(4z(z(2z+7)+29)+441)+1392)+3360)+5760)I_1\left(\frac{z}{2}\right) - \right. \\ \left. z(z(z(4z(z(2z+5)+21)+303)+840)+1440)I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0330.01

$$U\left(\frac{1}{2}, -\frac{11}{2}, z\right) = \frac{1}{46080} \left( 2\sqrt{z} (10395 - 2z(4z(2z-7)(2z^2+27)+2205)) + \right. \\ \left. e^z\sqrt{\pi} (4z(z(4z(z(4(z-3)z+45)-150)+1575)-2835)+10395) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0331.01

$$U\left(\frac{1}{2}, -\frac{11}{2}, -z\right) = \frac{1}{46080\sqrt{z}} \left( e^{-z} \left( \sqrt{z} (2e^z\sqrt{-z} (2z(4z(2z+7)(2z^2+27)+2205)+10395) + \right. \right. \\ \left. \left. \sqrt{\pi} (4z(z(4z(z(4z(z+3)+45)+150)+1575)+2835)+10395) \right) - \right. \\ \left. \sqrt{\pi}\sqrt{-z} (4z(z(4z(z(4z(z+3)+45)+150)+1575)+2835)+10395) \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0332.01

$$U\left(\frac{1}{2}, -5, z\right) = \frac{1}{10395\sqrt{\pi}} \left( 8 e^{z/2} z \left( z(z(z(4(z-2)z+27)-72)+120) K_0\left(\frac{z}{2}\right) + (z(-(z-3)z(4z^2+41)-288)+480) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0333.01

$$U\left(\frac{1}{2}, -5, -z\right) = \frac{1}{10395\sqrt{\pi}} \left( 8 e^{-z/2} z \left( z(z(z(4z(z+2)+27)+72)+120) K_0\left(\frac{z}{2}\right) + (z(z(z+3)(4z^2+41)+288)+480) K_1\left(\frac{z}{2}\right) + (z(z(z+3)(4z^2+41)+288)+480) I_1\left(\frac{z}{2}\right) - z(z(z(4z(z+2)+27)+72)+120) I_0\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0334.01

$$U\left(\frac{1}{2}, -\frac{9}{2}, z\right) = \frac{1}{3840} \left( 2\sqrt{z} (4z(2z(2(z-3)z+19)-105)+945) - e^z \sqrt{\pi} (2z(4z(2z-5)(2z^2+15)+525)-945) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0335.01

$$U\left(\frac{1}{2}, -\frac{9}{2}, -z\right) = \frac{1}{3840\sqrt{z}} \left( e^{-z} \left( \sqrt{z} (\sqrt{\pi} (2z(4z(2z+5)(2z^2+15)+525)+945) + 2 e^z \sqrt{-z} (4z(2z(2z(z+3)+19)+105)+945) \right) - \sqrt{\pi} \sqrt{-z} (2z(4z(2z+5)(2z^2+15)+525)+945) \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0336.01

$$U\left(\frac{1}{2}, -4, z\right) = -\frac{4 e^{z/2} z \left( z(z(4z^2-6z+15)-24) K_0\left(\frac{z}{2}\right) + (z(z(2(5-2z)z-27)+60)-96) K_1\left(\frac{z}{2}\right) \right)}{945\sqrt{\pi}}$$

07.33.03.0337.01

$$U\left(\frac{1}{2}, -4, -z\right) = \frac{1}{945\sqrt{\pi}} \left( 4 e^{-z/2} z \left( z(z(4z^2+6z+15)+24) K_0\left(\frac{z}{2}\right) + (z(z(2z(2z+5)+27)+60)+96) K_1\left(\frac{z}{2}\right) + (z(z(2z(2z+5)+27)+60)+96) I_1\left(\frac{z}{2}\right) - z(z(4z^2+6z+15)+24) I_0\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0338.01

$$U\left(\frac{1}{2}, -\frac{7}{2}, z\right) = \frac{1}{384} \left( 2\sqrt{z} (105-2z(2z(2z-5)+25)) + e^z \sqrt{\pi} (8z(z(2(z-2)z+9)-15)+105) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0339.01

$$U\left(\frac{1}{2}, -\frac{7}{2}, -z\right) = \frac{1}{384\sqrt{z}} \left( e^{-z} \left( \sqrt{z} (2 e^z \sqrt{-z} (2z(2z(2z+5)+25)+105) + \sqrt{\pi} (8z(z(2z(z+2)+9)+15)+105) \right) - \sqrt{\pi} \sqrt{-z} (8z(z(2z(z+2)+9)+15)+105) \operatorname{erfi}(\sqrt{z}) \right)$$



07.33.03.0340.01

$$U\left(\frac{1}{2}, -3, z\right) = \frac{4 e^{z/2} z \left( z(2(z-1)z+3) K_0\left(\frac{z}{2}\right) - 2(z((z-2)z+4) - 6) K_1\left(\frac{z}{2}\right) \right)}{105 \sqrt{\pi}}$$

07.33.03.0341.01

$$U\left(\frac{1}{2}, -3, -z\right) = \frac{1}{105 \sqrt{\pi}} \left( 4 e^{-z/2} z \left( z(2z(z+1)+3) K_0\left(\frac{z}{2}\right) + 2(z(z(z+2)+4) + 6) K_1\left(\frac{z}{2}\right) + \left( 2(z(z(z+2)+4) + 6) I_1\left(\frac{z}{2}\right) - z(2z(z+1)+3) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0342.01

$$U\left(\frac{1}{2}, -\frac{5}{2}, z\right) = \frac{1}{48} \left( 2 \sqrt{z} (4(z-2)z+15) - e^z \sqrt{\pi} (2z(4z^2-6z+9) - 15) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0343.01

$$U\left(\frac{1}{2}, -\frac{5}{2}, -z\right) = \frac{1}{48 \sqrt{z}} \left( e^{-z} \left( \sqrt{z} (2 e^z \sqrt{-z} (4z(z+2)+15) + \sqrt{\pi} (2z(4z^2+6z+9)+15)) - \sqrt{\pi} \sqrt{-z} (2z(4z^2+6z+9)+15) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0344.01

$$U\left(\frac{1}{2}, -2, z\right) = -\frac{2 e^{z/2} z \left( z(2z-1) K_0\left(\frac{z}{2}\right) + ((3-2z)z-4) K_1\left(\frac{z}{2}\right) \right)}{15 \sqrt{\pi}}$$

07.33.03.0345.01

$$U\left(\frac{1}{2}, -2, -z\right) = \frac{1}{15 \sqrt{\pi}} \left( 2 e^{-z/2} z \left( z(2z+1) K_0\left(\frac{z}{2}\right) + (z(2z+3)+4) K_1\left(\frac{z}{2}\right) + \left( (z(2z+3)+4) I_1\left(\frac{z}{2}\right) - z(2z+1) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0346.01

$$U\left(\frac{1}{2}, -\frac{3}{2}, z\right) = \frac{1}{8} \left( 2 \sqrt{z} (3-2z) + e^z \sqrt{\pi} (4(z-1)z+3) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0347.01

$$U\left(\frac{1}{2}, -\frac{3}{2}, -z\right) = \frac{e^{-z} \left( \sqrt{z} (2 e^z \sqrt{-z} (2z+3) + \sqrt{\pi} (4z(z+1)+3)) - \sqrt{\pi} \sqrt{-z} (4z(z+1)+3) \operatorname{erfi}(\sqrt{z}) \right)}{8 \sqrt{z}}$$

07.33.03.0348.01

$$U\left(\frac{1}{2}, -1, z\right) = \frac{2 e^{z/2} z \left( z K_0\left(\frac{z}{2}\right) - (z-1) K_1\left(\frac{z}{2}\right) \right)}{3 \sqrt{\pi}}$$

07.33.03.0349.01

$$U\left(\frac{1}{2}, -1, -z\right) = \frac{2 e^{-z/2} z \left( z K_0\left(\frac{z}{2}\right) + (z+1) K_1\left(\frac{z}{2}\right) + \left( (z+1) I_1\left(\frac{z}{2}\right) - z I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)}{3 \sqrt{\pi}}$$

07.33.03.0350.01

$$U\left(\frac{1}{2}, -\frac{1}{2}, z\right) = \sqrt{z} - \frac{1}{2} e^z \sqrt{\pi} (2z-1) \operatorname{erfc}(\sqrt{z})$$

07.33.03.0351.01

$$U\left(\frac{1}{2}, -\frac{1}{2}, -z\right) = \frac{e^{-z} \left( -\sqrt{\pi} \sqrt{-z} \operatorname{erfi}(\sqrt{z}) (2z+1) + \sqrt{\pi} \sqrt{z} (2z+1) + 2e^z \sqrt{-z^2} \right)}{2\sqrt{z}}$$

07.33.03.0352.01

$$U\left(\frac{1}{2}, 0, z\right) = -\frac{e^{z/2} z \left( K_0\left(\frac{z}{2}\right) - K_1\left(\frac{z}{2}\right) \right)}{\sqrt{\pi}}$$

07.33.03.0353.01

$$U\left(\frac{1}{2}, 0, -z\right) = \frac{e^{-z/2} z \left( K_0\left(\frac{z}{2}\right) + K_1\left(\frac{z}{2}\right) \right) + \left( I_1\left(\frac{z}{2}\right) - I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z))}{\sqrt{\pi}}$$

07.33.03.0025.01

$$U\left(\frac{1}{2}, \frac{1}{2}, z\right) = \sqrt{\pi} e^z \operatorname{erfc}(\sqrt{z})$$

07.33.03.0354.01

$$U\left(\frac{1}{2}, \frac{1}{2}, -z\right) = e^{-z} \sqrt{\pi} \left( \frac{\sqrt{z} \operatorname{erfi}(\sqrt{z})}{\sqrt{-z}} + 1 \right)$$

07.33.03.0355.01

$$U\left(\frac{1}{2}, 1, z\right) = \frac{e^{z/2} K_0\left(\frac{z}{2}\right)}{\sqrt{\pi}}$$

07.33.03.0356.01

$$U\left(\frac{1}{2}, 1, -z\right) = \frac{e^{-z/2} \left( K_0\left(\frac{z}{2}\right) + I_0\left(\frac{z}{2}\right) \right) (\log(z) - \log(-z))}{\sqrt{\pi}}$$

07.33.03.0357.01

$$U\left(\frac{1}{2}, \frac{3}{2}, z\right) = \frac{1}{\sqrt{z}}$$

07.33.03.0358.01

$$U\left(\frac{1}{2}, 2, z\right) = \frac{e^{z/2} \left( K_0\left(\frac{z}{2}\right) + K_1\left(\frac{z}{2}\right) \right)}{2\sqrt{\pi}}$$

07.33.03.0359.01

$$U\left(\frac{1}{2}, 2, -z\right) = \frac{e^{-z/2} \left( K_0\left(\frac{z}{2}\right) - K_1\left(\frac{z}{2}\right) \right) + \left( I_0\left(\frac{z}{2}\right) + I_1\left(\frac{z}{2}\right) \right) (\log(z) - \log(-z))}{2\sqrt{\pi}}$$

07.33.03.0360.01

$$U\left(\frac{1}{2}, \frac{5}{2}, z\right) = \frac{2z+1}{2z^{3/2}}$$

07.33.03.0361.01

$$U\left(\frac{1}{2}, 3, z\right) = \frac{e^{z/2} \left( z K_0\left(\frac{z}{2}\right) + (z+1) K_1\left(\frac{z}{2}\right) \right)}{2\sqrt{\pi} z}$$

07.33.03.0362.01

$$U\left(\frac{1}{2}, 3, -z\right) = \frac{e^{-z/2} \left( z K_0\left(\frac{z}{2}\right) - (z-1) K_1\left(\frac{z}{2}\right) - \left( z I_0\left(\frac{z}{2}\right) + (z-1) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)}{2 \sqrt{\pi} z}$$

07.33.03.0363.01

$$U\left(\frac{1}{2}, \frac{7}{2}, z\right) = \frac{4z(z+1)+3}{4z^{5/2}}$$

07.33.03.0364.01

$$U\left(\frac{1}{2}, 4, z\right) = \frac{e^{z/2} \left( z(2z+1) K_0\left(\frac{z}{2}\right) + (z(2z+3)+4) K_1\left(\frac{z}{2}\right) \right)}{4 \sqrt{\pi} z^2}$$

07.33.03.0365.01

$$U\left(\frac{1}{2}, 4, -z\right) = \frac{1}{4 \sqrt{\pi} z^2} \left( e^{-z/2} \left( z(2z-1) K_0\left(\frac{z}{2}\right) + ((3-2z)z-4) K_1\left(\frac{z}{2}\right) - \left( z(2z-1) I_0\left(\frac{z}{2}\right) + (z(2z-3)+4) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0366.01

$$U\left(\frac{1}{2}, \frac{9}{2}, z\right) = \frac{2z(4z^2+6z+9)+15}{8z^{7/2}}$$

07.33.03.0367.01

$$U\left(\frac{1}{2}, 5, z\right) = \frac{e^{z/2} \left( z(2z(z+1)+3) K_0\left(\frac{z}{2}\right) + 2(z(z(z+2)+4)+6) K_1\left(\frac{z}{2}\right) \right)}{4 \sqrt{\pi} z^3}$$

07.33.03.0368.01

$$U\left(\frac{1}{2}, 5, -z\right) = \frac{1}{4 \sqrt{\pi} z^3} \left( e^{-z/2} \left( z(2(z-1)z+3) K_0\left(\frac{z}{2}\right) - 2(z((z-2)z+4)-6) K_1\left(\frac{z}{2}\right) - \left( z(2(z-1)z+3) I_0\left(\frac{z}{2}\right) + 2(z((z-2)z+4)-6) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0369.01

$$U\left(\frac{1}{2}, \frac{11}{2}, z\right) = \frac{8z(z(2z(z+2)+9)+15)+105}{16z^{9/2}}$$

07.33.03.0370.01

$$U\left(\frac{1}{2}, 6, z\right) = \frac{e^{z/2} \left( z(z(4z^2+6z+15)+24) K_0\left(\frac{z}{2}\right) + (z(z(2z(2z+5)+27)+60)+96) K_1\left(\frac{z}{2}\right) \right)}{8 \sqrt{\pi} z^4}$$

07.33.03.0371.01

$$U\left(\frac{1}{2}, 6, -z\right) = \frac{1}{8 \sqrt{\pi} z^4} \left( e^{-z/2} \left( z(z(4z^2-6z+15)-24) K_0\left(\frac{z}{2}\right) + (z(z(2(5-2z)z-27)+60)-96) K_1\left(\frac{z}{2}\right) - \left( z(z(4z^2-6z+15)-24) I_0\left(\frac{z}{2}\right) + (z(z(2z(2z-5)+27)-60)+96) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

**For fixed  $z$  and  $a = 1$**

07.33.03.0372.01

$$U(1, -6, z) = \frac{e^z (\text{Chi}(z) - \text{Shi}(z)) z^7 + (z(z(z((z-1)z+2)-6)+24)-120)z+720}{5040}$$

07.33.03.0373.01

$$U\left(1, -\frac{11}{2}, z\right) = \frac{-128 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) z^{13/2} + 4(2z(2z(8z^3 - 4z^2 + 6z - 15) + 105) - 945)z + 20790}{135135}$$

07.33.03.0374.01

$$U\left(1, -\frac{11}{2}, -z\right) = \frac{1}{135135} \left( 2e^{-z} \left( -64\sqrt{\pi} (-z)^{13/2} + e^z (2z(2z(2z(8z^3 + 4z^2 + 6z + 15) + 105) + 945) + 10395) - 64\sqrt{\pi} z^{13/2} \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0375.01

$$U(1, -5, z) = \frac{1}{720} \left( -e^z (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^6 + (z(z(-z^2 + z - 2) + 6) - 24)z + 120 \right)$$

07.33.03.0376.01

$$U\left(1, -\frac{9}{2}, z\right) = \frac{2(32 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) z^{11/2} - 2(2z(8z^3 - 4z^2 + 6z - 15) + 105)z + 945)}{10395}$$

07.33.03.0377.01

$$U\left(1, -\frac{9}{2}, -z\right) = \frac{2e^{-z} \left( 32\sqrt{\pi} (-z)^{11/2} + e^z (2z(2z(8z^3 + 4z^2 + 6z + 15) + 105) + 945) - 32\sqrt{\pi} z^{11/2} \operatorname{erfi}(\sqrt{z}) \right)}{10395}$$

07.33.03.0378.01

$$U(1, -4, z) = \frac{1}{120} \left( e^z (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^5 + (z((z - 1)z + 2) - 6)z + 24 \right)$$

07.33.03.0379.01

$$U\left(1, -\frac{7}{2}, z\right) = \frac{1}{945} \left( -32 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) z^{9/2} + 4(8z^3 - 4z^2 + 6z - 15)z + 210 \right)$$

07.33.03.0380.01

$$U\left(1, -\frac{7}{2}, -z\right) = \frac{1}{945} e^{-z} \left( -32\sqrt{\pi} (-z)^{9/2} + 2e^z (2z(8z^3 + 4z^2 + 6z + 15) + 105) - 32\sqrt{\pi} z^{9/2} \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0381.01

$$U(1, -3, z) = \frac{1}{24} \left( -e^z (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^4 + (-z^2 + z - 2)z + 6 \right)$$

07.33.03.0382.01

$$U\left(1, -\frac{5}{2}, z\right) = \frac{2}{105} \left( 8 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) z^{7/2} - 8z^3 + 4z^2 - 6z + 15 \right)$$

07.33.03.0383.01

$$U\left(1, -\frac{5}{2}, -z\right) = \frac{2}{105} e^{-z} \left( 8\sqrt{\pi} (-z)^{7/2} + e^z (8z^3 + 4z^2 + 6z + 15) - 8\sqrt{\pi} z^{7/2} \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0384.01

$$U(1, -2, z) = \frac{1}{6} \left( e^z (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^3 + (z - 1)z + 2 \right)$$

07.33.03.0385.01

$$U\left(1, -\frac{3}{2}, z\right) = \frac{1}{15} \left( -8 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) z^{5/2} + 8z^2 - 4z + 6 \right)$$

07.33.03.0386.01

$$U\left(1, -\frac{3}{2}, -z\right) = \frac{1}{15} e^{-z} \left(-8 \sqrt{\pi} (-z)^{5/2} + e^z (8z^2 + 4z + 6) - 8 \sqrt{\pi} z^{5/2} \operatorname{erfi}(\sqrt{z})\right)$$

07.33.03.0387.01

$$U(1, -1, z) = \frac{1}{4} \left(-2 e^z \operatorname{Ei}(-z) z^2 - e^z \log\left(-\frac{1}{z}\right) z^2 + e^z \log(-z) z^2 - 2 e^z \log(z) z^2 - 2z + 2\right)$$

07.33.03.0388.01

$$U(1, -1, z) = \frac{1}{4} \left(-2 e^z (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^2 - 2z + 2\right)$$

07.33.03.0389.01

$$U(1, -1, z) = \frac{1}{2} \left(e^z \Gamma(0, z) z^2 - z + 1\right)$$

07.33.03.0390.01

$$U\left(1, -\frac{1}{2}, z\right) = \frac{2}{3} \left(2 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) z^{3/2} - 2z + 1\right)$$

07.33.03.0391.01

$$U\left(1, -\frac{1}{2}, -z\right) = \frac{2}{3} e^{-z} \left(2 \sqrt{\pi} (-z)^{3/2} + e^z (2z + 1) - 2 \sqrt{\pi} z^{3/2} \operatorname{erfi}(\sqrt{z})\right)$$

07.33.03.0392.01

$$U(1, 0, z) = e^z z \operatorname{Ei}(-z) + \frac{1}{2} e^z z \log\left(-\frac{1}{z}\right) - \frac{1}{2} e^z z \log(-z) + e^z z \log(z) + 1$$

07.33.03.0393.01

$$U(1, 0, z) = e^z z (\operatorname{Chi}(z) - \operatorname{Shi}(z)) + 1$$

07.33.03.0394.01

$$U(1, 0, z) = 1 - e^z z \Gamma(0, z)$$

07.33.03.0395.01

$$U\left(1, \frac{1}{2}, z\right) = 2 - 2 e^z \sqrt{\pi} \sqrt{z} \operatorname{erfc}(\sqrt{z})$$

07.33.03.0396.01

$$U\left(1, \frac{1}{2}, -z\right) = 2 e^{-z} \left(-\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + e^z - \sqrt{\pi} \sqrt{-z}\right)$$

07.33.03.0026.01

$$U(1, 1, z) = e^z \left(-\operatorname{Ei}(-z) + \frac{1}{2} \left(\log(-z) - \log\left(-\frac{1}{z}\right)\right) - \log(z)\right)$$

07.33.03.0397.01

$$U(1, 1, z) = e^z (\operatorname{Shi}(z) - \operatorname{Chi}(z))$$

07.33.03.0398.01

$$U(1, 1, z) = e^z \Gamma(0, z)$$

07.33.03.0399.01

$$U\left(1, \frac{3}{2}, z\right) = \frac{e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z})}{\sqrt{z}}$$

07.33.03.0400.01

$$U\left(1, \frac{3}{2}, -z\right) = -\frac{e^{-z} \sqrt{\pi} \left(\sqrt{z} \operatorname{erfi}(\sqrt{z}) + \sqrt{-z}\right)}{z}$$

07.33.03.0401.01

$$U(1, 2, z) = \frac{1}{z}$$

07.33.03.0402.01

$$U\left(1, \frac{5}{2}, z\right) = \frac{e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z})}{2 z^{3/2}} + \frac{1}{z}$$

07.33.03.0403.01

$$U\left(1, \frac{5}{2}, -z\right) = \frac{e^{-z} \left(-2 e^z z + \sqrt{\pi} \operatorname{erfi}(\sqrt{z}) \sqrt{z} + \sqrt{\pi} \sqrt{-z}\right)}{2 z^2}$$

07.33.03.0404.01

$$U(1, 3, z) = \frac{z+1}{z^2}$$

07.33.03.0405.01

$$U\left(1, \frac{7}{2}, z\right) = \frac{3 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z})}{4 z^{5/2}} + \frac{1}{z} + \frac{3}{2 z^2}$$

07.33.03.0406.01

$$U\left(1, \frac{7}{2}, -z\right) = \frac{e^{-z} \left(2 e^z (3-2z)z - 3 \sqrt{\pi} \operatorname{erfi}(\sqrt{z}) \sqrt{z} - 3 \sqrt{\pi} \sqrt{-z}\right)}{4 z^3}$$

07.33.03.0407.01

$$U(1, 4, z) = \frac{z(z+2)+2}{z^3}$$

07.33.03.0408.01

$$U\left(1, \frac{9}{2}, z\right) = \frac{2z(2z+5)+15}{4 z^3} + \frac{15 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z})}{8 z^{7/2}}$$

07.33.03.0409.01

$$U\left(1, \frac{9}{2}, -z\right) = \frac{e^{-z} \left(-2 e^z z (2z(2z-5)+15) + 15 \sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 15 \sqrt{\pi} \sqrt{-z}\right)}{8 z^4}$$

07.33.03.0410.01

$$U(1, 5, z) = \frac{z(z(z+3)+6)+6}{z^4}$$

07.33.03.0411.01

$$U\left(1, \frac{11}{2}, z\right) = \frac{2 \sqrt{z} (2z(2z(2z+7)+35)+105) + 105 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z})}{16 z^{9/2}}$$

07.33.03.0412.01

$$U\left(1, \frac{11}{2}, -z\right) = \frac{e^{-z} \left(-2 e^z z (2z(2z(2z-7)+35) - 105) - 105 \sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) - 105 \sqrt{\pi} \sqrt{-z}\right)}{16 z^5}$$

07.33.03.0413.01

$$U(1, 6, z) = \frac{z(z(z(z+4)+12)+24)+24}{z^5}$$

**For fixed  $z$  and  $a = \frac{3}{2}$**

07.33.03.0414.01

$$U\left(\frac{3}{2}, -6, z\right) = \frac{1}{2027025 \sqrt{\pi}} \left(16 e^{z/2} z \left(z(1440 - z(z(4z(z(2z(2z+9) - 15) + 45) - 495) + 1080)) K_0\left(\frac{z}{2}\right) + (z(z(z(4z(z(2z(2z+7) - 27) + 75) - 855) + 2160) - 4320) + 5760) K_1\left(\frac{z}{2}\right)\right)\right)$$

07.33.03.0415.01

$$U\left(\frac{3}{2}, -6, -z\right) = -\frac{1}{2027025 \sqrt{\pi}} \left(16 e^{-z/2} z \left(z(z(z(4z(z(2z(2z-9) - 15) - 45) - 495) - 1080) - 1440) K_0\left(\frac{z}{2}\right) + (z(z(z(4z(z(2z(2z-7) - 27) - 75) - 855) - 2160) - 4320) - 5760) K_1\left(\frac{z}{2}\right) - (z(z(z(4z(z(2z(2z-9) - 15) - 45) - 495) - 1080) - 1440) I_0\left(\frac{z}{2}\right) + (z(z(z(4z(z(2(7-2z)z+27) + 75) + 855) + 2160) + 4320) + 5760) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z))\right)\right)$$

07.33.03.0416.01

$$U\left(\frac{3}{2}, -\frac{11}{2}, z\right) = \frac{1}{322560} \left(e^z \sqrt{\pi} (2z(2z(2z(2z(2z(2z+7) - 21) + 105) - 525) + 2205) - 6615) + 10395) \operatorname{erfc}(\sqrt{z}) - 2 \sqrt{z} (4z(z(4z(z(4z(z+3) - 25) + 66) - 693) + 1575) - 10395)\right)$$

07.33.03.0417.01

$$U\left(\frac{3}{2}, -\frac{11}{2}, -z\right) = \frac{1}{322560 \sqrt{z}} \left(e^{-z} \left(-2 e^z \sqrt{-z^2} (4z(z(4z(z(4(z-3)z-25) - 66) - 693) - 1575) - 10395) + \sqrt{\pi} \sqrt{z} (2z(2z(2z(2z(2z(2(7-2z)z+21) + 105) + 525) + 2205) + 6615) + 10395) + \sqrt{\pi} \sqrt{-z} (2z(2z(2z(2z(2z(2z(2z-7) - 21) - 105) - 525) - 2205) - 6615) - 10395) \operatorname{erfi}(\sqrt{z})\right)\right)$$

07.33.03.0418.01

$$U\left(\frac{3}{2}, -5, z\right) = \frac{1}{135135 \sqrt{\pi}} \left(16 e^{z/2} z \left(4z(z(z(z(2z(z+4) - 5) + 12) - 24) + 30) K_0\left(\frac{z}{2}\right) + (480 - z(z(4z(2z(z(z+3) - 5) + 23) - 207) + 384)) K_1\left(\frac{z}{2}\right)\right)\right)$$

07.33.03.0419.01

$$U\left(\frac{3}{2}, -5, -z\right) = -\frac{1}{135\,135\sqrt{\pi}} \left( 16 e^{-z/2} z \right. \\ \left. \left( 4 z (z (z (z (2 (z-4) z - 5) - 12) - 24) - 30) K_0\left(\frac{z}{2}\right) + (z (z (4 z (2 z ((z-3) z - 5) - 23) - 207) - 384) - 480) K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. \left( 4 z (z (z (z (2 (z-4) z - 5) - 12) - 24) - 30) I_0\left(\frac{z}{2}\right) + (z (z (4 z (23 - 2 z ((z-3) z - 5)) + 207) + 384) + 480) I_1\left(\frac{z}{2}\right) \right) \right) \right) \\ \left. (\log(-z) - \log(z)) \right)$$

07.33.03.0420.01

$$U\left(\frac{3}{2}, -\frac{9}{2}, z\right) = \frac{1}{23\,040} \left( 2\sqrt{z} (2 z (4 z (2 z (z (2 z + 5) - 9) + 39) - 315) + 945) - \right. \\ \left. e^z \sqrt{\pi} (4 z (z (4 z (z (4 z (z + 3) - 15) + 30) - 225) + 315) - 945) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0421.01

$$U\left(\frac{3}{2}, -\frac{9}{2}, -z\right) = \frac{1}{23\,040\sqrt{z}} \left( e^{-z} \left( -2 e^z \sqrt{-z^2} (2 z (4 z (2 z (z (2 z - 5) - 9) - 39) - 315) - 945) + \right. \right. \\ \left. \left. \sqrt{\pi} \sqrt{z} (4 z (z (4 z (z (15 - 4 (z-3) z) + 30) + 225) + 315) + 945) + \right. \right. \\ \left. \left. \sqrt{\pi} \sqrt{-z} (4 z (z (4 z (z (4 (z-3) z - 15) - 30) - 225) - 315) - 945) \operatorname{erfi}(\sqrt{-z}) \right) \right)$$

07.33.03.0422.01

$$U\left(\frac{3}{2}, -4, z\right) = \\ \frac{1}{10\,395\sqrt{\pi}} \left( 8 e^{z/2} z \left( z (24 - z (4 z (z (2 z + 7) - 3) + 21)) K_0\left(\frac{z}{2}\right) + (z (z (4 (z-1) z (2 z + 7) + 51) - 84) + 96) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0423.01

$$U\left(\frac{3}{2}, -4, -z\right) = \\ -\frac{1}{10\,395\sqrt{\pi}} \left( 8 e^{-z/2} z \left( z (z (4 z (z (2 z - 7) - 3) - 21) - 24) K_0\left(\frac{z}{2}\right) + (z (z (4 z (z + 1) (2 z - 7) - 51) - 84) - 96) K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. \left( z (z (4 z (z (2 z - 7) - 3) - 21) - 24) I_0\left(\frac{z}{2}\right) + (z (z (4 z ((5 - 2 z) z + 7) + 51) + 84) + 96) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0424.01

$$U\left(\frac{3}{2}, -\frac{7}{2}, z\right) = \\ \frac{1}{1920} \left( e^z \sqrt{\pi} (2 z (4 z (2 z (z (2 z + 5) - 5) + 15) - 75) + 105) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (16 z ((z-1) z (z + 3) + 5) - 105) \right)$$

07.33.03.0425.01

$$U\left(\frac{3}{2}, -\frac{7}{2}, -z\right) = \\ \frac{1}{1920\sqrt{z}} \left( e^{-z} \left( -2 e^z \sqrt{-z^2} (16 z ((z-3) z (z + 1) - 5) - 105) + \sqrt{\pi} \sqrt{z} (2 z (4 z (2 z ((5 - 2 z) z + 5) + 15) + 75) + 105) + \right. \right. \\ \left. \left. \sqrt{\pi} \sqrt{-z} (2 z (4 z (2 z (z (2 z - 5) - 5) - 15) - 75) - 105) \operatorname{erfi}(\sqrt{-z}) \right) \right)$$



07.33.03.0426.01

$$U\left(\frac{3}{2}, -3, z\right) = \frac{8 e^{z/2} z \left( z (4 z (z + 3) - 3) + 3 \right) K_0\left(\frac{z}{2}\right) + (12 - z (z (4 z (z + 2) - 9) + 12)) K_1\left(\frac{z}{2}\right)}{945 \sqrt{\pi}}$$

07.33.03.0427.01

$$U\left(\frac{3}{2}, -3, -z\right) = -\frac{1}{945 \sqrt{\pi}} \left( 8 e^{-z/2} z \left( z (4 (z - 3) z - 3) - 3 \right) K_0\left(\frac{z}{2}\right) + (z (z (4 (z - 2) z - 9) - 12) - 12) K_1\left(\frac{z}{2}\right) - \left( z (z (4 (z - 3) z - 3) - 3) I_0\left(\frac{z}{2}\right) + (z (z (9 - 4 (z - 2) z) + 12) + 12) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0428.01

$$U\left(\frac{3}{2}, -\frac{5}{2}, z\right) = \frac{1}{192} \left( 2 \sqrt{z} (2 z + 5) (4 (z - 1) z + 3) - e^z \sqrt{\pi} (8 z (z (2 z (z + 2) - 3) + 3) - 15) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0429.01

$$U\left(\frac{3}{2}, -\frac{5}{2}, -z\right) = \frac{1}{192 z} \left( e^{-z} \left( z (\sqrt{\pi} (8 z (z (3 - 2 (z - 2) z) + 3) + 15) - 2 e^z \sqrt{-z} (2 z - 5) (4 z (z + 1) + 3)) + \sqrt{\pi} \sqrt{-z^2} (8 z (z (2 (z - 2) z - 3) - 3) - 15) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0430.01

$$U\left(\frac{3}{2}, -2, z\right) = \frac{4 e^{z/2} z \left( z (1 - 2 z (2 z + 5)) K_0\left(\frac{z}{2}\right) + (z (4 z^2 + 6 z - 5) + 4) K_1\left(\frac{z}{2}\right) \right)}{105 \sqrt{\pi}}$$

07.33.03.0431.01

$$U\left(\frac{3}{2}, -2, -z\right) = -\frac{1}{105 \sqrt{\pi}} \left( 4 e^{-z/2} z \left( z (2 z (2 z - 5) - 1) K_0\left(\frac{z}{2}\right) + (z (4 z^2 - 6 z - 5) - 4) K_1\left(\frac{z}{2}\right) - \left( z (2 z (2 z - 5) - 1) I_0\left(\frac{z}{2}\right) + (z (-4 z^2 + 6 z + 5) + 4) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0432.01

$$U\left(\frac{3}{2}, -\frac{3}{2}, z\right) = \frac{1}{24} \left( e^z \sqrt{\pi} (2 z (4 z^2 + 6 z - 3) + 3) \operatorname{erfc}(\sqrt{z}) - 2 \sqrt{z} (4 z (z + 1) - 3) \right)$$

07.33.03.0433.01

$$U\left(\frac{3}{2}, -\frac{3}{2}, -z\right) = \frac{1}{24 z} \left( e^{-z} \left( z (\sqrt{\pi} (2 z (-4 z^2 + 6 z + 3) + 3) - 2 e^z \sqrt{-z} (4 (z - 1) z - 3)) + \sqrt{\pi} \sqrt{-z^2} (2 z (4 z^2 - 6 z - 3) - 3) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0434.01

$$U\left(\frac{3}{2}, -1, z\right) = \frac{4 e^{z/2} z \left( 2 z (z + 2) K_0\left(\frac{z}{2}\right) + (1 - 2 z (z + 1)) K_1\left(\frac{z}{2}\right) \right)}{15 \sqrt{\pi}}$$

07.33.03.0435.01

$$U\left(\frac{3}{2}, -1, -z\right) = -\frac{1}{15 \sqrt{\pi}} \left( 4 e^{-z/2} z \left( 2 (z - 2) z K_0\left(\frac{z}{2}\right) + (2 (z - 1) z - 1) K_1\left(\frac{z}{2}\right) - \left( 2 (z - 2) z I_0\left(\frac{z}{2}\right) + (1 - 2 (z - 1) z) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0436.01

$$U\left(\frac{3}{2}, -\frac{1}{2}, z\right) = \frac{1}{4} \left( 2\sqrt{z} (2z+1) - e^z \sqrt{\pi} (4z(z+1) - 1) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0437.01

$$U\left(\frac{3}{2}, -\frac{1}{2}, -z\right) = (-z)^{3/2} \left( -2z + 3 - \frac{e^{-z} (4(z-1)z - 1) (-2e^z z + \sqrt{\pi} \operatorname{erfi}(\sqrt{z})) \sqrt{z} + \sqrt{\pi} \sqrt{-z}}{4z^2} \right)$$

07.33.03.0438.01

$$U\left(\frac{3}{2}, 0, z\right) = \frac{2e^{z/2} z (2z+1) K_1\left(\frac{z}{2}\right) - (2z+3) K_0\left(\frac{z}{2}\right)}{3\sqrt{\pi}}$$

07.33.03.0439.01

$$U\left(\frac{3}{2}, 0, -z\right) = \frac{1}{3\sqrt{\pi}} \left( 2e^{-z/2} z \left( (3-2z) K_0\left(\frac{z}{2}\right) + (1-2z) K_1\left(\frac{z}{2}\right) + (2z-3) I_0\left(\frac{z}{2}\right) + (1-2z) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0440.01

$$U\left(\frac{3}{2}, \frac{1}{2}, z\right) = e^z \sqrt{\pi} (2z+1) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z}$$

07.33.03.0441.01

$$U\left(\frac{3}{2}, \frac{1}{2}, -z\right) = \sqrt{-z} \left( \frac{e^{-z} \sqrt{\pi} (2z-1) (\sqrt{-z} \operatorname{erfi}(\sqrt{z}) - \sqrt{z})}{\sqrt{-z^2}} - 2 \right)$$

07.33.03.0442.01

$$U\left(\frac{3}{2}, 1, z\right) = \frac{2e^{z/2} ((z+1) K_0\left(\frac{z}{2}\right) - z K_1\left(\frac{z}{2}\right))}{\sqrt{\pi}}$$

07.33.03.0443.01

$$U\left(\frac{3}{2}, 1, -z\right) = -\frac{2e^{-z/2} ((z-1) K_0\left(\frac{z}{2}\right) + z K_1\left(\frac{z}{2}\right) + (z I_1\left(\frac{z}{2}\right) - (z-1) I_0\left(\frac{z}{2}\right)) (\log(-z) - \log(z)))}{\sqrt{\pi}}$$

07.33.03.0444.01

$$U\left(\frac{3}{2}, \frac{3}{2}, z\right) = \frac{2}{\sqrt{z}} - 2e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z})$$

07.33.03.0445.01

$$U\left(\frac{3}{2}, \frac{3}{2}, -z\right) = e^{-z} \left( 2\sqrt{\pi} \left( \frac{\sqrt{-z} \operatorname{erfi}(\sqrt{z})}{\sqrt{z}} - 1 \right) + \frac{2e^z}{\sqrt{-z}} \right)$$

07.33.03.0446.01

$$U\left(\frac{3}{2}, 2, z\right) = \frac{e^{z/2} (K_1\left(\frac{z}{2}\right) - K_0\left(\frac{z}{2}\right))}{\sqrt{\pi}}$$

07.33.03.0447.01

$$U\left(\frac{3}{2}, 2, -z\right) = \frac{e^{-z/2} (-K_0\left(\frac{z}{2}\right) - K_1\left(\frac{z}{2}\right) + (I_0\left(\frac{z}{2}\right) - I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)))}{\sqrt{\pi}}$$

07.33.03.0448.01

$$U\left(\frac{3}{2}, \frac{5}{2}, z\right) = \frac{1}{z^{3/2}}$$

07.33.03.0449.01

$$U\left(\frac{3}{2}, 3, z\right) = \frac{e^{z/2} K_1\left(\frac{z}{2}\right)}{\sqrt{\pi} z}$$

07.33.03.0450.01

$$U\left(\frac{3}{2}, 3, -z\right) = \frac{e^{-z/2} \left(K_1\left(\frac{z}{2}\right) + I_1\left(\frac{z}{2}\right) (\log(-z) - \log(z))\right)}{\sqrt{\pi} z}$$

07.33.03.0451.01

$$U\left(\frac{3}{2}, \frac{7}{2}, z\right) = \frac{2z + 3}{2z^{5/2}}$$

07.33.03.0452.01

$$U\left(\frac{3}{2}, 4, z\right) = \frac{e^{z/2} \left(z K_0\left(\frac{z}{2}\right) + (z + 4) K_1\left(\frac{z}{2}\right)\right)}{2\sqrt{\pi} z^2}$$

07.33.03.0453.01

$$U\left(\frac{3}{2}, 4, -z\right) = \frac{e^{-z/2} \left(-z K_0\left(\frac{z}{2}\right) + (z - 4) K_1\left(\frac{z}{2}\right) + (z I_0\left(\frac{z}{2}\right) + (z - 4) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z))\right)}{2\sqrt{\pi} z^2}$$

07.33.03.0454.01

$$U\left(\frac{3}{2}, \frac{9}{2}, z\right) = \frac{4z(z + 3) + 15}{4z^{7/2}}$$

07.33.03.0455.01

$$U\left(\frac{3}{2}, 5, z\right) = \frac{e^{z/2} \left(z(z + 3) K_0\left(\frac{z}{2}\right) + (z(z + 4) + 12) K_1\left(\frac{z}{2}\right)\right)}{2\sqrt{\pi} z^3}$$

07.33.03.0456.01

$$U\left(\frac{3}{2}, 5, -z\right) = \frac{1}{2\sqrt{\pi} z^3} \left( e^{-z/2} \left( -(z - 3) z K_0\left(\frac{z}{2}\right) + ((z - 4) z + 12) K_1\left(\frac{z}{2}\right) + (z - 3) z I_0\left(\frac{z}{2}\right) + ((z - 4) z + 12) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0457.01

$$U\left(\frac{3}{2}, \frac{11}{2}, z\right) = \frac{2z(2z(2z + 9) + 45) + 105}{8z^{9/2}}$$

07.33.03.0458.01

$$U\left(\frac{3}{2}, 6, z\right) = \frac{e^{z/2} \left(z(z(2z + 9) + 24) K_0\left(\frac{z}{2}\right) + (z + 4)(z(2z + 3) + 24) K_1\left(\frac{z}{2}\right)\right)}{4\sqrt{\pi} z^4}$$

07.33.03.0459.01

$$U\left(\frac{3}{2}, 6, -z\right) = \frac{1}{4\sqrt{\pi} z^4} \left( e^{-z/2} \left( z((9 - 2z)z - 24) K_0\left(\frac{z}{2}\right) + (z - 4)(z(2z - 3) + 24) K_1\left(\frac{z}{2}\right) + (z(z(2z - 9) + 24) I_0\left(\frac{z}{2}\right) + (z - 4)(z(2z - 3) + 24) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right) \right)$$

**For fixed  $z$  and  $a = 2$**

07.33.03.0460.01

$$U(2, -6, z) = \frac{e^z (z + 8) (\text{Chi}(z) - \text{Shi}(z)) z^7 + (z (z (z (z (z + 7) - 6) + 10) - 24) + 72) - 240) z + 720}{40320}$$

07.33.03.0461.01

$$U\left(2, -\frac{11}{2}, z\right) = \frac{1}{2027025} \left( 4 \left( -32 e^z \sqrt{\pi} (2z + 15) \operatorname{erfc}(\sqrt{z}) z^{13/2} + 4 (z (4z (z (4z (z (z + 7) - 3) + 15) - 30) + 315) - 945) z + 10395 \right) \right)$$

07.33.03.0462.01

$$U\left(2, -\frac{11}{2}, -z\right) = \frac{1}{2027025} \left( 4 e^{-z} \left( 32 \sqrt{\pi} (2z - 15) (-z)^{13/2} + e^z (4z (z (4z (z (15 - 4z ((z - 7)z - 3)) + 30) + 315) + 945) + 10395) + 32 \sqrt{\pi} z^{13/2} (2z - 15) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0463.01

$$U(2, -5, z) = \frac{-e^z (z + 7) (\text{Chi}(z) - \text{Shi}(z)) z^6 - (z (z (z (z (z + 6) - 5) + 8) - 18) + 48) z + 120}{5040}$$

07.33.03.0464.01

$$U\left(2, -\frac{9}{2}, z\right) = \frac{4 \left( 16 e^z \sqrt{\pi} (2z + 13) \operatorname{erfc}(\sqrt{z}) z^{11/2} - 4 (z (4z (z (2z (z + 6) - 5) + 6) - 45) + 105) z + 945 \right)}{135135}$$

07.33.03.0465.01

$$U\left(2, -\frac{9}{2}, -z\right) = \frac{1}{135135} \left( 4 e^{-z} \left( 16 \sqrt{\pi} (2z - 13) \operatorname{erfi}(\sqrt{z}) z^{11/2} + 16 \sqrt{\pi} (-z)^{9/2} (2z - 13) z + e^z (4z (z (4z (z (5 - 2(z - 6)z) + 6) + 45) + 105) + 945) \right) \right)$$

07.33.03.0466.01

$$U(2, -4, z) = \frac{1}{720} \left( e^z (z + 6) (\text{Chi}(z) - \text{Shi}(z)) z^5 + (z (z (z (z + 5) - 4) + 6) - 12) z + 24 \right)$$

07.33.03.0467.01

$$U\left(2, -\frac{7}{2}, z\right) = \frac{4 \left( -8 e^z \sqrt{\pi} (2z + 11) \operatorname{erfc}(\sqrt{z}) z^{9/2} + 4 (z (4z (z (z + 5) - 2) + 9) - 15) z + 105 \right)}{10395}$$

07.33.03.0468.01

$$U\left(2, -\frac{7}{2}, -z\right) = \frac{1}{10395} \left( 4 e^{-z} \left( 8 \sqrt{\pi} (2z - 11) (-z)^{9/2} + e^z (4z (z (9 - 4z ((z - 5)z - 2)) + 15) + 105) + 8 \sqrt{\pi} z^{9/2} (2z - 11) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0469.01

$$U(2, -3, z) = \frac{1}{240} \left( -2 e^z (z + 5) (\text{Chi}(z) - \text{Shi}(z)) z^4 - 2 (z - 1) (z (z (z + 5) + 2) + 6) \right)$$

07.33.03.0470.01

$$U\left(2, -\frac{5}{2}, z\right) = \frac{4}{945} \left(4 e^z \sqrt{\pi} (2z+9) \operatorname{erfc}(\sqrt{z}) z^{7/2} - 4(z(2z(z+4)-3)+3)z+15\right)$$

07.33.03.0471.01

$$U\left(2, -\frac{5}{2}, -z\right) = \frac{4}{945} e^{-z} \left(-4 \sqrt{\pi} (2z-9) (-z)^{7/2} + e^z (4z(z(3-2(z-4)z)+3)+15) + 4 \sqrt{\pi} z^{7/2} (2z-9) \operatorname{erfi}(\sqrt{z})\right)$$

07.33.03.0472.01

$$U(2, -2, z) = \frac{1}{24} \left(e^z (z+4) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^3 + (z(z+3)-2)z+2\right)$$

07.33.03.0473.01

$$U\left(2, -\frac{3}{2}, z\right) = \frac{4}{105} \left(-2 e^z \sqrt{\pi} (2z+7) \operatorname{erfc}(\sqrt{z}) z^{5/2} + 4(z(z+3)-1)z+3\right)$$

07.33.03.0474.01

$$U\left(2, -\frac{3}{2}, -z\right) = \frac{4}{105} e^{-z} \left(2 \sqrt{\pi} (2z-7) (-z)^{5/2} + e^z (3-4z((z-3)z-1)) + 2 \sqrt{\pi} z^{5/2} (2z-7) \operatorname{erfi}(\sqrt{z})\right)$$

07.33.03.0475.01

$$U(2, -1, z) = \frac{1}{6} \left(-e^z (z+3) \operatorname{Ei}(-z) z^2 - \frac{1}{2} e^z (z+3) \log\left(-\frac{1}{z}\right) z^2 + \frac{1}{2} e^z (z+3) \log(-z) z^2 - e^z (z+3) \log(z) z^2 - z^2 - 2z+1\right)$$

07.33.03.0476.01

$$U(2, -1, z) = \frac{1}{6} \left(-e^z (z+3) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^2 - (z+2)z+1\right)$$

07.33.03.0477.01

$$U(2, -1, z) = \frac{1}{6} \left(e^z (z+3) \Gamma(0, z) z^2 - (z+2)z+1\right)$$

07.33.03.0478.01

$$U\left(2, -\frac{1}{2}, z\right) = \frac{4}{15} \left(e^z \sqrt{\pi} (2z+5) \operatorname{erfc}(\sqrt{z}) z^{3/2} - 2(z+2)z+1\right)$$

07.33.03.0479.01

$$U\left(2, -\frac{1}{2}, -z\right) = \frac{4}{15} e^{-z} \left(\sqrt{\pi} (2z-5) \operatorname{erfi}(\sqrt{z}) z^{3/2} + \sqrt{\pi} \sqrt{-z} (2z-5)z + e^z (1-2(z-2)z)\right)$$

07.33.03.0480.01

$$U(2, 0, z) = \frac{1}{4} \left(-e^z \log(-z) z^2 + 2 e^z \log(z) z^2 + 2 e^z (z+2) \operatorname{Ei}(-z) z + e^z (z+2) \log\left(-\frac{1}{z}\right) z - 2 e^z \log(-z) z + 4 e^z \log(z) z + 2z+2\right)$$

07.33.03.0481.01

$$U(2, 0, z) = \frac{1}{2} \left(e^z (z+2) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z + z+1\right)$$

07.33.03.0482.01

$$U(2, 0, z) = \frac{1}{2} \left(-e^z (z+2) \Gamma(0, z) z + z+1\right)$$

07.33.03.0483.01

$$U\left(2, \frac{1}{2}, z\right) = -\frac{2}{3} \left(e^z \sqrt{\pi} \sqrt{z} (2z+3) \operatorname{erfc}(\sqrt{z}) - 2(z+1)\right)$$

07.33.03.0484.01

$$U\left(2, \frac{1}{2}, -z\right) = \frac{1}{3} e^{-z} \left( -4 e^z (z-1) + 2 \sqrt{\pi} \sqrt{-z} (2z-3) + 2 \sqrt{\pi} \sqrt{z} (2z-3) \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0485.01

$$U(2, 1, z) = -\frac{1}{2} e^z (z+1) \left( 2 \operatorname{Ei}(-z) + \log\left(-\frac{1}{z}\right) - \log(-z) + 2 \log(z) \right) - 1$$

07.33.03.0486.01

$$U(2, 1, z) = -e^z (z+1) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) - 1$$

07.33.03.0487.01

$$U(2, 1, z) = e^z (z+1) \Gamma(0, z) - 1$$

07.33.03.0488.01

$$U\left(2, \frac{3}{2}, z\right) = \frac{e^z \sqrt{\pi} (2z+1) \operatorname{erfc}(\sqrt{z})}{\sqrt{z}} - 2$$

07.33.03.0489.01

$$U\left(2, \frac{3}{2}, -z\right) = \frac{e^{-z} \left( -2 e^z z + \sqrt{\pi} (2z-1) \operatorname{erfi}(\sqrt{z}) \sqrt{z} + \sqrt{\pi} \sqrt{-z} (2z-1) \right)}{z}$$

07.33.03.0490.01

$$U(2, 2, z) = \frac{1}{2} e^z \left( 2 \operatorname{Ei}(-z) + \log\left(-\frac{1}{z}\right) - \log(-z) + 2 \log(z) \right) + \frac{1}{z}$$

07.33.03.0491.01

$$U(2, 2, z) = e^z (\operatorname{Chi}(z) - \operatorname{Shi}(z)) + \frac{1}{z}$$

07.33.03.0492.01

$$U(2, 2, z) = e^z \Gamma(-1, z)$$

07.33.03.0493.01

$$U\left(2, \frac{5}{2}, z\right) = \frac{1}{z} - \frac{e^z \sqrt{\pi} (2z-1) \operatorname{erfc}(\sqrt{z})}{2 z^{3/2}}$$

07.33.03.0494.01

$$U\left(2, \frac{5}{2}, -z\right) = \frac{e^{-z} \left( -2 e^z z + \sqrt{\pi} (2z+1) \operatorname{erfi}(\sqrt{z}) \sqrt{z} + \sqrt{\pi} \sqrt{-z} (2z+1) \right)}{2 z^2}$$

07.33.03.0495.01

$$U(2, 3, z) = \frac{1}{z^2}$$

07.33.03.0496.01

$$U\left(2, \frac{7}{2}, z\right) = \frac{3}{2 z^2} - \frac{e^z \sqrt{\pi} (2z-3) \operatorname{erfc}(\sqrt{z})}{4 z^{5/2}}$$

07.33.03.0497.01

$$U\left(2, \frac{7}{2}, -z\right) = \frac{e^{-z} \left( 6 e^z z - \sqrt{\pi} (2z+3) \operatorname{erfi}(\sqrt{z}) \sqrt{z} - \sqrt{\pi} \sqrt{-z} (2z+3) \right)}{4 z^3}$$

07.33.03.0498.01

$$U(2, 4, z) = \frac{z+2}{z^3}$$

07.33.03.0499.01

$$U\left(2, \frac{9}{2}, z\right) = \frac{4z+15}{4z^3} - \frac{3e^z \sqrt{\pi} (2z-5) \operatorname{erfc}(\sqrt{z})}{8z^{7/2}}$$

07.33.03.0500.01

$$U\left(2, \frac{9}{2}, -z\right) = \frac{e^{-z} \left(3\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) (2z+5) + 3\sqrt{\pi} \sqrt{-z} (2z+5) + 2e^z z (4z-15)\right)}{8z^4}$$

07.33.03.0501.01

$$U(2, 5, z) = \frac{z(z+4)+6}{z^4}$$

07.33.03.0502.01

$$U\left(2, \frac{11}{2}, z\right) = \frac{2\sqrt{z} (8z(z+5)+105) - 15e^z \sqrt{\pi} (2z-7) \operatorname{erfc}(\sqrt{z})}{16z^{9/2}}$$

07.33.03.0503.01

$$U\left(2, \frac{11}{2}, -z\right) = \frac{e^{-z} \left(-15\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) (2z+7) - 15\sqrt{\pi} \sqrt{-z} (2z+7) + 2e^z z (8(z-5)z+105)\right)}{16z^5}$$

07.33.03.0504.01

$$U(2, 6, z) = \frac{z(z(z+6)+18)+24}{z^5}$$

**For fixed  $z$  and  $a = \frac{5}{2}$**

07.33.03.0505.01

$$U\left(\frac{5}{2}, -6, z\right) = \frac{1}{103378275 \sqrt{\pi}} \left( 32e^{z/2} z \left( z(z(z(2z(2z(4z(z+2)(2z+21)-231)+975)-4455)+9360)-15840)+17280) K_1\left(\frac{z}{2}\right) - z(z(z(2z(2z(4z(z(2z+27)+66)-105)+495)-2205)+3960)-4320) K_0\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0506.01

$$U\left(\frac{5}{2}, -6, -z\right) = \frac{1}{103378275 \sqrt{\pi}} \left( 32e^{-z/2} z \left( z(z(z(2z(2z(4z(z(2z-27)+66)+105)+495)+2205)+3960)+4320) K_0\left(\frac{z}{2}\right) + (z(z(z(2z(2z(4(z-2)z(2z-21)+231)+975)+4455)+9360)+15840)+17280) K_1\left(\frac{z}{2}\right) + \left( z(z(z(2z(2z(4(z-2)z(2z-21)+231)+975)+4455)+9360)+15840)+17280) I_1\left(\frac{z}{2}\right) - z(z(z(2z(2z(4z(z(2z-27)+66)+105)+495)+2205)+3960)+4320) I_0\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0507.01

$$U\left(\frac{5}{2}, -\frac{11}{2}, z\right) = \frac{1}{7741440} \left( e^z \sqrt{\pi} (16z(z(2z(z(8z(z(z+12)+21)-21)+315)-630)+2205)-2835)+31185) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (2z(2z(2z(2z(4z^2+46z+63)-195)+795)-3339)+12285)-31185) \right)$$

07.33.03.0508.01

$$U\left(\frac{5}{2}, -\frac{11}{2}, -z\right) = \frac{1}{7741440z} \left( e^{-z} \left( z(2e^z \sqrt{-z} (2z(2z(2z(2z(4z^2-46z+63)+195)+795)+3339)+12285)+31185) + \sqrt{\pi} (16z(z(2z(z(8z(z((z-12)z+21)+21)+315)+630)+2205)+2835)+31185) - \sqrt{\pi} \sqrt{-z^2} (16z(z(2z(z(8z(z((z-12)z+21)+21)+315)+630)+2205)+2835)+31185) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0509.01

$$U\left(\frac{5}{2}, -5, z\right) = \frac{1}{6081075\sqrt{\pi}} \left( 32e^{z/2} z \left( z(z(z(4z(z(4z(z+12)+105)-30)+225)-360)+360) K_0\left(\frac{z}{2}\right) - (z(z(z(4z(z(4z(z+11)+63)-75)+525)-945)+1440)-1440) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0510.01

$$U\left(\frac{5}{2}, -5, -z\right) = \frac{1}{6081075\sqrt{\pi}} \left( 32e^{-z/2} z \left( z(z(z(4z(z(4(z-12)z+105)+30)+225)+360)+360) K_0\left(\frac{z}{2}\right) + (z(z(z(4z(z(4(z-11)z+63)+75)+525)+945)+1440)+1440) K_1\left(\frac{z}{2}\right) + \left( (z(z(z(4z(z(4(z-11)z+63)+75)+525)+945)+1440)+1440) I_1\left(\frac{z}{2}\right) - z(z(z(4z(z(4(z-12)z+105)+30)+225)+360)+360) I_0\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0511.01

$$U\left(\frac{5}{2}, -\frac{9}{2}, z\right) = \frac{1}{483840} \left( 2\sqrt{z} (4z(z(4z(z(4z(z+10)+45)-60)+399)-630)+2835) - e^z \sqrt{\pi} (2z(2z(2z(2z(2z(4z^2+42z+63)-105)+315)-945)+2205)-2835) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0512.01

$$U\left(\frac{5}{2}, -\frac{9}{2}, -z\right) = \frac{1}{483840z} \left( e^{-z} \left( z(2e^z \sqrt{-z} (4z(z(4z(z(4(z-10)z+45)+60)+399)+630)+2835) + \sqrt{\pi} (2z(2z(2z(2z(2z(4z^2-42z+63)+105)+315)+945)+2205)+2835) - \sqrt{\pi} \sqrt{-z^2} (2z(2z(2z(2z(2z(4z^2-42z+63)+105)+315)+945)+2205)+2835) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0513.01

$$U\left(\frac{5}{2}, -4, z\right) = \frac{1}{405405\sqrt{\pi}} \left( 16e^{z/2} z \left( (z(z(4z(z(4z^2+38z+45)-45)+249)-324)+288) K_1\left(\frac{z}{2}\right) - z(z(4z(z(4z^2+42z+81)-15)+81)-72) K_0\left(\frac{z}{2}\right) \right) \right)$$



07.33.03.0514.01

$$U\left(\frac{5}{2}, -4, -z\right) = \frac{1}{405405\sqrt{\pi}} \left( 16e^{-z/2} z \left( z \left( z \left( 4z^2 - 42z + 81 \right) + 15 \right) + 81 \right) + 72 \right) K_0\left(\frac{z}{2}\right) + \left( z \left( z \left( 4z \left( z \left( 4z^2 - 38z + 45 \right) + 45 \right) + 249 \right) + 324 \right) + 288 \right) K_1\left(\frac{z}{2}\right) + \left( \left( z \left( z \left( 4z \left( z \left( 4z^2 - 38z + 45 \right) + 45 \right) + 249 \right) + 324 \right) + 288 \right) I_1\left(\frac{z}{2}\right) - z \left( z \left( 4z \left( z \left( 4z^2 - 42z + 81 \right) + 15 \right) + 81 \right) + 72 \right) I_0\left(\frac{z}{2}\right) \left( \log(-z) - \log(z) \right) \right)$$

07.33.03.0515.01

$$U\left(\frac{5}{2}, -\frac{7}{2}, z\right) = \frac{1}{34560} \left( e^z \sqrt{\pi} \left( 4z \left( z \left( 4z \left( z \left( 4z(z+9) + 45 \right) - 30 \right) + 135 \right) - 135 \right) + 315 \right) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} \left( 2z \left( 4z \left( 2z \left( z+1 \right) \left( 2z+15 \right) - 33 \right) + 165 \right) - 315 \right) \right)$$

07.33.03.0516.01

$$U\left(\frac{5}{2}, -\frac{7}{2}, -z\right) = \frac{1}{34560\sqrt{-z}} \left( e^{-z} \left( -2e^z z \left( 2z \left( 4z \left( 2(z-1)z \left( 2z-15 \right) + 33 \right) + 165 \right) + 315 \right) + \sqrt{\pi} \sqrt{-z} \left( 4z \left( z \left( 4z \left( z \left( 4(z-9)z + 45 \right) + 30 \right) + 135 \right) + 135 \right) + 315 \right) + \sqrt{\pi} \sqrt{z} \left( 4z \left( z \left( 4z \left( z \left( 4(z-9)z + 45 \right) + 30 \right) + 135 \right) + 135 \right) + 315 \right) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0517.01

$$U\left(\frac{5}{2}, -3, z\right) = \frac{1}{31185\sqrt{\pi}} \left( 16e^{z/2} z \left( z \left( 4z \left( 2z \left( z \left( z+9 \right) + 15 \right) - 3 \right) + 9 \right) K_0\left(\frac{z}{2}\right) - 4 \left( z \left( z+2 \right) \left( z \left( 2z \left( z+6 \right) - 9 \right) + 6 \right) - 9 \right) K_1\left(\frac{z}{2}\right) \right)$$

07.33.03.0518.01

$$U\left(\frac{5}{2}, -3, -z\right) = \frac{1}{31185\sqrt{\pi}} \left( 16e^{-z/2} z \left( z \left( 4z \left( 2z \left( (z-9)z + 15 \right) + 3 \right) + 9 \right) K_0\left(\frac{z}{2}\right) + 4 \left( (z-2)z \left( z \left( 2(z-6)z - 9 \right) - 6 \right) + 9 \right) K_1\left(\frac{z}{2}\right) + \left( 4 \left( (z-2)z \left( z \left( 2(z-6)z - 9 \right) - 6 \right) + 9 \right) I_1\left(\frac{z}{2}\right) - z \left( 4z \left( 2z \left( (z-9)z + 15 \right) + 3 \right) + 9 \right) I_0\left(\frac{z}{2}\right) \left( \log(-z) - \log(z) \right) \right) \right)$$

07.33.03.0519.01

$$U\left(\frac{5}{2}, -\frac{5}{2}, z\right) = \frac{1}{2880} \left( 2\sqrt{z} \left( 2z+3 \right) \left( 8z^3 + 44z^2 - 30z + 15 \right) - e^z \sqrt{\pi} \left( 2z \left( 4z \left( 2z \left( z \left( 2z+15 \right) + 15 \right) - 15 \right) + 45 \right) - 45 \right) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0520.01

$$U\left(\frac{5}{2}, -\frac{5}{2}, -z\right) = \frac{4}{675} (-z)^{7/2} \left( z^4 - 10z^3 + 30z^2 - 45z + \frac{555}{16} + \frac{1}{256z^4} \left( e^{-z} \left( 2z \left( 4z \left( 2z \left( z \left( 2z-15 \right) + 15 \right) + 15 \right) + 45 \right) + 45 \right) \left( -2e^z z \left( 2z \left( 2z-5 \right) + 15 \right) + 15 \sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 15 \sqrt{\pi} \sqrt{-z} \right) \right)$$

07.33.03.0521.01

$$U\left(\frac{5}{2}, -2, z\right) = \frac{8e^{z/2} z \left( z \left( 4z \left( z \left( 2z+13 \right) + 9 \right) - 21 \right) + 12 \right) K_1\left(\frac{z}{2}\right) - z \left( 4z \left( z \left( 2z+15 \right) + 21 \right) - 3 \right) K_0\left(\frac{z}{2}\right)}{2835\sqrt{\pi}}$$

07.33.03.0522.01

$$U\left(\frac{5}{2}, -2, -z\right) = \frac{1}{2835\sqrt{\pi}} \left( 8e^{-z/2} z \left( z(4z(z(2z-15)+21)+3) K_0\left(\frac{z}{2}\right) + (z(4z(z(2z-13)+9)+21)+12) K_1\left(\frac{z}{2}\right) + \left( (z(4z(z(2z-13)+9)+21)+12) I_1\left(\frac{z}{2}\right) - z(4z(z(2z-15)+21)+3) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0523.01

$$U\left(\frac{5}{2}, -\frac{3}{2}, z\right) = \frac{1}{288} \left( e^z \sqrt{\pi} (8z(z(2z(z+6)+9)-3)+9) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (2z(4z^2+22z+9)-9) \right)$$

07.33.03.0524.01

$$U\left(\frac{5}{2}, -\frac{3}{2}, -z\right) = \frac{1}{108} (-z)^{5/2} \left( 8z^3 - 60z^2 + 114z - 75 - \frac{e^{-z} (8z(z(2(z-6)z+9)+3)+9) \left( 2e^z z(2z-3) + 3\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 3\sqrt{\pi} \sqrt{-z} \right) + 3\sqrt{\pi} \sqrt{-z}}{8z^3} \right)$$

07.33.03.0525.01

$$U\left(\frac{5}{2}, -1, z\right) = \frac{8e^{z/2} z \left( z(2z+3)(2z+9) K_0\left(\frac{z}{2}\right) - (z(4z(z+5)+9)-3) K_1\left(\frac{z}{2}\right) \right)}{315\sqrt{\pi}}$$

07.33.03.0526.01

$$U\left(\frac{5}{2}, -1, -z\right) = \frac{1}{315\sqrt{\pi}} \left( 8e^{-z/2} z \left( z(4(z-6)z+27) K_0\left(\frac{z}{2}\right) + (z(4(z-5)z+9)+3) K_1\left(\frac{z}{2}\right) + \left( z(-4(z-6)z-27) I_0\left(\frac{z}{2}\right) + (z(4(z-5)z+9)+3) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0527.01

$$U\left(\frac{5}{2}, -\frac{1}{2}, z\right) = \frac{1}{36} \left( 2\sqrt{z} (4z(z+4)+3) - e^z \sqrt{\pi} (2z(2z(2z+9)+9)-3) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0528.01

$$U\left(\frac{5}{2}, -\frac{1}{2}, -z\right) = \frac{4}{9} (-z)^{3/2} \left( z^2 - 5z + \frac{17}{4} + \frac{e^{-z} (2z(2z(2z-9)+9)+3) \left( -2e^z z + \sqrt{\pi} \operatorname{erfi}(\sqrt{z}) \sqrt{z} + \sqrt{\pi} \sqrt{-z} \right)}{16z^2} \right)$$

07.33.03.0529.01

$$U\left(\frac{5}{2}, 0, z\right) = \frac{4e^{z/2} z \left( (2z(2z+7)+3) K_1\left(\frac{z}{2}\right) - (2z(2z+9)+15) K_0\left(\frac{z}{2}\right) \right)}{45\sqrt{\pi}}$$

07.33.03.0530.01

$$U\left(\frac{5}{2}, 0, -z\right) = \frac{1}{45\sqrt{\pi}} \left( 4e^{-z/2} z \left( (2z(2z-9)+15) K_0\left(\frac{z}{2}\right) + (2z(2z-7)+3) K_1\left(\frac{z}{2}\right) + \left( (2(9-2z)z-15) I_0\left(\frac{z}{2}\right) + (2z(2z-7)+3) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0531.01

$$U\left(\frac{5}{2}, \frac{1}{2}, z\right) = \frac{1}{6} \left( e^z \sqrt{\pi} (4z(z+3)+3) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (2z+5) \right)$$

07.33.03.0532.01

$$U\left(\frac{5}{2}, \frac{1}{2}, -z\right) = \frac{2}{3} \sqrt{-z} \left( z - \frac{5}{2} - \frac{e^{-z} \sqrt{\pi} (4(z-3)z+3) (\sqrt{z} \operatorname{erfi}(\sqrt{z}) + \sqrt{-z})}{4z} \right)$$

07.33.03.0533.01

$$U\left(\frac{5}{2}, 1, z\right) = \frac{4 e^{z/2} \left( (2z(z+3)+3) K_0\left(\frac{z}{2}\right) - 2z(z+2) K_1\left(\frac{z}{2}\right) \right)}{9 \sqrt{\pi}}$$

07.33.03.0534.01

$$U\left(\frac{5}{2}, 1, -z\right) = \frac{1}{9 \sqrt{\pi}} \left( 4 e^{-z/2} \left( (2(z-3)z+3) K_0\left(\frac{z}{2}\right) + 2(z-2)z K_1\left(\frac{z}{2}\right) + (-2(z-3)z-3) I_0\left(\frac{z}{2}\right) + 2(z-2)z I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0535.01

$$U\left(\frac{5}{2}, \frac{3}{2}, z\right) = \frac{4(z+1)}{3 \sqrt{z}} - \frac{2}{3} e^z \sqrt{\pi} (2z+3) \operatorname{erfc}(\sqrt{z})$$

07.33.03.0536.01

$$U\left(\frac{5}{2}, \frac{3}{2}, -z\right) = \frac{e^{-z} \left( -4 e^z (z-1) + 2 \sqrt{\pi} \sqrt{-z} (2z-3) + 2 \sqrt{\pi} \sqrt{z} (2z-3) \operatorname{erfi}(\sqrt{z}) \right)}{3 \sqrt{-z}}$$

07.33.03.0537.01

$$U\left(\frac{5}{2}, 2, z\right) = \frac{2 e^{z/2} \left( (2z+1) K_1\left(\frac{z}{2}\right) - (2z+3) K_0\left(\frac{z}{2}\right) \right)}{3 \sqrt{\pi}}$$

07.33.03.0538.01

$$U\left(\frac{5}{2}, 2, -z\right) = \frac{e^{-z/2} \left( (4z-6) K_0\left(\frac{z}{2}\right) + (4z-2) K_1\left(\frac{z}{2}\right) - 2 \left( (2z-3) I_0\left(\frac{z}{2}\right) + (1-2z) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)}{3 \sqrt{\pi}}$$

07.33.03.0539.01

$$U\left(\frac{5}{2}, \frac{5}{2}, z\right) = \frac{1}{3} \left( \frac{2-4z}{z^{3/2}} + 4 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0540.01

$$U\left(\frac{5}{2}, \frac{5}{2}, -z\right) = \frac{2 e^{-z} \left( 2 \sqrt{\pi} (-z)^{3/2} + e^z (2z+1) - 2 \sqrt{\pi} z^{3/2} \operatorname{erfi}(\sqrt{z}) \right)}{3 (-z)^{3/2}}$$

07.33.03.0541.01

$$U\left(\frac{5}{2}, 3, z\right) = \frac{2 e^{z/2} \left( z K_0\left(\frac{z}{2}\right) - (z-1) K_1\left(\frac{z}{2}\right) \right)}{3 \sqrt{\pi} z}$$

07.33.03.0542.01

$$U\left(\frac{5}{2}, 3, -z\right) = \frac{2 e^{-z/2} \left( z K_0\left(\frac{z}{2}\right) + (z+1) K_1\left(\frac{z}{2}\right) + ((z+1) I_1\left(\frac{z}{2}\right) - z I_0\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right)}{3 \sqrt{\pi} z}$$

07.33.03.0543.01

$$U\left(\frac{5}{2}, \frac{7}{2}, z\right) = \frac{1}{z^{5/2}}$$

07.33.03.0544.01

$$U\left(\frac{5}{2}, 4, z\right) = \frac{e^{z/2} \left( z K_0\left(\frac{z}{2}\right) - (z-4) K_1\left(\frac{z}{2}\right) \right)}{3 \sqrt{\pi} z^2}$$

07.33.03.0545.01

$$U\left(\frac{5}{2}, 4, -z\right) = \frac{e^{-z/2} \left( -z K_0\left(\frac{z}{2}\right) - (z+4) K_1\left(\frac{z}{2}\right) + \left( z I_0\left(\frac{z}{2}\right) - (z+4) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)}{3 \sqrt{\pi} z^2}$$

07.33.03.0546.01

$$U\left(\frac{5}{2}, \frac{9}{2}, z\right) = \frac{2z+5}{2z^{7/2}}$$

07.33.03.0547.01

$$U\left(\frac{5}{2}, 5, z\right) = \frac{e^{z/2} K_2\left(\frac{z}{2}\right)}{\sqrt{\pi} z^2}$$

07.33.03.0548.01

$$U\left(\frac{5}{2}, 5, -z\right) = \frac{e^{-z/2} \left( K_2\left(\frac{z}{2}\right) + I_2\left(\frac{z}{2}\right) (\log(z) - \log(-z)) \right)}{\sqrt{\pi} z^2}$$

07.33.03.0549.01

$$U\left(\frac{5}{2}, \frac{11}{2}, z\right) = \frac{4z(z+5)+35}{4z^{9/2}}$$

07.33.03.0550.01

$$U\left(\frac{5}{2}, 6, z\right) = \frac{e^{z/2} \left( z(z+8) K_0\left(\frac{z}{2}\right) + (z(z+4)+32) K_1\left(\frac{z}{2}\right) \right)}{2 \sqrt{\pi} z^4}$$

07.33.03.0551.01

$$U\left(\frac{5}{2}, 6, -z\right) = \frac{1}{2 \sqrt{\pi} z^4} \left( e^{-z/2} \left( (z-8) z K_0\left(\frac{z}{2}\right) - ((z-4)z+32) K_1\left(\frac{z}{2}\right) - \left( (z-8) z I_0\left(\frac{z}{2}\right) + ((z-4)z+32) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

**For fixed  $z$  and  $a = 3$**

07.33.03.0552.01

$$U(3, -6, z) = \frac{1}{725760} \left( e^z (z+6)(z+12) (\text{Chi}(z) - \text{Shi}(z)) z^7 + (z(z+12)(z(z(z(z(z+5)-4)+6)-12)+24)-720)z + 1440) \right)$$

07.33.03.0553.01

$$U\left(3, -\frac{11}{2}, z\right) = \frac{1}{34459425} \left( 8 \left( -8 e^z \sqrt{\pi} (4z(z+17)+255) \text{erfc}(\sqrt{z}) z^{13/2} + 2(4z(2z(z(z(z(z(z+33)+112)-42)+45)-75)+315)-2835)z + 10395) \right) \right)$$

07.33.03.0554.01

$$U\left(3, -\frac{11}{2}, -z\right) = \frac{1}{34459425} \left( 8 e^{-z} \left( -8 \sqrt{\pi} (4(z-17)z+255) (-z)^{13/2} + e^z (2z(4z(2z(z(z(z(2z-33)+112)+42)+45)+75)+315)+2835) + 10395) - 8 \sqrt{\pi} z^{13/2} (4(z-17)z+255) \text{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0555.01

$$U(3, -5, z) = \frac{1}{80640} \left( -e^z (z(z+16) + 56) (\text{Chi}(z) - \text{Shi}(z)) z^6 - (z(z(z(z(z+15) + 42) - 30) + 40) - 72) + 144) z + 240 \right)$$

07.33.03.0556.01

$$U\left(3, -\frac{9}{2}, z\right) = \frac{1}{2027025} \left( 8 \left( 4 e^z \sqrt{\pi} (4z(z+15) + 195) \operatorname{erfc}(\sqrt{z}) z^{11/2} - 2 (4z(z(z(z+4)(2z+21) - 30) + 30) - 45) + 315) z + 945 \right) \right)$$

07.33.03.0557.01

$$U\left(3, -\frac{9}{2}, -z\right) = \frac{1}{2027025} \left( 8 e^{-z} \left( 4 \sqrt{\pi} (4(z-15)z + 195) (-z)^{11/2} + e^z (2z(4z(z((z-4)z(2z-21) + 30) + 30) + 45) + 315) + 945 \right) - 4 \sqrt{\pi} z^{11/2} (4(z-15)z + 195) \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0558.01

$$U(3, -4, z) = \frac{e^z (z(z+14) + 42) (\text{Chi}(z) - \text{Shi}(z)) z^5 + (z(z(z(z+3)(z+10) - 20) + 24) - 36) z + 48}{10080}$$

07.33.03.0559.01

$$U\left(3, -\frac{7}{2}, z\right) = \frac{1}{135135} \left( 8 \left( -2 e^z \sqrt{\pi} (4z(z+13) + 143) \operatorname{erfc}(\sqrt{z}) z^{9/2} + 2 (2z(z(z(z(2z+25) + 60) - 20) + 18) - 45) z + 105 \right) \right)$$

07.33.03.0560.01

$$U\left(3, -\frac{7}{2}, -z\right) = \frac{1}{135135} \left( 8 e^{-z} \left( -2 \sqrt{\pi} (4(z-13)z + 143) (-z)^{9/2} + e^z (2z(2z(z(z(2z-25) + 60) + 20) + 18) + 45) + 105 \right) - 2 \sqrt{\pi} z^{9/2} (4(z-13)z + 143) \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0561.01

$$U(3, -3, z) = \frac{-e^z (z(z+12) + 30) (\text{Chi}(z) - \text{Shi}(z)) z^4 - (z(z+3)(z(z+8) - 4) + 12) z + 12}{1440}$$

07.33.03.0562.01

$$U\left(3, -\frac{5}{2}, z\right) = \frac{8 \left( e^z \sqrt{\pi} (4z(z+11) + 99) \operatorname{erfc}(\sqrt{z}) z^{7/2} - 2 (z+3) (z(z(2z+15) - 5) + 3) z + 15 \right)}{10395}$$

07.33.03.0563.01

$$U\left(3, -\frac{5}{2}, -z\right) = \frac{1}{10395} \left( 8 e^{-z} \left( \sqrt{\pi} (4(z-11)z + 99) (-z)^{7/2} + e^z (2z(z((z-8)z(2z-5) + 12) + 9) + 15) + \sqrt{\pi} z^{7/2} (-4(z-11)z - 99) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0564.01

$$U(3, -2, z) = \frac{1}{240} \left( e^z (z(z+10) + 20) (\text{Chi}(z) - \text{Shi}(z)) z^3 + (z(z(z+9) + 12) - 6) z + 4 \right)$$

07.33.03.0565.01

$$U\left(3, -\frac{3}{2}, z\right) = \frac{1}{945} \left( 8(z(z(z(2z+17)+24)-6)+3) - 4e^z \sqrt{\pi} z^{5/2} (4z(z+9)+63) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0566.01

$$U\left(3, -\frac{3}{2}, -z\right) = \frac{4}{945} e^{-z} \left( \sqrt{\pi} (-4(z-9)z-63)(-z)^{5/2} + 2e^z (z(z(2z-17)+24)+6)+3 + \sqrt{\pi} z^{5/2} (-4(z-9)z-63) \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0567.01

$$U(3, -1, z) = \frac{1}{96} \left( -2z^3 - 2e^z (z^2 + 8z + 12) \operatorname{Ei}(-z) z^2 - e^z (z^2 + 8z + 12) \log\left(-\frac{1}{z}\right) z^2 + e^z (z+2)(z+6) \log(-z) z^2 - 2e^z (z+2)(z+6) \log(z) z^2 - 14z^2 - 12z + 4 \right)$$

07.33.03.0568.01

$$U(3, -1, z) = \frac{1}{48} \left( -e^z (z+2)(z+6) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^2 - (z+1)(z+6) z + 2 \right)$$

07.33.03.0569.01

$$U(3, -1, z) = \frac{1}{24} \left( e^z (z^2 + 8z + 12) \Gamma(-2, z) z^2 - z - 5 \right)$$

07.33.03.0570.01

$$U\left(3, -\frac{1}{2}, z\right) = \frac{1}{105} \left( 2e^z \sqrt{\pi} (4z(z+7)+35) \operatorname{erfc}(\sqrt{z}) z^{3/2} - 4(z(2z+13)+12)z + 8 \right)$$

07.33.03.0571.01

$$U\left(3, -\frac{1}{2}, -z\right) = \frac{1}{105} e^{-z} \left( 2\sqrt{\pi} (4(z-7)z+35)(-z)^{3/2} + e^z (4z(z(2z-13)+12)+8) - 2\sqrt{\pi} z^{3/2} (4(z-7)z+35) \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0572.01

$$U(3, 0, z) = \frac{1}{24} \left( 2z^2 + 2e^z (z^2 + 6z + 6) \operatorname{Ei}(-z) z + e^z (z^2 + 6z + 6) \log\left(-\frac{1}{z}\right) z - e^z (z^2 + 6z + 6) \log(-z) z + 2e^z (z^2 + 6z + 6) \log(z) z + 10z + 4 \right)$$

07.33.03.0573.01

$$U(3, 0, z) = \frac{1}{12} \left( z(z+5) + e^z z(z(z+6)+6) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) + 2 \right)$$

07.33.03.0574.01

$$U(3, 0, z) = \frac{1}{12} \left( e^z (z^2 + 6z + 6) \Gamma(-1, z) z - z - 4 \right)$$

07.33.03.0575.01

$$U\left(3, \frac{1}{2}, z\right) = \frac{1}{15} \left( 2(z+4)(2z+1) - e^z \sqrt{\pi} \sqrt{z} (4z(z+5)+15) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0576.01

$$U\left(3, \frac{1}{2}, -z\right) = \frac{1}{15} e^{-z} \left( \sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) (-4(z-5)z-15) + \sqrt{\pi} \sqrt{-z} (-4(z-5)z-15) + 2e^z (z(2z-9)+4) \right)$$

07.33.03.0577.01

$$U(3, 1, z) = \frac{1}{8} \left( -2z - 2e^z(z^2 + 4z + 2) \operatorname{Ei}(-z) - e^z(z^2 + 4z + 2) \log\left(-\frac{1}{z}\right) + e^z(z^2 + 4z + 2) \log(-z) - 2e^z(z^2 + 4z + 2) \log(z) - 6 \right)$$

07.33.03.0578.01

$$U(3, 1, z) = \frac{1}{8} (-2(z+3) - 2e^z(z(z+4) + 2) (\operatorname{Chi}(z) - \operatorname{Shi}(z)))$$

07.33.03.0579.01

$$U(3, 1, z) = \frac{1}{4} (-z + e^z(z^2 + 4z + 2) \Gamma(0, z) - 3)$$

07.33.03.0580.01

$$U\left(3, \frac{3}{2}, z\right) = \frac{e^z \sqrt{\pi} (4z(z+3) + 3) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (2z+5)}{6\sqrt{z}}$$

07.33.03.0581.01

$$U\left(3, \frac{3}{2}, -z\right) = \frac{e^{-z} \left( 2e^z z(2z-5) + \sqrt{\pi} \sqrt{-z} (-4(z-3)z-3) + \sqrt{\pi} \sqrt{z} (-4(z-3)z-3) \operatorname{erfi}(\sqrt{z}) \right)}{6z}$$

07.33.03.0582.01

$$U(3, 2, z) = \frac{1}{4z} \left( 2e^z(z+2) \operatorname{Ei}(-z)z + e^z(z+2) \log\left(-\frac{1}{z}\right)z - e^z(z+2) \log(-z)z + 2e^z(z+2) \log(z)z + 2z + 2 \right)$$

07.33.03.0583.01

$$U(3, 2, z) = \frac{e^z(z+2) (\operatorname{Chi}(z) - \operatorname{Shi}(z))z + z + 1}{2z}$$

07.33.03.0584.01

$$U(3, 2, z) = \frac{e^z z(z+2) \Gamma(-1, z) - 1}{2z}$$

07.33.03.0585.01

$$U\left(3, \frac{5}{2}, z\right) = \frac{2\sqrt{z} (2z+1) - e^z \sqrt{\pi} (4z(z+1) - 1) \operatorname{erfc}(\sqrt{z})}{4z^{3/2}}$$

07.33.03.0586.01

$$U\left(3, \frac{5}{2}, -z\right) = \frac{e^{-z} \left( 2e^z z(2z-1) + \sqrt{\pi} \sqrt{-z} (1-4(z-1)z) + \sqrt{\pi} \sqrt{z} (1-4(z-1)z) \operatorname{erfi}(\sqrt{z}) \right)}{4z^2}$$

07.33.03.0587.01

$$U(3, 3, z) = \frac{1}{2} \left( -\frac{1}{2} e^z \left( 2 \operatorname{Ei}(-z) + \log\left(-\frac{1}{z}\right) - \log(-z) + 2 \log(z) \right) - \frac{1}{z} + \frac{1}{z^2} \right)$$

07.33.03.0588.01

$$U(3, 3, z) = \frac{1}{2} \left( \frac{1-z}{z^2} + e^z (\operatorname{Shi}(z) - \operatorname{Chi}(z)) \right)$$

07.33.03.0589.01

$$U(3, 3, z) = e^z \Gamma(-2, z)$$

07.33.03.0590.01

$$U\left(3, \frac{7}{2}, z\right) = \frac{2\sqrt{z}(3-2z) + e^z \sqrt{\pi}(4(z-1)z+3) \operatorname{erfc}(\sqrt{z})}{8z^{5/2}}$$

07.33.03.0591.01

$$U\left(3, \frac{7}{2}, -z\right) = \frac{e^{-z} \left(2e^z z(2z+3) - \sqrt{\pi} \sqrt{-z}(4z(z+1)+3) - \sqrt{\pi} \sqrt{z}(4z(z+1)+3) \operatorname{erfi}(\sqrt{z})\right)}{8z^3}$$

07.33.03.0592.01

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

07.33.03.0593.01

$$U\left(3, \frac{9}{2}, z\right) = \frac{2\sqrt{z}(15-2z) + e^z \sqrt{\pi}(4(z-3)z+15) \operatorname{erfc}(\sqrt{z})}{16z^{7/2}}$$

07.33.03.0594.01

$$U\left(3, \frac{9}{2}, -z\right) = \frac{e^{-z} \left(-2e^z z(2z+15) + \sqrt{\pi} \sqrt{-z}(4z(z+3)+15) + \sqrt{\pi} \sqrt{z}(4z(z+3)+15) \operatorname{erfi}(\sqrt{z})\right)}{16z^4}$$

07.33.03.0595.01

$$U(3, 5, z) = \frac{z+3}{z^4}$$

07.33.03.0596.01

$$U\left(3, \frac{11}{2}, z\right) = \frac{10\sqrt{z}(2z+21) + 3e^z \sqrt{\pi}(4(z-5)z+35) \operatorname{erfc}(\sqrt{z})}{32z^{9/2}}$$

07.33.03.0597.01

$$U\left(3, \frac{11}{2}, -z\right) = \frac{e^{-z} \left(-10e^z z(2z-21) - 3\sqrt{\pi} \sqrt{-z}(4z(z+5)+35) - 3\sqrt{\pi} \sqrt{z}(4z(z+5)+35) \operatorname{erfi}(\sqrt{z})\right)}{32z^5}$$

07.33.03.0598.01

$$U(3, 6, z) = \frac{z(z+6)+12}{z^5}$$

**For fixed  $z$  and  $a = \frac{7}{2}$**

07.33.03.0599.01

$$U\left(\frac{7}{2}, -6, z\right) = \frac{1}{9820936125\sqrt{\pi}} \left(64e^{z/2} z \left( z(z(z(2z(4z(2z(z(4z^2+94z+583)+630)-1365)+9345)-35685)+64080)-93600)+86400) K_1\left(\frac{z}{2}\right) - z(z(z(2z(4z(2z(z(4z^2+98z+675)+1170)-525)+4095)-15345)+23400)-21600) K_0\left(\frac{z}{2}\right) \right) \right)$$



07.33.03.0600.01

$$U\left(\frac{7}{2}, -6, -z\right) = -\frac{1}{9820936125\sqrt{\pi}}$$

$$\left(64 e^{-z/2} z \left( z \left( z \left( 2 z \left( 4 z \left( 2 z \left( z \left( 4 z^2 - 98 z + 675 \right) - 1170 \right) - 525 \right) - 4095 \right) - 15345 \right) - 23400 \right) - 21600 \right) K_0\left(\frac{z}{2}\right) + \right.$$

$$\left. \left( z \left( z \left( 2 z \left( 4 z \left( 2 z \left( z \left( 4 z^2 - 94 z + 583 \right) - 630 \right) - 1365 \right) - 9345 \right) - 35685 \right) - 64080 \right) - 93600 \right) - 86400 \right) K_1\left(\frac{z}{2}\right) - \right.$$

$$\left. \left( z \left( z \left( 2 z \left( 4 z \left( 2 z \left( z \left( 4 z^2 - 98 z + 675 \right) - 1170 \right) - 525 \right) - 4095 \right) - 15345 \right) - 23400 \right) - 21600 \right) I_0\left(\frac{z}{2}\right) + \right.$$

$$\left. \left( z \left( z \left( 2 z \left( 4 z \left( 2 z \left( z \left( -4 z^2 + 94 z - 583 \right) + 630 \right) + 1365 \right) + 9345 \right) + 35685 \right) + 64080 \right) + 93600 \right) + 86400 \right) I_1\left(\frac{z}{2}\right) \left( \log(-z) - \log(z) \right) \right)$$

07.33.03.0601.01

$$U\left(\frac{7}{2}, -\frac{11}{2}, z\right) = \frac{1}{348364800}$$

$$\left( e^z \sqrt{\pi} \left( 2 z \left( 8 z \left( 2 z \left( z \left( 2 z \left( 4 z \left( z \left( 2 z + 45 \right) + 270 \right) + 315 \right) - 945 \right) + 2835 \right) - 4725 \right) + 14175 \right) - 127575 \right) + 155925 \right) \operatorname{erfc}(\sqrt{z}) - 2 \sqrt{z} \left( 8 z \left( z \left( 4 z \left( 2 z \left( 2 z \left( z \left( z + 22 \right) + 249 \right) + 210 \right) - 525 \right) + 1755 \right) - 12285 \right) + 18900 \right) - 155925 \right)$$

07.33.03.0602.01

$$U\left(\frac{7}{2}, -\frac{11}{2}, -z\right) = \frac{1}{348364800 z}$$

$$\left( e^{-z} \left( z \left( \sqrt{\pi} \left( 2 z \left( 127575 - 8 z \left( 2 z \left( z \left( 2 z \left( 4 z \left( z \left( 2 z - 45 \right) + 270 \right) - 315 \right) - 945 \right) - 2835 \right) - 4725 \right) - 14175 \right) \right) + 155925 \right) - \right.$$

$$\left. 2 e^z \sqrt{-z} \left( 8 z \left( z \left( 4 z \left( 2 z \left( 2 z \left( z \left( 2 z - 22 \right) z + 249 \right) - 210 \right) - 525 \right) - 1755 \right) - 12285 \right) - 18900 \right) - 155925 \right) \right) + \sqrt{\pi} \sqrt{-z^2} \left( 2 z \left( 8 z \left( 2 z \left( z \left( 2 z \left( 4 z \left( z \left( 2 z - 45 \right) + 270 \right) - 315 \right) - 945 \right) - 2835 \right) - 4725 \right) - 14175 \right) - 127575 \right) - 155925 \operatorname{erfi}(\sqrt{z}) \right)$$

07.33.03.0603.01

$$U\left(\frac{7}{2}, -5, z\right) = \frac{1}{516891375\sqrt{\pi}}$$

$$\left( 64 e^{z/2} z \left( 2 z \left( z \left( z \left( 16 z \left( z + 7 \right) \left( z \left( z + 15 \right) + 30 \right) - 525 \right) + 810 \right) - 1080 \right) + 900 \right) K_0\left(\frac{z}{2}\right) - \right.$$

$$\left. \left( z \left( 2 z \left( z \left( 8 z \left( z \left( 2 z \left( z + 21 \right) + 229 \right) + 210 \right) - 1575 \right) + 2235 \right) - 6705 \right) + 8640 \right) - 7200 \right) K_1\left(\frac{z}{2}\right) \right)$$

07.33.03.0604.01

$$U\left(\frac{7}{2}, -5, -z\right) = -\frac{1}{516891375\sqrt{\pi}}$$

$$\left( 64 e^{-z/2} z \left( 2 z \left( z \left( z \left( 16 \left( z - 7 \right) z \left( \left( z - 15 \right) z + 30 \right) - 525 \right) - 810 \right) - 1080 \right) - 900 \right) K_0\left(\frac{z}{2}\right) + \right.$$

$$\left. \left( z \left( 2 z \left( z \left( 8 z \left( z \left( 2 \left( z - 21 \right) z + 229 \right) - 210 \right) - 1575 \right) - 2235 \right) - 6705 \right) - 8640 \right) - 7200 \right) K_1\left(\frac{z}{2}\right) - \right.$$

$$\left. \left( 2 z \left( z \left( z \left( 16 \left( z - 7 \right) z \left( \left( z - 15 \right) z + 30 \right) - 525 \right) - 810 \right) - 1080 \right) - 900 \right) I_0\left(\frac{z}{2}\right) + \right.$$

$$\left. \left( z \left( 2 z \left( z \left( 1575 - 8 z \left( z \left( 2 \left( z - 21 \right) z + 229 \right) - 210 \right) \right) + 2235 \right) + 6705 \right) + 8640 \right) + 7200 \right) I_1\left(\frac{z}{2}\right) \left( \log(-z) - \log(z) \right) \right)$$

07.33.03.0605.01

$$U\left(\frac{7}{2}, -\frac{9}{2}, z\right) = \frac{1}{19353600} \left( 2\sqrt{z} (2z(2z(2z(2z(4z^2 + 78z + 383) + 525) - 1125) + 3045) - 7875) + 14175) - e^z \sqrt{\pi} (16z(z(2z(z(8z(z(z(z + 20) + 105) + 105) - 525) + 630) - 1575) + 1575) - 14175) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0606.01

$$U\left(\frac{7}{2}, -\frac{9}{2}, -z\right) = \frac{1}{285768000} \left( (-z)^{11/2} \left( -128z^7 + 3136z^6 - 26976z^5 + 119280z^4 - 372120z^3 + 868140z^2 - 1297170z + 939645 + \frac{1}{64z^6} \left( e^{-z} (16z(z(2z(z(8z(z((z-20)z + 105) - 105) - 525) - 630) - 1575) - 1575) - 14175) \right. \right. \right. \\ \left. \left. \left. \left( 2e^z z(2z(2z(2z(2z-9) + 63) - 315) + 945) - 945\sqrt{\pi}\sqrt{z}\operatorname{erfi}(\sqrt{z}) - 945\sqrt{\pi}\sqrt{-z} \right) \right) \right) \right)$$

07.33.03.0607.01

$$U\left(\frac{7}{2}, -4, z\right) = \frac{1}{30405375\sqrt{\pi}} \left( 32e^{z/2} z \left( z(z(2z(2z(4z(z(2z+37) + 174) + 525) - 825) + 1845) - 1980) + 1440) K_1\left(\frac{z}{2}\right) - z(z(2z(2z(4z(z(2z+39) + 210) + 1155) - 225) + 495) - 360) K_0\left(\frac{z}{2}\right) \right)$$

07.33.03.0608.01

$$U\left(\frac{7}{2}, -4, -z\right) = -\frac{1}{30405375\sqrt{\pi}} \left( 32e^{-z/2} z \left( z(z(2z(2z(4z(z(2z-39) + 210) - 1155) - 225) - 495) - 360) K_0\left(\frac{z}{2}\right) + (z(z(2z(2z(4z(z(2z-37) + 174) - 525) - 825) - 1845) - 1980) - 1440) K_1\left(\frac{z}{2}\right) - \left( z(z(2z(2z(4z(z(2z-39) + 210) - 1155) - 225) - 495) - 360) I_0\left(\frac{z}{2}\right) + (z(z(2z(2z(525 - 4z(z(2z-37) + 174)) + 825) + 1845) + 1980) + 1440) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0609.01

$$U\left(\frac{7}{2}, -\frac{7}{2}, z\right) = \frac{1}{1209600} \left( e^z \sqrt{\pi} (2z(2z(2z(2z(2z(4z^2 + 70z + 315) + 525) - 525) + 945) - 1575) + 1575) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (4z(z(4z(z(4z(z+17) + 283) + 150) - 525) + 525) - 1575) \right)$$

07.33.03.0610.01

$$U\left(\frac{7}{2}, -\frac{7}{2}, -z\right) = \frac{1}{3969000} \left( (-z)^{9/2} \left( -64z^6 + 1344z^5 - 9520z^4 + 32480z^3 - 71820z^2 + 104580z - 71505 + \frac{1}{32z^5} \left( e^{-z} (2z(2z(2z(2z(2z(4z^2 - 70z + 315) - 525) - 525) - 945) - 1575) - 1575) \right. \right. \right. \\ \left. \left. \left. \left( 2e^z z(2z(2z(2z(2z-7) + 35) - 105) + 105\sqrt{\pi}\sqrt{z}\operatorname{erfi}(\sqrt{z}) + 105\sqrt{\pi}\sqrt{-z} \right) \right) \right) \right)$$

07.33.03.0611.01

$$U\left(\frac{7}{2}, -3, z\right) = \frac{1}{2027025\sqrt{\pi}} \left( 32e^{z/2} z \left( z(z(4z(z+5)(4z(z+12) + 75) - 75) + 45) K_0\left(\frac{z}{2}\right) - (z(z(4z(z(4z(z+16) + 253) + 150) - 375) + 300) - 180) K_1\left(\frac{z}{2}\right) \right)$$

07.33.03.0612.01

$$U\left(\frac{7}{2}, -3, -z\right) = -\frac{1}{2027025\sqrt{\pi}} \left( 32 e^{-z/2} z \right. \\ \left. \left( z(z(4(z-5)z(4(z-12)z+75)-75)-45)K_0\left(\frac{z}{2}\right) + (z(z(4z(z(4(z-16)z+253)-150)-375)-300)-180) \right. \right. \\ \left. \left. K_1\left(\frac{z}{2}\right) - \left( z(z(4(z-5)z(4(z-12)z+75)-75)-45)I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\ \left. \left. \left. (z(z(4z(z(-4(z-16)z-253)+150)+375)+300)+180)I_1\left(\frac{z}{2}\right) \right) \right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0613.01

$$U\left(\frac{7}{2}, -\frac{5}{2}, z\right) = \frac{1}{86400} \left( 2\sqrt{z} (2z(4z(2z(z+9)(2z+11)+75)-195)+225) - \right. \\ \left. e^z \sqrt{\pi} (4z(z(4z(z(2z+15)^2+150)-225)+135)-225) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0614.01

$$U\left(\frac{7}{2}, -\frac{5}{2}, -z\right) = \frac{1}{81000} \left( (-z)^{7/2} \right. \\ \left. \left( -32z^5 + 560z^4 - 3120z^3 + 7560z^2 - 10170z + 6615 + \frac{1}{16z^4} \left( e^{-z} (4z(z(4z((15-2z)^2z-150)-225)-135)-225) \right. \right. \right. \\ \left. \left. \left. (2e^z z(2z(2z-5)+15) - 15\sqrt{\pi}\sqrt{z}\operatorname{erfi}(\sqrt{z}) - 15\sqrt{\pi}\sqrt{-z}) \right) \right) \right)$$

07.33.03.0615.01

$$U\left(\frac{7}{2}, -2, z\right) = \frac{1}{155925\sqrt{\pi}} \\ \left( 16e^{z/2} z \left( z(4z(z(4z^2+54z+173)+75)-135)+60 \right) K_1\left(\frac{z}{2}\right) - z(4z(z(4z^2+58z+225)+225)-15) K_0\left(\frac{z}{2}\right) \right)$$

07.33.03.0616.01

$$U\left(\frac{7}{2}, -2, -z\right) = \\ -\frac{1}{155925\sqrt{\pi}} \left( 16e^{-z/2} z \left( z(4z(z(4z^2-58z+225)-225)-15) K_0\left(\frac{z}{2}\right) + (z(4z(z(4z^2-54z+173)-75)-135)-60) \right. \right. \\ \left. \left. K_1\left(\frac{z}{2}\right) - \left( z(4z(z(4z^2-58z+225)-225)-15) I_0\left(\frac{z}{2}\right) + (z(4z(z(-4z^2+54z-173)+75)+135)+60) I_1\left(\frac{z}{2}\right) \right) \right) \right) \\ (\log(-z) - \log(z)) \right)$$

07.33.03.0617.01

$$U\left(\frac{7}{2}, -\frac{3}{2}, z\right) = \\ \frac{1}{7200} \left( e^z \sqrt{\pi} (2z(4z(2z(z+5)(2z+15)+75)-75)+45) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (2z+1)(8z^3+92z^2+210z-45) \right)$$

07.33.03.0618.01

$$U\left(\frac{7}{2}, -\frac{3}{2}, -z\right) = \frac{4}{675} (-z)^{5/2} \left( -z^4 + 14z^3 - 57z^2 + 84z - \frac{759}{16} + \right. \\ \left. \frac{1}{128z^3} \left( e^{-z} (2z(4z(2z(z-5)z(2z-15)-75)-75)-45) (2e^z z(2z-3) + 3\sqrt{\pi}\sqrt{z}\operatorname{erfi}(\sqrt{z}) + 3\sqrt{\pi}\sqrt{-z}) \right) \right)$$

07.33.03.0619.01

$$U\left(\frac{7}{2}, -1, z\right) = \frac{16 e^{z/2} z \left(4 z (z (2 z (z + 12) + 75) + 60) K_0\left(\frac{z}{2}\right) - (4 z (2 z (z (z + 11) + 27) + 15) - 15) K_1\left(\frac{z}{2}\right)\right)}{14 175 \sqrt{\pi}}$$

07.33.03.0620.01

$$U\left(\frac{7}{2}, -1, -z\right) = -\frac{1}{14 175 \sqrt{\pi}} \left(16 e^{-z/2} z \left(4 z (z (2 (z - 12) z + 75) - 60) K_0\left(\frac{z}{2}\right) + (4 z (2 z ((z - 11) z + 27) - 15) - 15) K_1\left(\frac{z}{2}\right) - (4 z (z (2 (z - 12) z + 75) - 60) I_0\left(\frac{z}{2}\right) + (4 z (15 - 2 z ((z - 11) z + 27)) + 15) I_1\left(\frac{z}{2}\right)) (\log(-z) - \log(z))\right)\right)$$

07.33.03.0621.01

$$U\left(\frac{7}{2}, -\frac{1}{2}, z\right) = \frac{1}{720} \left(2 \sqrt{z} (2 z + 5) (4 z (z + 7) + 3) - e^z \sqrt{\pi} (8 z (z (2 z (z + 10) + 45) + 15) - 15) \operatorname{erfc}(\sqrt{z})\right)$$

07.33.03.0622.01

$$U\left(\frac{7}{2}, -\frac{1}{2}, -z\right) = \frac{1}{180} (-z)^{3/2} \left(-8 z^3 + 84 z^2 - 218 z + 133 - \frac{e^{-z} (8 z (z (2 (z - 10) z + 45) - 15) - 15) (-2 e^z z + \sqrt{\pi} \operatorname{erfi}(\sqrt{z}) \sqrt{z} + \sqrt{\pi} \sqrt{-z})}{4 z^2}\right)$$

07.33.03.0623.01

$$U\left(\frac{7}{2}, 0, z\right) = \frac{8 e^{z/2} z \left(4 z (z (2 z + 17) + 29) + 15) K_1\left(\frac{z}{2}\right) - (4 z (z + 5) (2 z + 9) + 105) K_0\left(\frac{z}{2}\right)}{1575 \sqrt{\pi}}$$

07.33.03.0624.01

$$U\left(\frac{7}{2}, 0, -z\right) = -\frac{1}{1575 \sqrt{\pi}} \left(8 e^{-z/2} z \left(4 (z - 5) z (2 z - 9) - 105) K_0\left(\frac{z}{2}\right) + (4 z (z (2 z - 17) + 29) - 15) K_1\left(\frac{z}{2}\right) + (105 - 4 (z - 5) z (2 z - 9)) I_0\left(\frac{z}{2}\right) + (4 z (z (2 z - 17) + 29) - 15) I_1\left(\frac{z}{2}\right)\right) (\log(-z) - \log(z))\right)$$

07.33.03.0625.01

$$U\left(\frac{7}{2}, \frac{1}{2}, z\right) = \frac{1}{90} \left(e^z \sqrt{\pi} (8 z^3 + 60 z^2 + 90 z + 15) \operatorname{erfc}(\sqrt{z}) - 2 \sqrt{z} (4 z (z + 7) + 33)\right)$$

07.33.03.0626.01

$$U\left(\frac{7}{2}, \frac{1}{2}, -z\right) = \frac{4}{45} \sqrt{-z} \left(-z^2 + 7 z - \frac{e^{-z} \sqrt{\pi} (8 z^3 - 60 z^2 + 90 z - 15) (\sqrt{z} - \sqrt{-z} \operatorname{erfi}(\sqrt{z}))}{8 \sqrt{-z^2}} - \frac{33}{4}\right)$$

07.33.03.0627.01

$$U\left(\frac{7}{2}, 1, z\right) = \frac{8 e^{z/2} \left((z (2 z + 5) (2 z + 9) + 15) K_0\left(\frac{z}{2}\right) - z (4 z (z + 6) + 23) K_1\left(\frac{z}{2}\right)\right)}{225 \sqrt{\pi}}$$

07.33.03.0628.01

$$U\left(\frac{7}{2}, 1, -z\right) = -\frac{1}{225 \sqrt{\pi}} \left(8 e^{-z/2} \left((z (4 (z - 7) z + 45) - 15) K_0\left(\frac{z}{2}\right) + z (4 (z - 6) z + 23) K_1\left(\frac{z}{2}\right) + (z (-4 (z - 7) z - 45) + 15) I_0\left(\frac{z}{2}\right) + z (4 (z - 6) z + 23) I_1\left(\frac{z}{2}\right)\right) (\log(-z) - \log(z))\right)$$

07.33.03.0629.01

$$U\left(\frac{7}{2}, \frac{3}{2}, z\right) = \frac{1}{15} \left( \frac{2(z+4)(2z+1)}{\sqrt{z}} - e^z \sqrt{\pi} (4z(z+5) + 15) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0630.01

$$U\left(\frac{7}{2}, \frac{3}{2}, -z\right) = \frac{e^{-z} (\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) (-4(z-5)z - 15) + \sqrt{\pi} \sqrt{-z} (-4(z-5)z - 15) + 2e^z (z(2z-9) + 4))}{15 \sqrt{-z}}$$

07.33.03.0631.01

$$U\left(\frac{7}{2}, 2, z\right) = \frac{4e^{z/2} ((2z(2z+7) + 3) K_1\left(\frac{z}{2}\right) - (2z(2z+9) + 15) K_0\left(\frac{z}{2}\right))}{45 \sqrt{\pi}}$$

07.33.03.0632.01

$$U\left(\frac{7}{2}, 2, -z\right) = -\frac{1}{45 \sqrt{\pi}} \left( 4e^{-z/2} \left( (2z(2z-9) + 15) K_0\left(\frac{z}{2}\right) + (2z(2z-7) + 3) K_1\left(\frac{z}{2}\right) + (2(9-2z)z - 15) I_0\left(\frac{z}{2}\right) + (2z(2z-7) + 3) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0633.01

$$U\left(\frac{7}{2}, \frac{5}{2}, z\right) = \frac{4(e^z \sqrt{\pi} (2z+5) \operatorname{erfc}(\sqrt{z}) z^{3/2} - 2(z+2)z + 1)}{15 z^{3/2}}$$

07.33.03.0634.01

$$U\left(\frac{7}{2}, \frac{5}{2}, -z\right) = \frac{4e^{-z} (\sqrt{\pi} (2z-5) \operatorname{erfi}(\sqrt{z}) z^{3/2} + \sqrt{\pi} \sqrt{-z} (2z-5)z + e^z (1 - 2(z-2)z))}{15 (-z)^{3/2}}$$

07.33.03.0635.01

$$U\left(\frac{7}{2}, 3, z\right) = \frac{4e^{z/2} (2z(z+2) K_0\left(\frac{z}{2}\right) + (1-2z(z+1)) K_1\left(\frac{z}{2}\right))}{15 \sqrt{\pi} z}$$

07.33.03.0636.01

$$U\left(\frac{7}{2}, 3, -z\right) = -\frac{1}{15 \sqrt{\pi} z} \left( 4e^{-z/2} \left( 2(z-2)z K_0\left(\frac{z}{2}\right) + (2(z-1)z - 1) K_1\left(\frac{z}{2}\right) - (2(z-2)z I_0\left(\frac{z}{2}\right) + (1-2(z-1)z) I_1\left(\frac{z}{2}\right)) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0637.01

$$U\left(\frac{7}{2}, \frac{7}{2}, z\right) = \frac{2}{15} \left( \frac{4z^2 - 2z + 3}{z^{5/2}} - 4e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0638.01

$$U\left(\frac{7}{2}, \frac{7}{2}, -z\right) = \frac{e^{-z} (-8 \sqrt{\pi} (-z)^{5/2} + e^z (8z^2 + 4z + 6) - 8 \sqrt{\pi} z^{5/2} \operatorname{erfi}(\sqrt{z}))}{15 (-z)^{5/2}}$$

07.33.03.0639.01

$$U\left(\frac{7}{2}, 4, z\right) = -\frac{2e^{z/2} (z(2z-1) K_0\left(\frac{z}{2}\right) + ((3-2z)z - 4) K_1\left(\frac{z}{2}\right))}{15 \sqrt{\pi} z^2}$$

07.33.03.0640.01

$$U\left(\frac{7}{2}, 4, -z\right) = -\frac{1}{15\sqrt{\pi}z^2} \left( 2e^{-z/2} \left( z(2z+1)K_0\left(\frac{z}{2}\right) + (z(2z+3)+4)K_1\left(\frac{z}{2}\right) + \left( (z(2z+3)+4)I_1\left(\frac{z}{2}\right) - z(2z+1)I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0641.01

$$U\left(\frac{7}{2}, \frac{9}{2}, z\right) = \frac{1}{z^{7/2}}$$

07.33.03.0642.01

$$U\left(\frac{7}{2}, 5, z\right) = \frac{2e^{z/2} \left( (z-4)z + 12 \right) K_1\left(\frac{z}{2}\right) - (z-3)z K_0\left(\frac{z}{2}\right)}{15\sqrt{\pi}z^3}$$

07.33.03.0643.01

$$U\left(\frac{7}{2}, 5, -z\right) = \frac{1}{15\sqrt{\pi}z^3} \left( 2e^{-z/2} \left( z(z+3)K_0\left(\frac{z}{2}\right) + (z(z+4)+12)K_1\left(\frac{z}{2}\right) + \left( (z(z+4)+12)I_1\left(\frac{z}{2}\right) - z(z+3)I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0644.01

$$U\left(\frac{7}{2}, \frac{11}{2}, z\right) = \frac{2z+7}{2z^{9/2}}$$

07.33.03.0645.01

$$U\left(\frac{7}{2}, 6, z\right) = \frac{e^{z/2} \left( (z-4)z + 32 \right) K_1\left(\frac{z}{2}\right) - (z-8)z K_0\left(\frac{z}{2}\right)}{5\sqrt{\pi}z^4}$$

07.33.03.0646.01

$$U\left(\frac{7}{2}, 6, -z\right) = \frac{1}{5\sqrt{\pi}z^4} \left( e^{-z/2} \left( -z(z+8)K_0\left(\frac{z}{2}\right) - (z(z+4)+32)K_1\left(\frac{z}{2}\right) + \left( z(z+8)I_0\left(\frac{z}{2}\right) - (z(z+4)+32)I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

**For fixed  $z$  and  $a = 4$**

07.33.03.0647.01

$$U(4, -6, z) = \frac{1}{21772800} \left( e^z (z(z(z+30)+270)+720) (\text{Chi}(z) - \text{Shi}(z)) z^7 + (z(z(z(z(z(z+29)+242)+504)-336)+420)-720)+1440)-2880) z + 4320 \right)$$

07.33.03.0648.01

$$U\left(4, -\frac{11}{2}, z\right) = \frac{1}{1964187225} \left( 16 \left( -4e^z \sqrt{\pi} (2z(2z(2z+57)+969)+4845) \text{erfc}(\sqrt{z}) z^{13/2} + 8(z(z(z(z(z(4z(z+28)+915)+2016)-672)+630)-900)+1575)-2835) z + 31185 \right) \right)$$

07.33.03.0649.01

$$U\left(4, -\frac{11}{2}, -z\right) = -\frac{1}{1964187225} \left( 16e^{-z} \left( 4\sqrt{\pi} (4845-2z(2z(2z-57)+969)) (-z)^{13/2} + e^z (8z(z(z(z(z(4z(z-28)z+915)-2016)-672)-630)-900)-1575)-2835)-31185) + 4\sqrt{\pi} z^{13/2} (4845-2z(2z(2z-57)+969)) \text{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0650.01

$$U(4, -5, z) = \frac{1}{2177280} (-e^z (z(z(z+27) + 216) + 504) (\text{Chi}(z) - \text{Shi}(z)) z^6 - (z(z(z(z(z+12) + 30)(z(z+14) - 7) + 240) - 360) + 576) z + 720)$$

07.33.03.0651.01

$$U\left(4, -\frac{9}{2}, z\right) = \frac{1}{103378275} \left(16 \left(2 e^z \sqrt{\pi} (2z(2z(2z+51) + 765) + 3315) \text{erfc}(\sqrt{z}) z^{11/2} - 4(z(z(z(z(4z+25) + 717) + 1344) - 420) + 360) - 450) + 630) z + 2835\right)$$

07.33.03.0652.01

$$U\left(4, -\frac{9}{2}, -z\right) = -\frac{1}{103378275} \left(16 e^{-z} \left(2 \sqrt{\pi} (3315 - 2z(2z(2z-51) + 765)) \text{erfi}(\sqrt{z}) z^{11/2} + 2 \sqrt{\pi} (-z)^{9/2} (3315 - 2z(2z(2z-51) + 765)) z + e^z (4z(z(z(z(4z-25)z + 717) - 1344) - 420) - 360) - 450) - 630) - 2835\right)$$

07.33.03.0653.01

$$U(4, -4, z) = \frac{1}{241920} (e^z (z(z(z+24) + 168) + 336) (\text{Chi}(z) - \text{Shi}(z)) z^5 + (z(z(z(z(z+23) + 146) + 210) - 120) + 120) - 144) z + 144)$$

07.33.03.0654.01

$$U\left(4, -\frac{7}{2}, z\right) = \frac{1}{6081075} \left(16 \left(-e^z \sqrt{\pi} (2z(4z^2 + 90z + 585) + 2145) \text{erfc}(\sqrt{z}) z^{9/2} + 2(z(z(z(4z+22) + 543) + 840) - 240) + 180) - 180) z + 315\right)$$

07.33.03.0655.01

$$U\left(4, -\frac{7}{2}, -z\right) = -\frac{1}{6081075} \left(16 e^{-z} \left(\sqrt{\pi} (2145 - 2z(4z^2 - 90z + 585)) (-z)^{9/2} + e^z (2z(z(z(z(4z-22)z + 543) - 840) - 240) - 180) - 180) - 315) + \sqrt{\pi} z^{9/2} (2145 - 2z(4z^2 - 90z + 585)) \text{erfi}(\sqrt{z})\right)$$

07.33.03.0656.01

$$U(4, -3, z) = \frac{1}{30240} (-e^z (z(z(z+21) + 126) + 210) (\text{Chi}(z) - \text{Shi}(z)) z^4 - (z(z(z(z(z+20) + 107) + 120) - 60) + 48) z + 36)$$

07.33.03.0657.01

$$U\left(4, -\frac{5}{2}, z\right) = \frac{1}{405405} \left(8 \left(e^z \sqrt{\pi} z^{7/2} (2z(4z^2 + 78z + 429) + 1287) \text{erfc}(\sqrt{z}) - 2(z(z(z(z(4z+19) + 393) + 480) - 120) + 72) - 45\right)\right)$$

07.33.03.0658.01

$$U\left(4, -\frac{5}{2}, -z\right) = -\frac{1}{405405} \left(8 e^{-z} \left(\sqrt{\pi} (2z(4z^2 - 78z + 429) - 1287) (-z)^{7/2} + 2 e^z (z(z(z(z(4z-19)z + 393) - 480) - 120) - 72) - 45) + \sqrt{\pi} z^{7/2} (1287 - 2z(4z^2 - 78z + 429)) \text{erfi}(\sqrt{z})\right)\right)$$

07.33.03.0659.01

$$U(4, -2, z) = \frac{e^z (z (z (z + 18) + 90) + 120) (\text{Chi}(z) - \text{Shi}(z)) z^3 + (z (z (z + 17) + 74) + 60) - 24) z + 12}{4320}$$

07.33.03.0660.01

$$U\left(4, -\frac{3}{2}, z\right) = \frac{1}{31185} \left( 8 (z (z (z (4 z (z + 16) + 267) + 240) - 48) + 18) - 4 e^z \sqrt{\pi} z^{5/2} (2 z (4 z^2 + 66 z + 297) + 693) \text{erfc}(\sqrt{z}) \right)$$

07.33.03.0661.01

$$U\left(4, -\frac{3}{2}, -z\right) = -\frac{1}{31185} \left( 4 e^{-z} \left( \sqrt{\pi} (693 - 2 z (4 z^2 - 66 z + 297)) \right) (-z)^{5/2} + 2 e^z (z (z (z (4 (z - 16) z + 267) - 240) - 48) - 18) + \sqrt{\pi} z^{5/2} (693 - 2 z (4 z^2 - 66 z + 297)) \text{erfi}(\sqrt{z}) \right)$$

07.33.03.0662.01

$$U(4, -1, z) = \frac{1}{1440} \left( -2 z^4 - 28 z^3 - 2 e^z (z^3 + 15 z^2 + 60 z + 60) \text{Ei}(-z) z^2 - e^z (z^3 + 15 z^2 + 60 z + 60) \log\left(-\frac{1}{z}\right) z^2 + e^z (z^3 + 15 z^2 + 60 z + 60) \log(-z) z^2 - 2 e^z (z^3 + 15 z^2 + 60 z + 60) \log(z) z^2 - 94 z^2 - 48 z + 12 \right)$$

07.33.03.0663.01

$$U(4, -1, z) = \frac{1}{720} \left( -e^z (z (z (z + 15) + 60) + 60) (\text{Chi}(z) - \text{Shi}(z)) z^2 - (z (z (z + 14) + 47) + 24) z + 6 \right)$$

07.33.03.0664.01

$$U(4, -1, z) = \frac{1}{360} \left( e^z (z^3 + 15 z^2 + 60 z + 60) \Gamma(-2, z) z^2 - z^2 - 12 z - 27 \right)$$

07.33.03.0665.01

$$U\left(4, -\frac{1}{2}, z\right) = \frac{2 e^z \sqrt{\pi} z^{3/2} (2 z (4 z^2 + 54 z + 189) + 315) \text{erfc}(\sqrt{z}) - 4 (z (z (4 z (z + 13) + 165) + 96) - 12)}{2835}$$

07.33.03.0666.01

$$U\left(4, -\frac{1}{2}, -z\right) = \frac{1}{2835} \left( 2 e^{-z} \left( \sqrt{\pi} (2 z (4 z^2 - 54 z + 189) - 315) \text{erfi}(\sqrt{z}) z^{3/2} + \sqrt{\pi} \sqrt{-z} (2 z (4 z^2 - 54 z + 189) - 315) z + e^z (2 z (z (-4 (z - 13) z - 165) + 96) + 24) \right) \right)$$

07.33.03.0667.01

$$U(4, 0, z) = \frac{1}{288} \left( 2 z^3 + 22 z^2 + 2 e^z (z^3 + 12 z^2 + 36 z + 24) \text{Ei}(-z) z + e^z (z^3 + 12 z^2 + 36 z + 24) \log\left(-\frac{1}{z}\right) z - e^z (z^3 + 12 z^2 + 36 z + 24) \log(-z) z + 2 e^z (z^3 + 12 z^2 + 36 z + 24) \log(z) z + 52 z + 12 \right)$$

07.33.03.0668.01

$$U(4, 0, z) = \frac{1}{144} \left( (z + 3) (z (z + 8) + 2) + e^z z (z (z + 6)^2 + 24) (\text{Chi}(z) - \text{Shi}(z)) \right)$$

07.33.03.0669.01

$$U(4, 0, z) = \frac{1}{144} \left( -z^2 + e^z (z^3 + 12 z^2 + 36 z + 24) \Gamma(-1, z) z - 10 z - 18 \right)$$

07.33.03.0670.01

$$U\left(4, \frac{1}{2}, z\right) = \frac{1}{315} \left( 2 z (4 z (z + 10) + 87) - e^z \sqrt{\pi} \sqrt{z} (8 z^3 + 84 z^2 + 210 z + 105) \text{erfc}(\sqrt{z}) + 48 \right)$$



07.33.03.0671.01

$$U\left(4, \frac{1}{2}, -z\right) = \frac{1}{315} e^{-z} \left( \sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) (8z^3 - 84z^2 + 210z - 105) + \sqrt{\pi} \sqrt{-z} (8z^3 - 84z^2 + 210z - 105) + e^z (48 - 2z(4(z-10)z + 87)) \right)$$

07.33.03.0672.01

$$U(4, 1, z) = \frac{1}{72} \left( -2z^2 - 16z - 2e^z (z^3 + 9z^2 + 18z + 6) \operatorname{Ei}(-z) - e^z (z^3 + 9z^2 + 18z + 6) \log\left(-\frac{1}{z}\right) + e^z (z^3 + 9z^2 + 18z + 6) \log(-z) - 2e^z (z^3 + 9z^2 + 18z + 6) \log(z) - 22 \right)$$

07.33.03.0673.01

$$U(4, 1, z) = \frac{1}{72} (-2(z(z+8) + 11) - 2e^z (z(z+3)(z+6) + 6) (\operatorname{Chi}(z) - \operatorname{Shi}(z)))$$

07.33.03.0674.01

$$U(4, 1, z) = \frac{1}{36} (-z^2 - 8z + e^z (z^3 + 9z^2 + 18z + 6) \Gamma(0, z) - 11)$$

07.33.03.0675.01

$$U\left(4, \frac{3}{2}, z\right) = \frac{e^z \sqrt{\pi} (8z^3 + 60z^2 + 90z + 15) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (4z(z+7) + 33)}{90\sqrt{z}}$$

07.33.03.0676.01

$$U\left(4, \frac{3}{2}, -z\right) = \frac{1}{90z} \left( e^{-z} (-2e^z z(4(z-7)z + 33) + \sqrt{\pi} \sqrt{-z} (8z^3 - 60z^2 + 90z - 15) + \sqrt{\pi} \sqrt{z} (8z^3 - 60z^2 + 90z - 15) \operatorname{erfi}(\sqrt{z})) \right)$$

07.33.03.0677.01

$$U(4, 2, z) = \frac{1}{24z} \left( 2z^2 + 2e^z (z^2 + 6z + 6) \operatorname{Ei}(-z) z + e^z (z^2 + 6z + 6) \log\left(-\frac{1}{z}\right) z - e^z (z^2 + 6z + 6) \log(-z) z + 2e^z (z^2 + 6z + 6) \log(z) z + 10z + 4 \right)$$

07.33.03.0678.01

$$U(4, 2, z) = \frac{z(z+5) + e^z z(z(z+6) + 6) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) + 2}{12z}$$

07.33.03.0679.01

$$U(4, 2, z) = -\frac{-e^z (z^2 + 6z + 6) \Gamma(-1, z) z + z + 4}{12z}$$

07.33.03.0680.01

$$U\left(4, \frac{5}{2}, z\right) = \frac{2\sqrt{z} (4z(z+4) + 3) - e^z \sqrt{\pi} (2z(2z(2z+9) + 9) - 3) \operatorname{erfc}(\sqrt{z})}{36z^{3/2}}$$

07.33.03.0681.01

$$U\left(4, \frac{5}{2}, -z\right) = \frac{1}{36z^2} \left( e^{-z} (-2e^z z(4(z-4)z + 3) + \sqrt{\pi} \sqrt{-z} (2z(2z(2z-9) + 9) + 3) + \sqrt{\pi} \sqrt{z} (2z(2z(2z-9) + 9) + 3) \operatorname{erfi}(\sqrt{z})) \right)$$

07.33.03.0682.01

$$U(4, 3, z) = -\frac{1}{12 z^2} \left( 2 e^z (z+3) \operatorname{Ei}(-z) z^2 + e^z (z+3) \log\left(-\frac{1}{z}\right) z^2 - e^z (z+3) \log(-z) z^2 + 2 e^z (z+3) \log(z) z^2 + 2 z^2 + 4 z - 2 \right)$$

07.33.03.0683.01

$$U(4, 3, z) = -\frac{e^z (z+3) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^2 + (z+2) z - 1}{6 z^2}$$

07.33.03.0684.01

$$U(4, 3, z) = \frac{e^z (z+3) \Gamma(-2, z) z^2 - z^2 + e^z (z-1) \Gamma(2, z)}{3 z^2}$$

07.33.03.0685.01

$$U\left(4, \frac{7}{2}, z\right) = \frac{e^z \sqrt{\pi} (2 z (4 z^2 + 6 z - 3) + 3) \operatorname{erfc}(\sqrt{z}) - 2 \sqrt{z} (4 z (z+1) - 3)}{24 z^{5/2}}$$

07.33.03.0686.01

$$U\left(4, \frac{7}{2}, -z\right) = \frac{1}{24 z^3} \left( e^{-z} \left( -2 e^z z (4 (z-1) z - 3) + \sqrt{\pi} \sqrt{-z} (2 z (4 z^2 - 6 z - 3) - 3) + \sqrt{\pi} \sqrt{z} (2 z (4 z^2 - 6 z - 3) - 3) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0687.01

$$U(4, 4, z) = \frac{1}{6} \left( \frac{1}{2} e^z \left( 2 \operatorname{Ei}(-z) + \log\left(-\frac{1}{z}\right) - \log(-z) + 2 \log(z) \right) + \frac{1}{z} - \frac{1}{z^2} + \frac{2}{z^3} \right)$$

07.33.03.0688.01

$$U(4, 4, z) = \frac{e^z (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^3 + (z-1) z + 2}{6 z^3}$$

07.33.03.0689.01

$$U(4, 4, z) = e^z \Gamma(-3, z)$$

07.33.03.0690.01

$$U\left(4, \frac{9}{2}, z\right) = \frac{2 \sqrt{z} (4 (z-2) z + 15) - e^z \sqrt{\pi} (2 z (4 z^2 - 6 z + 9) - 15) \operatorname{erfc}(\sqrt{z})}{48 z^{7/2}}$$

07.33.03.0691.01

$$U\left(4, \frac{9}{2}, -z\right) = \frac{1}{48 z^4} \left( e^{-z} \left( -2 e^z z (4 z (z+2) + 15) + \sqrt{\pi} \sqrt{-z} (2 z (4 z^2 + 6 z + 9) + 15) + \sqrt{\pi} \sqrt{z} (2 z (4 z^2 + 6 z + 9) + 15) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0692.01

$$U(4, 5, z) = \frac{1}{z^4}$$

07.33.03.0693.01

$$U\left(4, \frac{11}{2}, z\right) = \frac{2 \sqrt{z} (4 (z-5) z + 105) - e^z \sqrt{\pi} (2 z (2 z (2 z - 9) + 45) - 105) \operatorname{erfc}(\sqrt{z})}{96 z^{9/2}}$$

07.33.03.0694.01

$$U\left(4, \frac{11}{2}, -z\right) = \frac{1}{96 z^5} \left( e^{-z} \left( 2 e^z z (4 z (z + 5) + 105) - \sqrt{\pi} \sqrt{-z} (2 z (2 z (2 z + 9) + 45) + 105) - \sqrt{\pi} \sqrt{z} (2 z (2 z (2 z + 9) + 45) + 105) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0695.01

$$U(4, 6, z) = \frac{z + 4}{z^5}$$

**For fixed  $z$  and  $a = \frac{9}{2}$**

07.33.03.0696.01

$$U\left(\frac{9}{2}, -6, z\right) = \frac{1}{1443677610375 \sqrt{\pi}} \left( 128 e^{z/2} z \left( z (z (z (8 z (z (2 z (z (4 z (z (2 z + 73) + 855) + 14043) + 11025) - 19845) + 28665) - 376425) + 589680) - 756000) + 604800) K_1\left(\frac{z}{2}\right) - z (z (z (8 z (z (2 z (z (4 z (z (2 z + 75) + 927) + 17325) + 23625) - 6615) + 11025) - 142695) + 189000) - 151200) K_0\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0697.01

$$U\left(\frac{9}{2}, -6, -z\right) = \frac{1}{1443677610375 \sqrt{\pi}} \left( 128 e^{-z/2} z \left( z (z (z (8 z (z (2 z (z (4 z (z (2 z - 75) + 927) - 17325) + 23625) + 6615) + 11025) + 142695) + 189000) + 151200) K_0\left(\frac{z}{2}\right) + (z (z (z (8 z (z (2 z (z (4 z (z (2 z - 73) + 855) - 14043) + 11025) + 19845) + 28665) + 376425) + 589680) + 756000) + 604800) K_1\left(\frac{z}{2}\right) + \left( (z (z (z (8 z (z (2 z (z (4 z (z (2 z - 73) + 855) - 14043) + 11025) + 19845) + 28665) + 376425) + 589680) + 756000) + 604800) I_1\left(\frac{z}{2}\right) - z (z (z (8 z (z (2 z (z (4 z (z (2 z - 75) + 927) - 17325) + 23625) + 6615) + 11025) + 142695) + 189000) + 151200) I_0\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0698.01

$$U\left(\frac{9}{2}, -\frac{11}{2}, z\right) = \frac{1}{24385536000} \left( e^z \sqrt{\pi} (4 z (z (8 z (z (4 z (z (2 z (z (4 z (z + 35) + 1575) + 6300) + 11025) - 6615) + 33075) - 47250) + 496125) - 496125) + 1091475) \operatorname{erfc}(\sqrt{z}) - 2 \sqrt{z} (2 z (8 z (2 z (z (2 z (4 z (z (2 z + 69) + 754) + 2805) + 6615) - 13965) + 19845) - 59535) + 628425) - 1091475) \right)$$

07.33.03.0699.01

$$U\left(\frac{9}{2}, -\frac{11}{2}, -z\right) = \frac{1}{24\,385\,536\,000\,z} \left( e^{-z} \left( z \left( 2 e^z \sqrt{-z} \left( 2z(8z(2z(z(2z(4z(z(z(2z-69)+754)-2805)+6615)+13\,965)+19\,845)+59\,535)+628\,425)+1\,091\,475) + \sqrt{\pi} \left( 4z(z(8z(z(4z(z(2z(z(4(z-35)z+1575)-6300)+11\,025)+6615)+33\,075)+47\,250)+496\,125)+496\,125)+1\,091\,475) \right) - \sqrt{\pi} \sqrt{-z^2} \left( 4z(z(8z(z(4z(z(2z(z(4(z-35)z+1575)-6300)+11\,025)+6615)+33\,075)+47\,250)+496\,125)+496\,125)+1\,091\,475) \operatorname{erfi}(\sqrt{z}) \right) \right) \right) \right)$$

07.33.03.0700.01

$$U\left(\frac{9}{2}, -5, z\right) = \frac{1}{68\,746\,552\,875 \sqrt{\pi}} \left( 128 e^{z/2} z \left( z(z(z(8z(z(2z(z(4z(z+34)+1511)+6300)+15\,435)-1470)+15\,435)-17\,640)+12\,600) K_0\left(\frac{z}{2}\right) - (z(z(z(8z(z(2z(z+17)(4z(z+16)+293)+6615)-5145)+49\,245)-63\,315)+70\,560)-50\,400) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0701.01

$$U\left(\frac{9}{2}, -5, -z\right) = \frac{1}{68\,746\,552\,875 \sqrt{\pi}} \left( 128 e^{-z/2} z \left( z(z(z(8z(z(2z(z(4(z-34)z+1511)-6300)+15\,435)+1470)+15\,435)+17\,640)+12\,600) K_0\left(\frac{z}{2}\right) + (z(z(z(8z(z(2(z-17)z(4(z-16)z+293)+6615)+5145)+49\,245)+63\,315)+70\,560)+50\,400) K_1\left(\frac{z}{2}\right) + \left( (z(z(z(8z(z(2(z-17)z(4(z-16)z+293)+6615)+5145)+49\,245)+63\,315)+70\,560)+50\,400) I_1\left(\frac{z}{2}\right) - z(z(z(8z(z(2z(z(4(z-34)z+1511)-6300)+15\,435)+1470)+15\,435)+17\,640)+12\,600) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0702.01

$$U\left(\frac{9}{2}, -\frac{9}{2}, z\right) = \frac{1}{1\,219\,276\,800} \left( 2 \sqrt{z} \left( 4z(4z(z(2z(2z(4z(z(z+31)+300)+3867)+3675)-6615)+7560)-33\,075)+99\,225) - e^z \sqrt{\pi} \left( 2z(8z(2z(z(2z(4z(z(z(2z+63)+630)+2205)+6615)-6615)+6615)-14\,175)+99\,225)-99\,225) \operatorname{erfc}(\sqrt{z}) \right) \right)$$

07.33.03.0703.01

$$U\left(\frac{9}{2}, -\frac{9}{2}, -z\right) = \frac{1}{281\,302\,875} \left( 4(-z)^{11/2} \left( z^8 - 36z^7 + \frac{945z^6}{2} - \frac{6111z^5}{2} + \frac{48\,195z^4}{4} - 34\,965z^3 + \frac{2\,384\,235z^2}{32} - \frac{3\,246\,075z}{32} + \frac{16\,899\,435}{256} + \frac{1}{16\,384z^6} \right) \left( e^{-z} \left( 2z(8z(2z(z(2z(4z(z(z(2z-63)+630)-2205)+6615)+6615)+6615)+14\,175)+99\,225)+99\,225) \right) \left( -2 e^z z(2z(2z(2z(2z-9)+63)-315)+945)+945 \sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 945 \sqrt{\pi} \sqrt{-z} \right) \right) \right)$$

07.33.03.0704.01

$$U\left(\frac{9}{2}, -4, z\right) = \frac{1}{3\,618\,239\,625\sqrt{\pi}} \left( 64 e^{z/2} z \left( z(z(2z(4z(2z(z(2z(2z+59)+1087)+3378)+3675)-9555)+17955)-16380)+10080) K_1\left(\frac{z}{2}\right) - z(z(2z(4z(2z(z(2z(2z+61)+1203)+4410)+9555)-2205)+4095)-2520) K_0\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0705.01

$$U\left(\frac{9}{2}, -4, -z\right) = \frac{1}{3\,618\,239\,625\sqrt{\pi}} \left( 64 e^{-z/2} z \left( z(z(2z(4z(2z(z(2z(2z-61)+1203)-4410)+9555)+2205)+4095)+2520) K_0\left(\frac{z}{2}\right) + (z(z(2z(4z(2z(z(2z(2z-59)+1087)-3378)+3675)+9555)+17955)+16380)+10080) K_1\left(\frac{z}{2}\right) + \left( (z(z(2z(4z(2z(z(2z(2z-59)+1087)-3378)+3675)+9555)+17955)+16380)+10080) I_1\left(\frac{z}{2}\right) - z(z(2z(4z(2z(z(2z(2z-61)+1203)-4410)+9555)+2205)+4095)+2520) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0706.01

$$U\left(\frac{9}{2}, -\frac{7}{2}, z\right) = \frac{1}{67\,737\,600} \left( e^z \sqrt{\pi} (16z(z(2z(z(8z(z(z(z+28)+245)+735)+3675)-1470)+2205)-1575)+11025) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (2z(2z(2z(2z(2z(2z+55)+927)+5053)+3675)-5355)+8925)-11025) \right)$$

07.33.03.0707.01

$$U\left(\frac{9}{2}, -\frac{7}{2}, -z\right) = \frac{1}{222\,264\,000} \left( (-z)^{9/2} \left( 128z^7 - 4032z^6 + 45024z^5 - 236880z^4 + 710360z^3 - 1440180z^2 + 1879290z - 1145655 - \frac{1}{32z^5} \left( e^{-z} (16z(z(2z(z(8z(z((z-28)z+245)-735)+3675)+1470)+2205)+1575)+11025) \right. \right. \right. \\ \left. \left. \left. \left( 2e^z z(2z(2z(2z-7)+35)-105) + 105\sqrt{\pi}\sqrt{z}\operatorname{erfi}(\sqrt{z}) + 105\sqrt{\pi}\sqrt{-z} \right) \right) \right) \right)$$

07.33.03.0708.01

$$U\left(\frac{9}{2}, -3, z\right) = \frac{1}{212\,837\,625\sqrt{\pi}} \left( 64 e^{z/2} z \left( z(2z(z(8z(z(2z(z+27)+465)+1470)+11025)-315)+315) K_0\left(\frac{z}{2}\right) - 2(z(z(z(16z(z(z(z+26)+207)+540)+3675)-1890)+1260)-630) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0709.01

$$U\left(\frac{9}{2}, -3, -z\right) = \frac{1}{212\,837\,625\sqrt{\pi}} \left( 64 e^{-z/2} z \left( z(2z(z(8z(z(2(z-27)z+465) - 1470) + 11\,025) + 315) + 315) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. 2(z(z(z(16z(z((z-26)z+207) - 540) + 3675) + 1890) + 1260) + 630) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. \left( 2(z(z(z(16z(z((z-26)z+207) - 540) + 3675) + 1890) + 1260) + 630) I_1\left(\frac{z}{2}\right) - \right. \right. \right. \\ \left. \left. \left. z(2z(z(8z(z(2(z-27)z+465) - 1470) + 11\,025) + 315) + 315) I_0\left(\frac{z}{2}\right) \right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0710.01

$$U\left(\frac{9}{2}, -\frac{5}{2}, z\right) = \frac{1}{4\,233\,600} \left( 2\sqrt{z} (4z(z(4z(z(4z(z+24) + 689) + 1536) + 1575) - 840) + 1575) - \right. \\ \left. e^z \sqrt{\pi} (2z(2z(2z(2z(2z(4z^2 + 98z + 735) + 3675) + 3675) - 2205) + 2205) - 1575) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0711.01

$$U\left(\frac{9}{2}, -\frac{5}{2}, -z\right) = \frac{1}{496\,125} \left( 8(-z)^{7/2} \left( z^6 - 27z^5 + \frac{995z^4}{4} - \frac{2025z^3}{2} + \frac{33\,795z^2}{16} - \frac{40\,815z}{16} + \frac{92\,385}{64} + \right. \right. \\ \left. \left. \frac{1}{1024z^4} \left( e^{-z} (2z(2z(2z(2z(2z(4z^2 - 98z + 735) - 3675) + 3675) + 2205) + 2205) + 1575) \right) \right) \right) \\ \left. \left. \left( -2e^z z(2z(2z - 5) + 15) + 15\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 15\sqrt{\pi} \sqrt{-z} \right) \right) \right)$$

07.33.03.0712.01

$$U\left(\frac{9}{2}, -2, z\right) = \frac{1}{14\,189\,175\sqrt{\pi}} \left( 32 e^{z/2} z \left( z(2z(2z(4z(z(2z+45) + 302) + 2549) + 1575) - 1155) + 420) K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. z(2z(2z(4z(z(2z+47) + 346) + 3675) + 5775) - 105) K_0\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0713.01

$$U\left(\frac{9}{2}, -2, -z\right) = \frac{1}{14\,189\,175\sqrt{\pi}} \left( 32 e^{-z/2} z \left( z(2z(2z(4z(z(2z-47) + 346) - 3675) + 5775) + 105) K_0\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(2z(2z(4z(z(2z-45) + 302) - 2549) + 1575) + 1155) + 420) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. \left( z(2z(2z(4z(z(2z-45) + 302) - 2549) + 1575) + 1155) + 420) I_1\left(\frac{z}{2}\right) - \right. \right. \right. \\ \left. \left. \left. z(2z(2z(4z(z(2z-47) + 346) - 3675) + 5775) + 105) I_0\left(\frac{z}{2}\right) \right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0714.01

$$U\left(\frac{9}{2}, -\frac{3}{2}, z\right) = \frac{1}{302\,400} \left( e^z \sqrt{\pi} (4z(z(4z(z(4z(z+21) + 525) + 1050) + 1575) - 315) + 315) \operatorname{erfc}(\sqrt{z}) - \right. \\ \left. 2\sqrt{z} (2z(4z(2z(z(2z+41) + 243) + 843) + 525) - 315) \right)$$

07.33.03.0715.01

$$U\left(\frac{9}{2}, -\frac{3}{2}, -z\right) = \frac{1}{14175} \left( 4(-z)^{5/2} \left( z^5 - \frac{45z^4}{2} + \frac{327z^3}{2} - \frac{1899z^2}{4} + \frac{9333z}{16} - \frac{9153}{32} - \frac{1}{256z^3} \left( e^{-z} (4z(z(4z(z(4(z-21)z+525) - 1050) + 1575) + 315) + 315) \right. \right. \right. \\ \left. \left. \left. \left( 2e^z z(2z-3) + 3\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 3\sqrt{\pi} \sqrt{-z} \right) \right) \right) \right)$$

07.33.03.0716.01

$$U\left(\frac{9}{2}, -1, z\right) = \frac{1}{1091475\sqrt{\pi}} \left( 32e^{z/2} z \left( z(4z(z(4z(z+20) + 489) + 1050) + 2625) K_0\left(\frac{z}{2}\right) - (z(4z(z+3)(4z(z+16) + 223) + 525) - 105) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0717.01

$$U\left(\frac{9}{2}, -1, -z\right) = \frac{1}{1091475\sqrt{\pi}} \left( 32e^{-z/2} z \left( z(4z(z(4(z-20)z + 489) - 1050) + 2625) K_0\left(\frac{z}{2}\right) + (z(4(z-3)z(4(z-16)z + 223) + 525) + 105) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left( z(4z(z(-4(z-20)z - 489) + 1050) - 2625) I_0\left(\frac{z}{2}\right) + (z(4(z-3)z(4(z-16)z + 223) + 525) + 105) I_1\left(\frac{z}{2}\right) \right) \right) \right) \\ (\log(-z) - \log(z)) \right)$$

07.33.03.0718.01

$$U\left(\frac{9}{2}, -\frac{1}{2}, z\right) = \frac{1}{25200} \left( 2\sqrt{z} (4z(2z(2z(z+17) + 159) + 395) + 105) - e^z \sqrt{\pi} (2z(4z(2z(z(2z+35) + 175) + 525) + 525) - 105) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0719.01

$$U\left(\frac{9}{2}, -\frac{1}{2}, -z\right) = \frac{1}{1575} \left( 4(-z)^{3/2} \left( z^4 - 18z^3 + 96z^2 - 171z + \frac{1315}{16} + \frac{1}{64z^2} \left( e^{-z} (2z(4z(2z(z(2z-35) + 175) - 525) + 525) + 105) \left( -2e^z z + \sqrt{\pi} \operatorname{erfi}(\sqrt{z}) \sqrt{z} + \sqrt{\pi} \sqrt{-z} \right) \right) \right) \right)$$

07.33.03.0720.01

$$U\left(\frac{9}{2}, 0, z\right) = \frac{1}{99225\sqrt{\pi}} \left( 16e^{z/2} z \left( (4z(z(4z^2 + 62z + 261) + 291) + 105) K_1\left(\frac{z}{2}\right) - (2z+9)(2z(4z(z+12) + 105) + 105) K_0\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0721.01

$$U\left(\frac{9}{2}, 0, -z\right) = \frac{1}{99225\sqrt{\pi}} \left( 16e^{-z/2} z \left( (2z-9)(2z(4(z-12)z + 105) - 105) K_0\left(\frac{z}{2}\right) + (4z(z(4z^2 - 62z + 261) - 291) + 105) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left( (4z(z(4z^2 - 62z + 261) - 291) + 105) I_1\left(\frac{z}{2}\right) - (2z-9)(2z(4(z-12)z + 105) - 105) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0722.01

$$U\left(\frac{9}{2}, \frac{1}{2}, z\right) = \frac{e^z \sqrt{\pi} (8z(z(2z(z+14)+105)+105)+105) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (2z(4z^2+54z+185)+279)}{2520}$$

07.33.03.0723.01

$$U\left(\frac{9}{2}, \frac{1}{2}, -z\right) = \frac{2}{315} \sqrt{-z} \left( z^3 - \frac{27z^2}{2} + \frac{185z}{4} - \frac{279}{8} - \frac{e^{-z} \sqrt{\pi} (8z(z(2(z-14)z+105)-105)+105) (\sqrt{z} \operatorname{erfi}(\sqrt{z}) + \sqrt{-z})}{16z} \right)$$

07.33.03.0724.01

$$U\left(\frac{9}{2}, 1, z\right) = \frac{16 e^{z/2} ((4z(2z(z+13)+47)+105)+105) K_0\left(\frac{z}{2}\right) - 4z(z(2z(z+12)+71)+44) K_1\left(\frac{z}{2}\right)}{11025 \sqrt{\pi}}$$

07.33.03.0725.01

$$U\left(\frac{9}{2}, 1, -z\right) = \frac{1}{11025 \sqrt{\pi}} \left( 16 e^{-z/2} \left( (4z(2z((z-13)z+47)-105)+105) K_0\left(\frac{z}{2}\right) + 4z(z(2(z-12)z+71)-44) K_1\left(\frac{z}{2}\right) + \left( (4z(105-2z((z-13)z+47))-105) I_0\left(\frac{z}{2}\right) + 4z(z(2(z-12)z+71)-44) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0726.01

$$U\left(\frac{9}{2}, \frac{3}{2}, z\right) = \frac{1}{315} \left( \frac{2z(4z(z+10)+87)+48}{\sqrt{z}} - e^z \sqrt{\pi} (8z^3+84z^2+210z+105) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0727.01

$$U\left(\frac{9}{2}, \frac{3}{2}, -z\right) = \frac{1}{315 \sqrt{-z}} \left( e^{-z} (\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z})) (8z^3-84z^2+210z-105) + \sqrt{\pi} \sqrt{-z} (8z^3-84z^2+210z-105) + e^z (48-2z(4(z-10)z+87)) \right)$$

07.33.03.0728.01

$$U\left(\frac{9}{2}, 2, z\right) = \frac{8 e^{z/2} ((4z(z(2z+17)+29)+15) K_1\left(\frac{z}{2}\right) - (4z(z+5)(2z+9)+105) K_0\left(\frac{z}{2}\right))}{1575 \sqrt{\pi}}$$

07.33.03.0729.01

$$U\left(\frac{9}{2}, 2, -z\right) = \frac{1}{1575 \sqrt{\pi}} \left( 8 e^{-z/2} \left( (4(z-5)z(2z-9)-105) K_0\left(\frac{z}{2}\right) + (4z(z(2z-17)+29)-15) K_1\left(\frac{z}{2}\right) + \left( (105-4(z-5)z(2z-9)) I_0\left(\frac{z}{2}\right) + (4z(z(2z-17)+29)-15) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0730.01

$$U\left(\frac{9}{2}, \frac{5}{2}, z\right) = \frac{2 e^z \sqrt{\pi} (4z(z+7)+35) \operatorname{erfc}(\sqrt{z}) z^{3/2} - 4(z(2z+13)+12)z+8}{105 z^{3/2}}$$

07.33.03.0731.01

$$U\left(\frac{9}{2}, \frac{5}{2}, -z\right) = \frac{1}{105 (-z)^{3/2}} \left( 2 e^{-z} (\sqrt{\pi} (-4(z-7)z-35) \operatorname{erfi}(\sqrt{z}) z^{3/2} + \sqrt{\pi} \sqrt{-z} (-4(z-7)z-35)z + e^z (2z(z(2z-13)+12)+4)) \right)$$



07.33.03.0732.01

$$U\left(\frac{9}{2}, 3, z\right) = \frac{8 e^{z/2} \left( z(2z+3)(2z+9) K_0\left(\frac{z}{2}\right) - (z(4z(z+5)+9) - 3) K_1\left(\frac{z}{2}\right) \right)}{315 \sqrt{\pi} z}$$

07.33.03.0733.01

$$U\left(\frac{9}{2}, 3, -z\right) = \frac{1}{315 \sqrt{\pi} z} \left( 8 e^{-z/2} \left( z(4(z-6)z+27) K_0\left(\frac{z}{2}\right) + (z(4(z-5)z+9)+3) K_1\left(\frac{z}{2}\right) \right) + \left( z(-4(z-6)z-27) I_0\left(\frac{z}{2}\right) + (z(4(z-5)z+9)+3) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0734.01

$$U\left(\frac{9}{2}, \frac{7}{2}, z\right) = \frac{4 \left( -2 e^z \sqrt{\pi} (2z+7) \operatorname{erfc}(\sqrt{z}) z^{5/2} + 4(z(z+3)-1)z+3 \right)}{105 z^{5/2}}$$

07.33.03.0735.01

$$U\left(\frac{9}{2}, \frac{7}{2}, -z\right) = \frac{4 e^{-z} \left( 2 \sqrt{\pi} (2z-7) (-z)^{5/2} + e^z (3-4z((z-3)z-1)) + 2 \sqrt{\pi} z^{5/2} (2z-7) \operatorname{erfi}(\sqrt{z}) \right)}{105 (-z)^{5/2}}$$

07.33.03.0736.01

$$U\left(\frac{9}{2}, 4, z\right) = \frac{4 e^{z/2} \left( z(1-2z(2z+5)) K_0\left(\frac{z}{2}\right) + (z(4z^2+6z-5)+4) K_1\left(\frac{z}{2}\right) \right)}{105 \sqrt{\pi} z^2}$$

07.33.03.0737.01

$$U\left(\frac{9}{2}, 4, -z\right) = \frac{1}{105 \sqrt{\pi} z^2} \left( 4 e^{-z/2} \left( z(2z(2z-5)-1) K_0\left(\frac{z}{2}\right) + (z(4z^2-6z-5)-4) K_1\left(\frac{z}{2}\right) \right) - \left( z(2z(2z-5)-1) I_0\left(\frac{z}{2}\right) + (z(-4z^2+6z+5)+4) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0738.01

$$U\left(\frac{9}{2}, \frac{9}{2}, z\right) = \frac{2 \left( 8 e^z \sqrt{\pi} \operatorname{erfc}(\sqrt{z}) z^{7/2} - 8z^3 + 4z^2 - 6z + 15 \right)}{105 z^{7/2}}$$

07.33.03.0739.01

$$U\left(\frac{9}{2}, \frac{9}{2}, -z\right) = \frac{2 e^{-z} \left( 8 \sqrt{\pi} (-z)^{7/2} + e^z (8z^3 + 4z^2 + 6z + 15) - 8 \sqrt{\pi} z^{7/2} \operatorname{erfi}(\sqrt{z}) \right)}{105 (-z)^{7/2}}$$

07.33.03.0740.01

$$U\left(\frac{9}{2}, 5, z\right) = \frac{4 e^{z/2} \left( z(2(z-1)z+3) K_0\left(\frac{z}{2}\right) - 2(z((z-2)z+4)-6) K_1\left(\frac{z}{2}\right) \right)}{105 \sqrt{\pi} z^3}$$

07.33.03.0741.01

$$U\left(\frac{9}{2}, 5, -z\right) = \frac{1}{105 \sqrt{\pi} z^3} \left( 4 e^{-z/2} \left( z(2z(z+1)+3) K_0\left(\frac{z}{2}\right) + 2(z(z(z+2)+4)+6) K_1\left(\frac{z}{2}\right) \right) + \left( 2(z(z(z+2)+4)+6) I_1\left(\frac{z}{2}\right) - z(2z(z+1)+3) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0742.01

$$U\left(\frac{9}{2}, \frac{11}{2}, z\right) = \frac{1}{z^{9/2}}$$

$$07.33.03.0743.01 \\ U\left(\frac{9}{2}, 6, z\right) = \frac{2 e^{z/2} \left( z(z(2z-9) + 24) K_0\left(\frac{z}{2}\right) - (z-4)(z(2z-3) + 24) K_1\left(\frac{z}{2}\right) \right)}{105 \sqrt{\pi} z^4}$$

$$07.33.03.0744.01 \\ U\left(\frac{9}{2}, 6, -z\right) = -\frac{1}{105 \sqrt{\pi} z^4} \left( 2 e^{-z/2} \left( z(z(2z+9) + 24) K_0\left(\frac{z}{2}\right) + (z+4)(z(2z+3) + 24) K_1\left(\frac{z}{2}\right) \right) + \right. \\ \left. (z+4)(z(2z+3) + 24) I_1\left(\frac{z}{2}\right) - z(z(2z+9) + 24) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \Bigg)$$

**For fixed  $z$  and  $a = 5$**

$$07.33.03.0745.01 \\ U(5, -6, z) = \frac{1}{958003200} \left( e^z (z(z(z(z+44) + 660) + 3960) + 7920) (\text{Chi}(z) - \text{Shi}(z)) z^7 + \right. \\ \left. (z(z(z(z(z(z(z+43) + 618) + 3382) + 5040) - 3024) + 3360) - 5040) + 8640) - 14400) z + 17280 \right)$$

$$07.33.03.0746.01 \\ U\left(5, -\frac{11}{2}, z\right) = \frac{1}{41247931725} \\ \left( 32(z(z(z(z(z(z(z(2z(2z+83) + 2313) + 24975) + 40320) - 12096) + 10080) - 12600) + 18900) - 28350) + \right. \\ \left. 31185) - 16 e^z \sqrt{\pi} z^{13/2} (8z(z(2z(z+42) + 1197) + 6783) + 101745) \text{erfc}(\sqrt{z}) \right)$$

$$07.33.03.0747.01 \\ U\left(5, -\frac{11}{2}, -z\right) = \frac{1}{41247931725} \left( 16 e^{-z} \left( \sqrt{\pi} (8z(z(-2(z-42)z - 1197) + 6783) - 101745) (-z)^{13/2} + 2 e^z \right. \right. \\ \left. \left. (z(z(z(z(z(z(2z(2z-83) + 2313) - 24975) + 40320) + 12096) + 10080) + 12600) + 18900) + 28350) + \right. \right. \\ \left. \left. 31185) + \sqrt{\pi} z^{13/2} (8z(z(-2(z-42)z - 1197) + 6783) - 101745) \text{erfi}(\sqrt{z}) \right) \right)$$

$$07.33.03.0748.01 \\ U(5, -5, z) = \frac{1}{87091200} \left( -e^z (z(z(z(z+40) + 540) + 2880) + 5040) (\text{Chi}(z) - \text{Shi}(z)) z^6 - \right. \\ \left. (z(z(z(z(z(z(z+39) + 502) + 2414) + 3024) - 1680) + 1680) - 2160) + 2880) z + 2880 \right)$$

$$07.33.03.0749.01 \\ U\left(5, -\frac{9}{2}, z\right) = \frac{1}{1964187225} \left( 8 \left( e^z \sqrt{\pi} z^{11/2} (8z(z(2z(z+38) + 969) + 4845) + 62985) \text{erfc}(\sqrt{z}) - \right. \right. \\ \left. \left. 2(z(z(z(z(2z+21)(z(4z(z+27) + 731) + 1152) - 6720) + 5040) - 5400) + 6300) - 5670) \right) \right)$$

$$07.33.03.0750.01 \\ U\left(5, -\frac{9}{2}, -z\right) = \frac{1}{1964187225} \\ \left( 8 e^{-z} \left( \sqrt{\pi} (-8z(z(2(z-38)z + 969) - 4845) - 62985) \text{erfi}(\sqrt{z}) \right) z^{11/2} + \sqrt{\pi} \sqrt{-z} (-8z(z(2(z-38)z + 969) - 4845) - \right. \\ \left. 62985) z^5 + 2 e^z (z(z(z(z(2z-21)(z(4(z-27)z + 731) - 1152) + 6720) + 5040) + 5400) + 6300) + 5670) \right)$$

$$07.33.03.0751.01 \\ U(5, -4, z) = \frac{1}{8709120} \left( e^z (z+6)(z(z(z+30) + 252) + 504) (\text{Chi}(z) - \text{Shi}(z)) z^5 + \right. \\ \left. (z(z(z(z(z(z+35) + 398) + 1650) + 1680) - 840) + 720) - 720) z + 576 \right)$$

$$\begin{aligned}
 & \text{07.33.03.0752.01} \\
 U\left(5, -\frac{7}{2}, z\right) &= \frac{1}{103378275} \left( 8(z(z(z(z(z(2z(2z+67)+1465)+11919)+13440)-3360)+2160)-1800)+1260) - \right. \\
 & \left. 4e^z \sqrt{\pi} z^{9/2} (8z(z(2z(z+34)+765)+3315)+36465) \operatorname{erfc}(\sqrt{z}) \right)
 \end{aligned}$$

$$\begin{aligned}
 & \text{07.33.03.0753.01} \\
 U\left(5, -\frac{7}{2}, -z\right) &= \frac{1}{103378275} \left( 4e^{-z} \left( \sqrt{\pi} (-8z(z(2(z-34)z+765)-3315)-36465) (-z)^{9/2} + \right. \right. \\
 & \left. \left. 2e^z (z(z(z(z(2z(2z-67)+1465)-11919)+13440)+3360)+2160)+1800)+1260) + \right. \\
 & \left. \sqrt{\pi} z^{9/2} (-8z(z(2(z-34)z+765)-3315)-36465) \operatorname{erfi}(\sqrt{z}) \right)
 \end{aligned}$$

$$\begin{aligned}
 & \text{07.33.03.0754.01} \\
 U(5, -3, z) &= \frac{1}{967680} \left( -e^z (z(z(z(z+32)+336)+1344)+1680) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^4 - \right. \\
 & \left. (z(z(z(z(z+31)+306)+1066)+840)-360)+240) z + 144 \right)
 \end{aligned}$$

$$\begin{aligned}
 & \text{07.33.03.0755.01} \\
 U\left(5, -\frac{5}{2}, z\right) &= \frac{1}{6081075} \left( 2e^z \sqrt{\pi} z^{7/2} (8z(z(2z(z+30)+585)+2145)+19305) \operatorname{erfc}(\sqrt{z}) - \right. \\
 & \left. 4(z(z(z(z(2z(2z+59)+1113)+7575)+6720)-1440)+720)-360) \right)
 \end{aligned}$$

$$\begin{aligned}
 & \text{07.33.03.0756.01} \\
 U\left(5, -\frac{5}{2}, -z\right) &= \frac{1}{6081075} \left( e^{-z} \left( 2\sqrt{\pi} (8z(z(2(z-30)z+585)-2145)+19305) (-z)^{7/2} + \right. \right. \\
 & \left. \left. 4e^z (z(z(z(z(2z(2z-59)+1113)-7575)+6720)+1440)+720)+360) - \right. \right. \\
 & \left. \left. 2\sqrt{\pi} z^{7/2} (8z(z(2(z-30)z+585)-2145)+19305) \operatorname{erfi}(\sqrt{z}) \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 & \text{07.33.03.0757.01} \\
 U(5, -2, z) &= \\
 & \frac{1}{120960} \left( e^z (z(z(z(z+28)+252)+840)+840) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^3 + (z(z(z(z+27)+226)+638)+360)-120) z + 48 \right)
 \end{aligned}$$

$$\begin{aligned}
 & \text{07.33.03.0758.01} \\
 U\left(5, -\frac{3}{2}, z\right) &= \frac{1}{405405} \left( -e^z \sqrt{\pi} (8z(z(2z(z+26)+429)+1287)+9009) \operatorname{erfc}(\sqrt{z}) z^{5/2} + \right. \\
 & \left. 2(z(z(2z(2z+51)+809)+4431)+2880)-480) z + 288 \right)
 \end{aligned}$$

$$\begin{aligned}
 & \text{07.33.03.0759.01} \\
 U\left(5, -\frac{3}{2}, -z\right) &= \frac{1}{405405} \left( e^{-z} \left( \sqrt{\pi} (-8z(z(2(z-26)z+429)-1287)-9009) (-z)^{5/2} + \right. \right. \\
 & \left. \left. 2e^z (z(z(z(2z(2z-51)+809)-4431)+2880)+480)+144) + \right. \right. \\
 & \left. \left. \sqrt{\pi} z^{5/2} (-8z(z(2(z-26)z+429)-1287)-9009) \operatorname{erfi}(\sqrt{z}) \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 & \text{07.33.03.0760.01} \\
 U(5, -1, z) &= \frac{1}{17280} \left( -e^z (z(z(z(z+24)+180)+480)+360) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^2 - (z(z(z(z+23)+158)+342)+120) z + 24 \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0761.01 \\
 U\left(5, -\frac{1}{2}, z\right) &= \frac{1}{62370} \left( e^z \sqrt{\pi} z^{3/2} (8z(z(2z(z+22)+297)+693)+3465) \operatorname{erfc}(\sqrt{z}) - 2(z(z(2z(4z^2+86z+553)+2295)+960)-96) \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0762.01 \\
 U\left(5, -\frac{1}{2}, -z\right) &= \frac{1}{62370} \left( e^{-z} \left( \sqrt{\pi} (-8z(z(2(z-22)z+297)-693)-3465) \operatorname{erfi}(\sqrt{z}) z^{3/2} + \sqrt{\pi} \sqrt{-z} (-8z(z(2(z-22)z+297)-693)-3465)z + 2e^z (z(z(2z(4z^2-86z+553)-2295)+960)+96) \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0763.01 \\
 U(5, 0, z) &= \frac{z(z+11)(z(z+8)+14) + e^z z(z(z(z+20)+120)+240)+120(\operatorname{Chi}(z) - \operatorname{Shi}(z)) + 24}{2880}
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0764.01 \\
 U\left(5, \frac{1}{2}, z\right) &= \frac{1}{11340} \left( 2(z(2z+5)(4z(z+15)+195)+192) - e^z \sqrt{\pi} \sqrt{z} (8z(z(2z(z+18)+189)+315)+945) \operatorname{erfc}(\sqrt{z}) \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0765.01 \\
 U\left(5, \frac{1}{2}, -z\right) &= \frac{1}{11340} \left( e^{-z} \left( 2e^z (z(2z-5)(4(z-15)z+195)+192) + \sqrt{\pi} \sqrt{-z} (-8z(z(2(z-18)z+189)-315)-945) + \sqrt{\pi} \sqrt{z} (-8z(z(2(z-18)z+189)-315)-945) \operatorname{erfi}(\sqrt{z}) \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0766.01 \\
 U(5, 1, z) &= \frac{1}{576} \left( -z(z(z+15)+58) - e^z (z(z+4)(z(z+12)+24)+24) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) - 50 \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0767.01 \\
 U\left(5, \frac{3}{2}, z\right) &= \frac{e^z \sqrt{\pi} (8z(z(2z(z+14)+105)+105)+105) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (2z(4z^2+54z+185)+279)}{2520\sqrt{z}}
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0768.01 \\
 U\left(5, \frac{3}{2}, -z\right) &= \frac{1}{2520z} \left( e^{-z} \left( 2e^z z(2z(4z^2-54z+185)-279) + \sqrt{\pi} \sqrt{-z} (8z(z(-2(z-14)z-105)+105)-105) + \sqrt{\pi} \sqrt{z} (8z(z(-2(z-14)z-105)+105)-105) \operatorname{erfi}(\sqrt{z}) \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0769.01 \\
 U(5, 2, z) &= \frac{(z+3)(z(z+8)+2) + e^z z(z(z+6)^2+24) (\operatorname{Chi}(z) - \operatorname{Shi}(z))}{144z}
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0770.01 \\
 U\left(5, \frac{5}{2}, z\right) &= \frac{2\sqrt{z} (2z+5)(4z(z+7)+3) - e^z \sqrt{\pi} (8z(z(2z(z+10)+45)+15)-15) \operatorname{erfc}(\sqrt{z})}{720z^{3/2}}
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0771.01 \\
 U\left(5, \frac{5}{2}, -z\right) &= \frac{1}{720z^2} \left( e^{-z} \left( 2e^z z(2z-5)(4(z-7)z+3) + \sqrt{\pi} \sqrt{-z} (15-8z(z(2(z-10)z+45)-15)) + \sqrt{\pi} \sqrt{z} (15-8z(z(2(z-10)z+45)-15)) \operatorname{erfi}(\sqrt{z}) \right) \right)
 \end{aligned}$$

07.33.03.0772.01

$$U(5, 3, z) = -\frac{e^z (z+2)(z+6)(\text{Chi}(z) - \text{Shi}(z))z^2 + (z+1)(z+6)z - 2}{48z^2}$$

07.33.03.0773.01

$$U\left(5, \frac{7}{2}, z\right) = \frac{e^z \sqrt{\pi} (8z(z(2z(z+6)+9)-3)+9) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (2z(4z^2+22z+9)-9)}{288z^{5/2}}$$

07.33.03.0774.01

$$U\left(5, \frac{7}{2}, -z\right) = \frac{1}{288z^3} \left( e^{-z} \left( 2e^z z (2z(4z^2 - 22z + 9) + 9) - \sqrt{\pi} \sqrt{-z} (8z(z(2(z-6)z+9)+3)+9) - \sqrt{\pi} \sqrt{z} (8z(z(2(z-6)z+9)+3)+9) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0775.01

$$U(5, 4, z) = \frac{e^z (z+4)(\text{Chi}(z) - \text{Shi}(z))z^3 + (z(z+3)-2)z + 2}{24z^3}$$

07.33.03.0776.01

$$U\left(5, \frac{9}{2}, z\right) = \frac{2\sqrt{z} (2z+5)(4(z-1)z+3) - e^z \sqrt{\pi} (8z(z(2z(z+2)-3)+3)-15) \operatorname{erfc}(\sqrt{z})}{192z^{7/2}}$$

07.33.03.0777.01

$$U\left(5, \frac{9}{2}, -z\right) = \frac{1}{192z^4} \left( e^{-z} \left( 2e^z z (2z-5)(4z(z+1)+3) + \sqrt{\pi} \sqrt{-z} (8z(z(3-2(z-2)z)+3)+15) + \sqrt{\pi} \sqrt{z} (8z(z(3-2(z-2)z)+3)+15) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0778.01

$$U(5, 5, z) = \frac{-e^z (\text{Chi}(z) - \text{Shi}(z))z^4 + (-z^2 + z - 2)z + 6}{24z^4}$$

07.33.03.0779.01

$$U\left(5, \frac{11}{2}, z\right) = \frac{2\sqrt{z} (105 - 2z(2z(2z-5)+25)) + e^z \sqrt{\pi} (8z(z(2(z-2)z+9)-15)+105) \operatorname{erfc}(\sqrt{z})}{384z^{9/2}}$$

07.33.03.0780.01

$$U\left(5, \frac{11}{2}, -z\right) = \frac{1}{384z^5} \left( e^{-z} \left( 2e^z z (2z(2z(2z+5)+25)+105) - \sqrt{\pi} \sqrt{-z} (8z(z(2z(z+2)+9)+15)+105) - \sqrt{\pi} \sqrt{z} (8z(z(2z(z+2)+9)+15)+105) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0781.01

$$U(5, 6, z) = \frac{1}{z^5}$$

**For fixed  $z$  and  $a = \frac{11}{2}$**



07.33.03.0786.01

$$U\left(\frac{11}{2}, -5, z\right) = \frac{1}{12993098493375\sqrt{\pi}} \left( 256 e^{z/2} z \left( 8z(z(z(z(2z(z(4z(z(2z(z+48)+1641)+12264)+155925)+158760)-19845)+22680)-22680)+14175) K_0\left(\frac{z}{2}\right) - (z(z(8z(2z(z(2z(2z(z(z+47)+774)+10761)+57813)+59535)-39690)+82215)-739935)+725760) - 453600) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0787.01

$$U\left(\frac{11}{2}, -5, -z\right) = -\frac{1}{12993098493375\sqrt{\pi}} \left( 256 e^{-z/2} z \left( 8z(z(z(z(2z(z(4z(z(2(z-48)z+1641)-12264)+155925)-158760)-19845)-22680)-22680)-14175) K_0\left(\frac{z}{2}\right) + (z(z(8z(2z(z(2z(2z(z((z-47)z+774)-10761)+57813)-59535)-39690)-82215)-739935)-725760) - 453600) K_1\left(\frac{z}{2}\right) - \left( 8z(z(z(z(2z(z(4z(z(2(z-48)z+1641)-12264)+155925)-158760)-19845)-22680)-22680)-14175) I_0\left(\frac{z}{2}\right) + (z(z(739935-8z(2z(z(2z(2z(z((z-47)z+774)-10761)+57813)-59535)-39690)-82215)) + 725760) + 453600) I_1\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0788.01

$$U\left(\frac{11}{2}, -\frac{9}{2}, z\right) = \frac{1}{109734912000} \left( 2\sqrt{z} (2z(8z(2z(z(2z(4z(z(z(2z+89)+1374)+8805)+83955)+59535)-46305)+91665)-694575)+893025) - e^z \sqrt{\pi} (4z(z(8z(z(4z(z(2z(z(z+45)+2835)+18900)+99225)+59535)-99225)+85050)-637875)+496125) - 893025) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0789.01

$$U\left(\frac{11}{2}, -\frac{9}{2}, -z\right) = \frac{1}{1620304560000} \left( (-z)^{11/2} \left( -512z^9 + 25344z^8 - 474624z^7 + 4435200z^6 - 23889600z^5 + 86153760z^4 - 232938720z^3 + 457546320z^2 - 571507650z + 337889475 + \frac{1}{64z^6} \left( e^{-z} (4z(z(8z(z(4z(z(2z(z(4(z-45)z+2835)-18900)+99225)-59535)-99225)-85050)-637875)-496125) - 893025) \right) \right) \right) \left( 2e^z z (2z(2z(2z(2z-9)+63)-315)+945) - 945\sqrt{\pi}\sqrt{z}\operatorname{erfi}(\sqrt{z}) - 945\sqrt{\pi}\sqrt{-z} \right) \right)$$

07.33.03.0790.01

$$U\left(\frac{11}{2}, -4, z\right) = \frac{1}{618718975875\sqrt{\pi}} \left( 128 e^{z/2} z \left( z(z(8z(z(2z(z(4z(z(2z+85)+1251)+30615)+70797)+59535)-33075)+214515)-170100) + 90720) K_1\left(\frac{z}{2}\right) - z(z(8z(z(2z(z(4z(z(2z+87)+1335)+35457)+99225)+178605)-6615)+42525)-22680) K_0\left(\frac{z}{2}\right) \right)$$

07.33.03.0791.01

$$U\left(\frac{11}{2}, -4, -z\right) = -\frac{1}{618718975875\sqrt{\pi}} \left( 128 e^{-z/2} z \left( z(z(8z(z(2z(z(4z(z(2z-87)+1335)-35457)+99225)-178605)-6615)-42525)-22680) K_0\left(\frac{z}{2}\right) + (z(z(8z(z(2z(z(4z(z(2z-85)+1251)-30615)+70797)-59535)-33075)-214515)-170100)-90720) K_1\left(\frac{z}{2}\right) - (z(z(8z(z(2z(z(4z(z(2z-87)+1335)-35457)+99225)-178605)-6615)-42525)-22680) I_0\left(\frac{z}{2}\right) + (z(z(214515-8z(z(2z(z(4z(z(2z-85)+1251)-30615)+70797)-59535)-33075)) + 170100) + 90720) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0792.01

$$U\left(\frac{11}{2}, -\frac{7}{2}, z\right) = \frac{1}{5486745600} \left( e^z \sqrt{\pi} (2z(8z(2z(z(2z(4z(z+21)(z(2z+39)+315)+59535)+59535)-19845)+25515)-127575)+99225) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (8z(z(8z(2z(z(z(2z(z+40)+1095)+6105)+12288)+6615)-33075)+23625)-99225) \right)$$

07.33.03.0793.01

$$U\left(\frac{11}{2}, -\frac{7}{2}, -z\right) = \frac{1}{281302875} \left( 4(-z)^{9/2} \left( -z^8 + 44z^7 - \frac{1435z^6}{2} + \frac{11319z^5}{2} - \frac{49035z^4}{2} + \frac{132825z^3}{2} - \frac{3964905z^2}{32} + \frac{4695075z}{32} - \frac{20632815}{256} + \frac{1}{8192z^5} \left( e^{-z} (2z(8z(2z(z(2z(4(z-21)z(z(2z-39)+315)+59535)-59535)-19845)-25515)-127575) - 99225) \left( 2e^z z (2z(2z(2z-7)+35)-105) + 105\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + 105\sqrt{\pi} \sqrt{-z} \right) \right) \right)$$

07.33.03.0794.01

$$U\left(\frac{11}{2}, -3, z\right) = \frac{1}{32564156625\sqrt{\pi}} \left( 128 e^{z/2} z \left( z(z(8z(z(2z(z(4z(z+39)+2121)+12315)+59535)+46305)-6615)+2835) K_0\left(\frac{z}{2}\right) - (z(z(8z(z(2z(z(4z(z+38)+1971)+10416)+40395)+13230)-46305)+26460)-11340) K_1\left(\frac{z}{2}\right) \right)$$



07.33.03.0795.01

$$U\left(\frac{11}{2}, -3, -z\right) = -\frac{1}{32564156625\sqrt{\pi}}$$

$$\left(128 e^{-z/2} z \left(z(8z(z(2z(z(4(z-39)z+2121)-12315)+59535)-46305)-6615)-2835) K_0\left(\frac{z}{2}\right) + \right.$$

$$\left. z(z(8z(z(2z(z(4(z-38)z+1971)-10416)+40395)-13230)-46305)-26460)-11340) K_1\left(\frac{z}{2}\right) - \right.$$

$$\left. z(z(8z(z(2z(z(4(z-39)z+2121)-12315)+59535)-46305)-6615)-2835) I_0\left(\frac{z}{2}\right) + \right.$$

$$\left. z(z(46305-8z(z(2z(z(4(z-38)z+1971)-10416)+40395)-13230)) + 26460) + 11340) \right.$$

$$\left. I_1\left(\frac{z}{2}\right) (\log(-z) - \log(z))\right)$$

07.33.03.0796.01

$$U\left(\frac{11}{2}, -\frac{5}{2}, z\right) =$$

$$\frac{1}{304819200} \left(2\sqrt{z} (2z(2z(2z(2z(2z(2z+71)+1695)+16077)+52827)+19845)-17955)+14175) - \right.$$

$$\left. e^z \sqrt{\pi} (16z(z(2z(z(8z(z(z+36)+441)+2205)+33075)+13230)-6615)+2835)-14175) \operatorname{erfc}(\sqrt{z})\right)$$

07.33.03.0797.01

$$U\left(\frac{11}{2}, -\frac{5}{2}, -z\right) =$$

$$\frac{1}{285768000} \left((-z)^{7/2} \left(-128z^7 + 4928z^6 - 68448z^5 + 440880z^4 - 1455000z^3 + 2694780z^2 - 2943090z + 1476585 + \right.$$

$$\left. \frac{1}{16z^4} \left(e^{-z} (16z(z(2z(z(8z(z((z-36)z+441)-2205)+33075)-13230)-6615)-2835)-14175) \right.$$

$$\left. \left(2e^z z(2z(2z-5)+15) - 15\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) - 15\sqrt{\pi} \sqrt{-z}\right)\right)\right)$$

07.33.03.0798.01

$$U\left(\frac{11}{2}, -2, z\right) =$$

$$\frac{1}{1915538625\sqrt{\pi}} \left(64 e^{z/2} z \left(z(2z(4z(2z(z(2z(2z+67)+1503)+6690)+20955)+19845)-12285)+3780) K_1\left(\frac{z}{2}\right) - \right.$$

$$\left. z(2z(4z(2z(z(2z(2z+69)+1635)+8130)+33075)+85995)-945) K_0\left(\frac{z}{2}\right)\right)$$

07.33.03.0799.01

$$U\left(\frac{11}{2}, -2, -z\right) = -\frac{1}{1915538625\sqrt{\pi}} \left( 64 e^{-z/2} z \left( z(2z(4z(2z(z(2z(2z-69)+1635)-8130)+33075)-85995)-945) K_0\left(\frac{z}{2}\right) + (z(2z(4z(2z(z(2z(2z-67)+1503)-6690)+20955)-19845)-12285)-3780) K_1\left(\frac{z}{2}\right) - (z(2z(4z(2z(z(2z(2z-69)+1635)-8130)+33075)-85995)-945) I_0\left(\frac{z}{2}\right) + (z(2z(19845-4z(2z(z(2z(2z-67)+1503)-6690)+20955))+12285)+3780) I_1\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0800.01

$$U\left(\frac{11}{2}, -\frac{3}{2}, z\right) = \frac{1}{19051200} \left( e^z \sqrt{\pi} (2z(2z(2z(2z(2z(2z(2z+63)+1323)+11025)+33075)+19845)-6615)+2835) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (4z(z(4z(z(4z(z+31)+1263)+4938)+25179)+2835)-2835) \right)$$

07.33.03.0801.01

$$U\left(\frac{11}{2}, -\frac{3}{2}, -z\right) = \frac{1}{893025} \left( 8(-z)^{5/2} \left( -z^6 + 33z^5 - \frac{1515z^4}{4} + \frac{3795z^3}{2} - \frac{69939z^2}{16} + \frac{74349z}{16} - \frac{128457}{64} + \frac{1}{512z^3} (e^{-z} (2z(2z(2z(2z(2z(2z(2z-63)+1323)-11025)+33075)-19845)-6615)-2835) (2e^z z(2z-3) + 3\sqrt{\pi}\sqrt{z}\operatorname{erfi}(\sqrt{z}) + 3\sqrt{\pi}\sqrt{-z}) \right) \right)$$

07.33.03.0802.01

$$U\left(\frac{11}{2}, -1, z\right) = \frac{1}{127702575\sqrt{\pi}} \left( 64 e^{z/2} z \left( 2z(2z+9) (z(2z(2z(2z+51)+753)+3255)+1890) K_0\left(\frac{z}{2}\right) - (2z(z(8z(z(2z(z+29)+549)+1986)+18969)+2835)-945) K_1\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0803.01

$$U\left(\frac{11}{2}, -1, -z\right) = -\frac{1}{127702575\sqrt{\pi}} \left( 64 e^{-z/2} z \left( 2z(2z-9) (z(2z(2z(2z-51)+753)-3255)+1890) K_0\left(\frac{z}{2}\right) + (2z(z(8z(z(2(z-29)z+549)-1986)+18969)-2835)-945) K_1\left(\frac{z}{2}\right) - (2z(2z-9) (z(2z(2z(2z-51)+753)-3255)+1890) I_0\left(\frac{z}{2}\right) + (2z(z(-8z(z(2(z-29)z+549)-1986)-18969)+2835)+945) I_1\left(\frac{z}{2}\right) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0804.01

$$U\left(\frac{11}{2}, -\frac{1}{2}, z\right) = \frac{1}{1360800} \left( 2\sqrt{z} (2z(4z(2z(z(2z+53)+447)+2751)+10005)+945) - e^z \sqrt{\pi} (4z(z(4z(z(4z(z+27)+945)+3150)+14175)+2835)-945) \operatorname{erfc}(\sqrt{z}) \right)$$

$$\begin{aligned}
 &07.33.03.0805.01 \\
 U\left(\frac{11}{2}, -\frac{1}{2}, -z\right) &= \frac{1}{340200} \left( (-z)^{3/2} \left( -32z^5 + 880z^4 - 7984z^3 + 28776z^2 - \right. \right. \\
 &\quad \left. \left. 39354z + 15675 - \frac{1}{4z^2} \left( e^{-z} (4z(z(4z(z(4(z-27)z+945) - 3150) + 14175) - 2835) - 945) \right. \right. \right. \\
 &\quad \left. \left. \left. (-2e^z z + \sqrt{\pi} \operatorname{erfi}(\sqrt{z}) \sqrt{z} + \sqrt{\pi} \sqrt{-z}) \right) \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0806.01 \\
 U\left(\frac{11}{2}, 0, z\right) &= \frac{1}{9823275\sqrt{\pi}} \left( 32e^{z/2} z \left( (2z(2z(4z(z(2z+49) + 378) + 4209) + 6927) + 945) K_1\left(\frac{z}{2}\right) - \right. \right. \\
 &\quad \left. \left. (2z(2z(4z(z(2z+51) + 426) + 5631) + 14175) + 10395) K_0\left(\frac{z}{2}\right) \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0807.01 \\
 U\left(\frac{11}{2}, 0, -z\right) &= -\frac{1}{9823275\sqrt{\pi}} \left( 32e^{-z/2} z \left( (2z(2z(4z(z(2z-51) + 426) - 5631) + 14175) - 10395) K_0\left(\frac{z}{2}\right) + \right. \right. \\
 &\quad \left. \left. (2z(2z(4z(z(2z-49) + 378) - 4209) + 6927) - 945) K_1\left(\frac{z}{2}\right) + \right. \right. \\
 &\quad \left. \left. \left( (10395 - 2z(2z(4z(z(2z-51) + 426) - 5631) + 14175)) I_0\left(\frac{z}{2}\right) + \right. \right. \right. \\
 &\quad \left. \left. \left. (2z(2z(4z(z(2z-49) + 378) - 4209) + 6927) - 945) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0808.01 \\
 U\left(\frac{11}{2}, \frac{1}{2}, z\right) &= \frac{1}{113400} \\
 &\quad \left( e^z \sqrt{\pi} (2z(4z(2z(z(2z+45) + 315) + 1575) + 4725) + 945) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (16z(z(z+22) + 147) + 330) + 2895 \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0809.01 \\
 U\left(\frac{11}{2}, \frac{1}{2}, -z\right) &= \frac{1}{14175} \left( 4\sqrt{-z} \left( -z^4 + 22z^3 - 147z^2 + 330z - \right. \right. \\
 &\quad \left. \left. \frac{e^{-z} \sqrt{\pi} (2z(4z(2z(z(2z-45) + 315) - 1575) + 4725) - 945) (\sqrt{z} - \sqrt{-z} \operatorname{erfi}(\sqrt{z})) - 2895}{32\sqrt{-z^2}} - \frac{2895}{16} \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 &07.33.03.0810.01 \\
 U\left(\frac{11}{2}, 1, z\right) &= \frac{1}{893025\sqrt{\pi}} \\
 &\quad \left( 32e^{z/2} \left( (z(4z(z(4z(z+21) + 555) + 1371) + 4725) + 945) K_0\left(\frac{z}{2}\right) - z(4z(z(4z(z+20) + 477) + 930) + 1689) K_1\left(\frac{z}{2}\right) \right) \right)
 \end{aligned}$$

07.33.03.0811.01

$$U\left(\frac{11}{2}, 1, -z\right) = -\frac{1}{893\,025\sqrt{\pi}} \left( 32 e^{-z/2} \left( (z(4z(z(4(z-21)z+555)-1371)+4725)-945) K_0\left(\frac{z}{2}\right) + z(4z(z(4(z-20)z+477)-930)+1689) K_1\left(\frac{z}{2}\right) + (z(4z(z(-4(z-21)z-555)+1371)-4725)+945) I_0\left(\frac{z}{2}\right) + z(4z(z(4(z-20)z+477)-930)+1689) I_1\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

07.33.03.0812.01

$$U\left(\frac{11}{2}, \frac{3}{2}, z\right) = \frac{1}{11\,340\sqrt{z}} \left( 2(z(2z+5)(4z(z+15)+195)+192) - e^z \sqrt{\pi} \sqrt{z} (8z(z(2z(z+18)+189)+315)+945) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0813.01

$$U\left(\frac{11}{2}, \frac{3}{2}, -z\right) = \frac{1}{11\,340\sqrt{-z}} \left( 8z^3 - 132z^2 + 570z + e^{-z} (8z(z(2(z-18)z+189)-315)+945) \left( -\sqrt{\pi} \sqrt{z} \operatorname{erfi}(\sqrt{z}) + e^z - \sqrt{\pi} \sqrt{-z} \right) - 561 \right)$$

07.33.03.0814.01

$$U\left(\frac{11}{2}, 2, z\right) = \frac{1}{99\,225\sqrt{\pi}} \left( 16 e^{z/2} \left( (4z(z(4z^2+62z+261)+291)+105) K_1\left(\frac{z}{2}\right) - (2z+9)(2z(4z(z+12)+105)+105) K_0\left(\frac{z}{2}\right) \right) \right)$$

07.33.03.0815.01

$$U\left(\frac{11}{2}, 2, -z\right) = -\frac{1}{99\,225\sqrt{\pi}} \left( 16 e^{-z/2} \left( (2z-9)(2z(4(z-12)z+105)-105) K_0\left(\frac{z}{2}\right) + (4z(z(4z^2-62z+261)-291)+105) K_1\left(\frac{z}{2}\right) + ((4z(z(4z^2-62z+261)-291)+105) I_1\left(\frac{z}{2}\right) - (2z-9)(2z(4(z-12)z+105)-105) I_0\left(\frac{z}{2}\right)) (\log(-z) - \log(z)) \right) \right)$$

07.33.03.0816.01

$$U\left(\frac{11}{2}, \frac{5}{2}, z\right) = \frac{2 \left( e^z \sqrt{\pi} (2z(4z^2+54z+189)+315) \operatorname{erfc}(\sqrt{z}) - \frac{2(z(z(4z(z+13)+165)+96)-12)}{z^{3/2}} \right)}{2835}$$

07.33.03.0817.01

$$U\left(\frac{11}{2}, \frac{5}{2}, -z\right) = -\frac{1}{2835(-z)^{3/2}} \left( 2 e^{-z} \left( \sqrt{\pi} (315-2z(4z^2-54z+189)) \operatorname{erfi}(\sqrt{z}) z^{3/2} + \sqrt{\pi} \sqrt{-z} (315-2z(4z^2-54z+189)) z + 2 e^z (z(z(4(z-13)z+165)-96)-12) \right) \right)$$

07.33.03.0818.01

$$U\left(\frac{11}{2}, 3, z\right) = \frac{16 e^{z/2} (4z(z(2z(z+12)+75)+60) K_0\left(\frac{z}{2}\right) - (4z(2z(z(z+11)+27)+15)-15) K_1\left(\frac{z}{2}\right))}{14\,175\sqrt{\pi} z}$$

07.33.03.0819.01

$$U\left(\frac{11}{2}, 3, -z\right) = -\frac{1}{14175\sqrt{\pi}z} \left( 16e^{-z/2} \left( 4z(z(2(z-12)z+75)-60)K_0\left(\frac{z}{2}\right) + (4z(2z((z-11)z+27)-15)-15)K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. (4z(z(2(z-12)z+75)-60)I_0\left(\frac{z}{2}\right) + (4z(15-2z((z-11)z+27))+15)I_1\left(\frac{z}{2}\right))(\log(-z)-\log(z)) \right) \right)$$

07.33.03.0820.01

$$U\left(\frac{11}{2}, \frac{7}{2}, z\right) = \frac{8(z(z(z(2z+17)+24)-6)+3) - 4e^z\sqrt{\pi}z^{5/2}(4z(z+9)+63)\operatorname{erfc}(\sqrt{z})}{945z^{5/2}}$$

07.33.03.0821.01

$$U\left(\frac{11}{2}, \frac{7}{2}, -z\right) = \frac{1}{945(-z)^{5/2}} \left( 4e^{-z}(\sqrt{\pi}(-4(z-9)z-63)(-z)^{5/2} + 2e^z(z(z(z(2z-17)+24)+6)+3) + \sqrt{\pi}z^{5/2}(-4(z-9)z-63)\operatorname{erfi}(\sqrt{z})) \right)$$

07.33.03.0822.01

$$U\left(\frac{11}{2}, 4, z\right) = \frac{8e^{z/2}((z(4z(z(2z+13)+9)-21)+12)K_1\left(\frac{z}{2}\right) - z(4z(z(2z+15)+21)-3)K_0\left(\frac{z}{2}\right))}{2835\sqrt{\pi}z^2}$$

07.33.03.0823.01

$$U\left(\frac{11}{2}, 4, -z\right) = -\frac{1}{2835\sqrt{\pi}z^2} \left( 8e^{-z/2} \left( z(4z(z(2z-15)+21)+3)K_0\left(\frac{z}{2}\right) + (z(4z(z(2z-13)+9)+21)+12)K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(4z(z(2z-13)+9)+21)+12)I_1\left(\frac{z}{2}\right) - z(4z(z(2z-15)+21)+3)I_0\left(\frac{z}{2}\right) \right) (\log(-z)-\log(z)) \right)$$

07.33.03.0824.01

$$U\left(\frac{11}{2}, \frac{9}{2}, z\right) = \frac{4(4e^z\sqrt{\pi}(2z+9)\operatorname{erfc}(\sqrt{z})z^{7/2} - 4(z(2z(z+4)-3)+3)z+15)}{945z^{7/2}}$$

07.33.03.0825.01

$$U\left(\frac{11}{2}, \frac{9}{2}, -z\right) = -\frac{1}{945(-z)^{7/2}} \left( 4e^{-z}(-4\sqrt{\pi}(9-2z)(-z)^{7/2} + e^z(4z(z(2(z-4)z-3)-3)-15) + 4\sqrt{\pi}(9-2z)z^{7/2}\operatorname{erfi}(\sqrt{z})) \right)$$

07.33.03.0826.01

$$U\left(\frac{11}{2}, 5, z\right) = \frac{8e^{z/2}(z(z(4z(z+3)-3)+3)K_0\left(\frac{z}{2}\right) + (12-z(z(4z(z+2)-9)+12))K_1\left(\frac{z}{2}\right))}{945\sqrt{\pi}z^3}$$

07.33.03.0827.01

$$U\left(\frac{11}{2}, 5, -z\right) = -\frac{1}{945\sqrt{\pi}z^3} \left( 8e^{-z/2} \left( z(z(4(z-3)z-3)-3)K_0\left(\frac{z}{2}\right) + (z(z(4(z-2)z-9)-12)-12)K_1\left(\frac{z}{2}\right) - \right. \right. \\ \left. \left. (z(z(4(z-3)z-3)-3)I_0\left(\frac{z}{2}\right) + (z(z(9-4(z-2)z)+12)+12)I_1\left(\frac{z}{2}\right))(\log(-z)-\log(z)) \right) \right)$$

07.33.03.0828.01

$$U\left(\frac{11}{2}, \frac{11}{2}, z\right) = \frac{-32e^z\sqrt{\pi}\operatorname{erfc}(\sqrt{z})z^{9/2} + 4(8z^3 - 4z^2 + 6z - 15)z + 210}{945z^{9/2}}$$

07.33.03.0829.01

$$U\left(\frac{11}{2}, \frac{11}{2}, -z\right) = \frac{e^{-z} \left( -32 \sqrt{\pi} (-z)^{9/2} + 2 e^z (2z(8z^3 + 4z^2 + 6z + 15) + 105) - 32 \sqrt{\pi} z^{9/2} \operatorname{erfi}(\sqrt{z}) \right)}{945 (-z)^{9/2}}$$

07.33.03.0830.01

$$U\left(\frac{11}{2}, 6, z\right) = -\frac{4 e^{z/2} \left( z(z(4z^2 - 6z + 15) - 24) K_0\left(\frac{z}{2}\right) + (z(z(2(5 - 2z)z - 27) + 60) - 96) K_1\left(\frac{z}{2}\right) \right)}{945 \sqrt{\pi} z^4}$$

07.33.03.0831.01

$$U\left(\frac{11}{2}, 6, -z\right) = -\frac{1}{945 \sqrt{\pi} z^4} \left( 4 e^{-z/2} \left( z(z(4z^2 + 6z + 15) + 24) K_0\left(\frac{z}{2}\right) + (z(z(2z(2z + 5) + 27) + 60) + 96) K_1\left(\frac{z}{2}\right) + \right. \right. \\ \left. \left. (z(z(2z(2z + 5) + 27) + 60) + 96) I_1\left(\frac{z}{2}\right) - z(z(4z^2 + 6z + 15) + 24) I_0\left(\frac{z}{2}\right) \right) (\log(-z) - \log(z)) \right)$$

**For fixed  $z$  and  $a = 6$**

07.33.03.0832.01

$$U(6, -6, z) = \frac{1}{57480192000} \left( e^z (z(z(z(z(z + 60) + 1320) + 13200) + 59400) + 95040) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^7 + \right. \\ \left. (z(z(z(z(z(z(z + 59) + 1262) + 11994) + 48504) + 55440) - 30240) + 30240) - 40320) + 60480) - 86400) z + 86400 \right)$$

07.33.03.0833.01

$$U\left(6, -\frac{11}{2}, z\right) = \frac{1}{4743512148375} \\ \left( 32(z(z(z(z(z(z(4z(2z(2z(z + 57) + 2359) + 43635) + 701145) + 887040) - 241920) + 181440) - 201600) + \right. \\ \left. 264600) - 340200) + 311850) - 16 e^z \sqrt{\pi} z^{13/2} (2z(4z(2z(z(2z + 115) + 2415) + 45885) + 780045) + 2340135) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0834.01

$$U\left(6, -\frac{11}{2}, -z\right) = -\frac{1}{4743512148375} \left( 16 e^{-z} \left( \sqrt{\pi} (2340135 - 2z(4z(2z(z(2z - 115) + 2415) - 45885) + 780045)) (-z)^{13/2} + \right. \right. \\ \left. \left. 2 e^z (z(z(z(z(z(z(4z(2z(2z(z - 57)z + 2359) - 43635) + 701145) - 887040) - 241920) - 181440) - 201600) - 264600) - 340200) - 311850) + \right. \right. \\ \left. \left. \sqrt{\pi} z^{13/2} (2340135 - 2z(4z(2z(z(2z - 115) + 2415) - 45885) + 780045)) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0835.01

$$U(6, -5, z) = \frac{1}{4790016000} \left( -e^z (z(z(z(z(z + 55) + 1100) + 9900) + 39600) + 55440) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^6 - \right. \\ \left. (z(z(z(z(z(z(z + 54) + 1047) + 8904) + 31594) + 30240) - 15120) + 13440) - 15120) + 17280) z + 14400 \right)$$

07.33.03.0836.01

$$U\left(6, -\frac{9}{2}, z\right) = \frac{1}{206239658625} \left( 8 \left( e^z \sqrt{\pi} z^{11/2} (2z(4z(2z(z(2z + 105) + 1995) + 33915) + 508725) + 1322685) \operatorname{erfc}(\sqrt{z}) - 2 \right. \right. \\ \left. \left. (z(z(z(z(z(z(8z(2z(z(z + 52) + 972) + 16035) + 451395) + 483840) - 120960) + 80640) - 75600) + 75600) - 56700) \right) \right)$$

07.33.03.0837.01

$$U\left(6, -\frac{9}{2}, -z\right) = -\frac{1}{206239658625} \left( 8 e^{-z} \left( \sqrt{\pi} (1322685 - 2z(4z(2z(z(2z-105) + 1995) - 33915) + 508725)) \operatorname{erfi}(\sqrt{z}) z^{11/2} + \sqrt{\pi} \sqrt{-z} (1322685 - 2z(4z(2z(z(2z-105) + 1995) - 33915) + 508725)) z^5 + 2 e^z (z(z(z(z(z(8z(2z((z-52)z + 972) - 16035) + 451395) - 483840) - 120960) - 80640) - 75600) - 75600) - 56700) \right) \right)$$

07.33.03.0838.01

$$U(6, -4, z) = \frac{1}{435456000} \left( e^z (z(z(z(z(z+50) + 900) + 7200) + 25200) + 30240) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^5 + (z(z(z(z(z(z+49) + 852) + 6394) + 19524) + 15120) - 6720) + 5040) - 4320) z + 2880 \right)$$

07.33.03.0839.01

$$U\left(6, -\frac{7}{2}, z\right) = \frac{1}{9820936125} \left( 8(z(z(z(z(z(4z(2z(2z(z+47) + 1569) + 22745) + 274845) + 241920) - 53760) + 30240) - 21600) + 12600) - 4 e^z \sqrt{\pi} z^{9/2} (2z(4z(2z(z(2z+95) + 1615) + 24225) + 314925) + 692835) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0840.01

$$U\left(6, -\frac{7}{2}, -z\right) = -\frac{1}{9820936125} \left( 4 e^{-z} \left( \sqrt{\pi} (692835 - 2z(4z(2z(z(2z-95) + 1615) - 24225) + 314925)) (-z)^{9/2} + 2 e^z (z(z(z(z(z(4z(2z(2z(z-47)z + 1569) - 22745) + 274845) - 241920) - 53760) - 30240) - 21600) - 12600) + \sqrt{\pi} z^{9/2} (692835 - 2z(4z(2z(z(2z-95) + 1615) - 24225) + 314925)) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0841.01

$$U(6, -3, z) = \frac{1}{43545600} \left( -e^z (z(z(z(z(z+45) + 720) + 5040) + 15120) + 15120) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^4 - (z(z(z(z(z(z+44) + 677) + 4404) + 11274) + 6720) - 2520) + 1440) z + 720 \right)$$

07.33.03.0842.01

$$U\left(6, -\frac{5}{2}, z\right) = \frac{1}{516891375} \left( 2 e^z \sqrt{\pi} z^{7/2} (2z(4z(2z(z(2z+85) + 1275) + 16575) + 182325) + 328185) \operatorname{erfc}(\sqrt{z}) - 4(z(z(z(z(16z(z(z+42) + 617) + 3855) + 155655) + 107520) - 20160) + 8640) - 3600) \right)$$

07.33.03.0843.01

$$U\left(6, -\frac{5}{2}, -z\right) = \frac{1}{516891375} \left( e^{-z} \left( -2 \sqrt{\pi} (2z(4z(2z(z(2z-85) + 1275) - 16575) + 182325) - 328185) (-z)^{7/2} - 4 e^z (z(z(z(z(16z(z((z-42)z + 617) - 3855) + 155655) - 107520) - 20160) - 8640) - 3600) + 2 \sqrt{\pi} z^{7/2} (2z(4z(2z(z(2z-85) + 1275) - 16575) + 182325) - 328185) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0844.01

$$U(6, -2, z) = \frac{1}{4838400} \left( e^z (z(z(z(z(z+40) + 560) + 3360) + 8400) + 6720) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^3 + (z(z(z(z(z+39) + 522) + 2874) + 5944) + 2520) - 720) z + 240 \right)$$

07.33.03.0845.01

$$U\left(6, -\frac{3}{2}, z\right) = \frac{1}{30405375} \left( 2(z(z(z(4z(2z(2z(z+37)+939)+9855)+79905)+40320)-5760)+1440) - e^z \sqrt{\pi} z^{5/2} (2z(4z(2z(2z(z+75)+975)+10725)+96525)+135135) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0846.01

$$U\left(6, -\frac{3}{2}, -z\right) = \frac{1}{30405375} \left( e^{-z} \left( \sqrt{\pi} (2z(4z(2z(2z(z-75)+975)-10725)+96525)-135135) (-z)^{5/2} - 2e^z (z(z(z(4z(2z(2z(z-37)z+939)-9855)+79905)-40320)-5760)-1440) + \sqrt{\pi} z^{5/2} (2z(4z(2z(2z(z-75)+975)-10725)+96525)-135135) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0847.01

$$U(6, -1, z) = \frac{1}{604800} \left( -e^z (z(z(z(z(z+35)+420)+2100)+4200)+2520) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^2 - (z(z(z(z(z+34)+387)+1744)+2754)+720) z + 120 \right)$$

07.33.03.0848.01

$$U\left(6, -\frac{1}{2}, z\right) = \frac{1}{4054050} \left( e^z \sqrt{\pi} z^{3/2} (2z(4z(2z(z(2z+65)+715)+6435)+45045)+45045) \operatorname{erfc}(\sqrt{z}) - 2(z(z(8z(2z(z(z+32)+342)+2905)+35595)+11520)-960) \right)$$

07.33.03.0849.01

$$U\left(6, -\frac{1}{2}, -z\right) = \frac{1}{4054050} \left( e^{-z} \left( \sqrt{\pi} (2z(4z(2z(z(2z-65)+715)-6435)+45045)-45045) \operatorname{erfi}(\sqrt{z}) z^{3/2} + \sqrt{\pi} \sqrt{-z} (2z(4z(2z(z(2z-65)+715)-6435)+45045)-45045) z - 2e^z (z(z(8z(2z(z(z-32)z+342)-2905)+35595)-11520)-960) \right) \right)$$

07.33.03.0850.01

$$U(6, 0, z) = \frac{1}{86400} (z(z(z(z(z+29)+272)+954)+1044) + e^z z(z(z(z(z+30)+300)+1200)+1800)+720) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) + 120$$

07.33.03.0851.01

$$U\left(6, \frac{1}{2}, z\right) = \frac{1}{623700} \left( 2z(4z(2z(2z(z+27)+469)+3045)+12645) - e^z \sqrt{\pi} \sqrt{z} (2z(4z(2z(z(2z+55)+495)+3465)+17325)+10395) \operatorname{erfc}(\sqrt{z}) + 3840 \right)$$

07.33.03.0852.01

$$U\left(6, \frac{1}{2}, -z\right) = \frac{1}{623700} \left( e^{-z} \left( e^z (3840 - 2z(4z(2z(2(z-27)z+469)-3045)+12645)) + \sqrt{\pi} \sqrt{-z} (2z(4z(2z(z(2z-55)+495)-3465)+17325)-10395) + \sqrt{\pi} \sqrt{z} (2z(4z(2z(z(2z-55)+495)-3465)+17325)-10395) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0853.01

$$U(6, 1, z) = \frac{1}{14400} (-z(z(z(z(z+24)+177)+444) - e^z (z(z(z(z+10)+20)(z(z+15)+30)+120) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) - 274)$$



07.33.03.0854.01

$$U\left(6, \frac{3}{2}, z\right) = \frac{1}{113400 \sqrt{z}} \left( e^z \sqrt{\pi} (2z(4z(2z(z(2z+45)+315)+1575)+4725)+945) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (16z(z(z(2z+22)+147)+330)+2895) \right)$$

07.33.03.0855.01

$$U\left(6, \frac{3}{2}, -z\right) = \frac{1}{113400 z} \left( e^{-z} \left( -2e^z z (16z(z((z-22)z+147)-330)+2895) + \sqrt{\pi} \sqrt{-z} (2z(4z(2z(z(2z-45)+315)-1575)+4725)-945) + \sqrt{\pi} \sqrt{z} (2z(4z(2z(z(2z-45)+315)-1575)+4725)-945) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0856.01

$$U(6, 2, z) = \frac{z(z+11)(z(z+8)+14) + e^z z(z(z(z+20)+120)+240) + 120(\operatorname{Chi}(z) - \operatorname{Shi}(z)) + 24}{2880 z}$$

07.33.03.0857.01

$$U\left(6, \frac{5}{2}, z\right) = \frac{1}{25200 z^{3/2}} \left( 2\sqrt{z} (4z(2z(2z(z+17)+159)+395)+105) - e^z \sqrt{\pi} (2z(4z(2z(z(2z+35)+175)+525)+525)-105) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0858.01

$$U\left(6, \frac{5}{2}, -z\right) = \frac{1}{25200 z^2} \left( e^{-z} \left( -2e^z z (4z(2z(2(z-17)z+159)-395)+105) + \sqrt{\pi} \sqrt{-z} (2z(4z(2z(z(2z-35)+175)-525)+525)+105) + \sqrt{\pi} \sqrt{z} (2z(4z(2z(z(2z-35)+175)-525)+525)+105) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0859.01

$$U(6, 3, z) = -\frac{e^z (z(z(z+15)+60)+60) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^2 + (z(z(z+14)+47)+24) z - 6}{720 z^2}$$

07.33.03.0860.01

$$U\left(6, \frac{7}{2}, z\right) = \frac{1}{7200 z^{5/2}} \left( e^z \sqrt{\pi} (2z(4z(2z(z+5)(2z+15)+75)-75)+45) \operatorname{erfc}(\sqrt{z}) - 2\sqrt{z} (2z+1)(8z^3+92z^2+210z-45) \right)$$

07.33.03.0861.01

$$U\left(6, \frac{7}{2}, -z\right) = \frac{1}{7200 z^3} \left( e^{-z} \left( -16e^z (2(z-8)(z-4)z-15) z^2 + 90e^z z + \sqrt{\pi} (2z(4z(2(z-5)z(2z-15)-75)-75)-45) \operatorname{erfi}(\sqrt{z}) \sqrt{z} + \sqrt{\pi} \sqrt{-z} (2z(4z(2(z-5)z(2z-15)-75)-75)-45) \right) \right)$$

07.33.03.0862.01

$$U(6, 4, z) = \frac{e^z (z(z+10)+20) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^3 + (z(z(z+9)+12)-6) z + 4}{240 z^3}$$

07.33.03.0863.01

$$U\left(6, \frac{9}{2}, z\right) = \frac{1}{2880 z^{7/2}} \left( 2 \sqrt{z} (2z+3) (8z^3 + 44z^2 - 30z + 15) - e^z \sqrt{\pi} (2z(4z(2z(z(2z+15)+15)-15)+45) - 45) \operatorname{erfc}(\sqrt{z}) \right)$$

07.33.03.0864.01

$$U\left(6, \frac{9}{2}, -z\right) = \frac{1}{2880 z^4} \left( e^{-z} \left( -2 e^z z (4z(2z(2(z-7)z+9)+15)+45) + \sqrt{\pi} \sqrt{-z} (2z(4z(2z(z(2z-15)+15)+15)+45) + 45) + \sqrt{\pi} \sqrt{z} (2z(4z(2z(z(2z-15)+15)+15)+45) + 45) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0865.01

$$U(6, 5, z) = -\frac{2 e^z (z+5) (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^4 + 2(z-1)(z(z(z+5)+2)+6)}{240 z^4}$$

07.33.03.0866.01

$$U\left(6, \frac{11}{2}, z\right) = \frac{1}{1920 z^{9/2}} \left( e^z \sqrt{\pi} (2z(4z(2z(z(2z+5)-5)+15)-75)+105) \operatorname{erfc}(\sqrt{z}) - 2 \sqrt{z} (16z((z-1)z(z+3)+5)-105) \right)$$

07.33.03.0867.01

$$U\left(6, \frac{11}{2}, -z\right) = \frac{1}{1920 z^5} \left( e^{-z} \left( -2 e^z z (16z((z-3)z(z+1)-5)-105) + \sqrt{\pi} \sqrt{-z} (2z(4z(2z(z(2z-5)-5)-15)-75)-105) + \sqrt{\pi} \sqrt{z} (2z(4z(2z(z(2z-5)-5)-15)-75)-105) \operatorname{erfi}(\sqrt{z}) \right) \right)$$

07.33.03.0868.01

$$U(6, 6, z) = \frac{e^z (\operatorname{Chi}(z) - \operatorname{Shi}(z)) z^5 + (z((z-1)z+2)-6)z+24}{120 z^5}$$

## General characteristics

### Domain and analyticity

$U(a, b, z)$  is an analytical function of  $a$ ,  $b$  and  $z$  which is defined in  $\mathbb{C}^3$ . For negative integer  $a$ ,  $U(a, b, z)$  degenerates to a polynomial in  $z$  of order  $-a$ .

07.33.04.0001.01

$$(a * b * z) \rightarrow U(a, b, z) :: (\mathbb{C} \otimes \mathbb{C} \otimes \mathbb{C}) \rightarrow \mathbb{C}$$

### Symmetries and periodicities

#### Mirror symmetry

07.33.04.0002.01

$$U(\bar{a}, \bar{b}, \bar{z}) = \overline{U(a, b, z)} /; z \notin (-\infty, 0)$$

### Periodicity

No periodicity

## Poles and essential singularities

### With respect to $z$

For fixed  $a, b$ ;  $-a \notin \mathbb{N}$ , the function  $U(a, b, z)$  has only one essential singular point at  $z = \infty$ . At the same time, the point  $z = \infty$  is a branch point.

$$07.33.04.0003.01 \\ \text{Sing}_z(U(a, b, z)) = \{\{\infty, \infty\}\}; -a \notin \mathbb{N}$$

For negative integer  $a$  and fixed  $b$ , the function  $U(a, b, z)$  is a polynomial and has pole of order  $-a$  at  $z = \infty$ .

$$07.33.04.0004.01 \\ \text{Sing}_z(U(a, b, z)) = \{\{\infty, -a\}\}; -a \in \mathbb{N}^+$$

### With respect to $b$

For fixed  $a, z$ , the function  $U(a, b, z)$  has only one singular point at  $b = \infty$ . It is an essential singular point.

$$07.33.04.0005.01 \\ \text{Sing}_b(U(a, b, z)) = \{\{\infty, \infty\}\}$$

### With respect to $a$

For fixed  $b, z$ , the function  $U(a, b, z)$  has only one singular point at  $a = \infty$ . It is an essential singular point.

$$07.33.04.0006.01 \\ \text{Sing}_a(U(a, b, z)) = \{\{\infty, \infty\}\}$$

## Branch points

### With respect to $z$

For fixed  $a, b$ ;  $-a \notin \mathbb{N}$ , the function  $U(a, b, z)$  has two branch points:  $z = 0, z = \infty$ . At the same time, the point  $z = \infty$  is an essential singularity.

$$07.33.04.0007.01 \\ \mathcal{BP}_z(U(a, b, z)) = \{0, \infty\}; -a \notin \mathbb{N}$$

$$07.33.04.0008.01 \\ \mathcal{R}_z(U(a, b, z), 0) = \log; b \in \mathbb{Z} \vee b \notin \mathbb{Q} \wedge -a \notin \mathbb{N}$$

$$07.33.04.0009.01 \\ \mathcal{R}_z\left(U\left(a, \frac{p}{q}, z\right), 0\right) = q; p \in \mathbb{Z} \wedge q - 1 \in \mathbb{N}^+ \wedge \gcd(p, q) = 1 \wedge -a \notin \mathbb{N}$$

$$07.33.04.0010.01 \\ \mathcal{R}_z(U(a, b, z), \infty) = \log; a \notin \mathbb{Q} \wedge -a \notin \mathbb{N}$$

$$07.33.04.0011.01 \\ \mathcal{R}_z\left(U\left(\frac{p}{q}, b, z\right), \infty\right) = q; p \in \mathbb{Z} \wedge q - 1 \in \mathbb{N}^+ \wedge \gcd(p, q) = 1$$

**With respect to  $b$** 

For fixed  $a, z$ , the function  $U(a, b, z)$  does not have branch points.

07.33.04.0012.01

$$\mathcal{BP}_b(U(a, b, z)) = \{\}$$

**With respect to  $a$** 

For fixed  $b, z$ , the function  $U(a, b, z)$  does not have branch points.

07.33.04.0013.01

$$\mathcal{BP}_a(U(a, b, z)) = \{\}$$

**Branch cuts****With respect to  $z$** 

For fixed  $a, b$  /;  $-a \notin \mathbb{N}$ , the function  $U(a, b, z)$  is a single-valued function on the  $z$ -plane cut along the interval  $(-\infty, 0)$ , where it is continuous from above.

07.33.04.0014.01

$$\mathcal{BC}_z(U(a, b, z)) = \{(-\infty, 0), -i\} /; -a \notin \mathbb{N}$$

07.33.04.0015.01

$$\lim_{\epsilon \rightarrow +0} U(a, b, x + i\epsilon) = U(a, b, x) /; x < 0$$

07.33.04.0016.01

$$\lim_{\epsilon \rightarrow +0} U(a, b, x - i\epsilon) = e^{2ib\pi} U(a, b, x) - \frac{2i\pi e^{ib\pi}}{\Gamma(a-b+1)\Gamma(b)} {}_1F_1(a; b; x) /; x < 0$$

**With respect to  $b$** 

For fixed  $a, z$ , the function  $U(a, b, z)$  does not have branch cuts.

07.33.04.0017.01

$$\mathcal{BC}_b(U(a, b, z)) = \{\}$$

**With respect to  $a$** 

For fixed  $b, z$ , the function  $U(a, b, z)$  does not have branch cuts.

07.33.04.0018.01

$$\mathcal{BC}_a(U(a, b, z)) = \{\}$$

**Series representations****Generalized power series**

Expansions at generic point  $z = z_0$

**For the function itself**

07.33.06.0015.01

$$\begin{aligned}
 U(a, b, z) &\propto \left(\frac{1}{z_0}\right)^{-b \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor - b \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor} U(a, b, z_0) + \frac{e^{i b \pi} (2 i \pi)}{\Gamma(a-b+1)} \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor {}_1\tilde{F}_1(a; b; z_0) + \\
 &a \left( \frac{(2 i \pi) e^{i b \pi}}{\Gamma(a-b+1)} \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor {}_1\tilde{F}_1(a+1; b+1; z_0) - \left(\frac{1}{z_0}\right)^{-b \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor - b \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor} U(a+1, b+1, z_0) \right) (z-z_0) + \\
 &\frac{a(a+1)}{2} \left( \left(\frac{1}{z_0}\right)^{-b \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor - b \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor} U(a+2, b+2, z_0) + \frac{e^{i b \pi} 2 i \pi}{\Gamma(a-b+1)} \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor {}_1\tilde{F}_1(a+2; b+2; z_0) \right) \\
 &(z-z_0)^2 + \dots ; (z \rightarrow z_0)
 \end{aligned}$$

07.33.06.0016.01

$$\begin{aligned}
 U(a, b, z) &\propto \left(\frac{1}{z_0}\right)^{-b \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor - b \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor} U(a, b, z_0) + \frac{e^{i b \pi} (2 i \pi)}{\Gamma(a-b+1)} \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor {}_1\tilde{F}_1(a; b; z_0) + \\
 &a \left( \frac{(2 i \pi) e^{i b \pi}}{\Gamma(a-b+1)} \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor {}_1\tilde{F}_1(a+1; b+1; z_0) - \left(\frac{1}{z_0}\right)^{-b \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor - b \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor} U(a+1, b+1, z_0) \right) (z-z_0) + \\
 &\frac{a(a+1)}{2} \left( \left(\frac{1}{z_0}\right)^{-b \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor - b \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor} U(a+2, b+2, z_0) + \frac{e^{i b \pi} 2 i \pi}{\Gamma(a-b+1)} \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor {}_1\tilde{F}_1(a+2; b+2; z_0) \right) \\
 &(z-z_0)^2 + \mathcal{O}(z-z_0)^3
 \end{aligned}$$

07.33.06.0017.01

$$\begin{aligned}
 U(a, b, z) &= \\
 &\sum_{k=0}^{\infty} \frac{(a)_k}{k!} \left( (-1)^k \left(\frac{1}{z_0}\right)^{-b \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor - b \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor} U(a+k, b+k, z_0) + \frac{2 i \pi e^{b \pi i}}{\Gamma(a-b+1)} \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor {}_1\tilde{F}_1(a+k; b+k; z_0) \right) \\
 &(z-z_0)^k
 \end{aligned}$$

07.33.06.0018.01

$$U(a, b, z) \propto \left(\frac{1}{z_0}\right)^{-b \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor - b \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor} U(a, b, z_0) + \frac{e^{i b \pi} (2 i \pi)}{\Gamma(a-b+1)} \left\lfloor \frac{\arg(z-z_0)}{2\pi} \right\rfloor \left\lfloor \frac{\arg(z_0) + \pi}{2\pi} \right\rfloor {}_1\tilde{F}_1(a; b; z_0) + \mathcal{O}(z-z_0)$$

### Expansions on branch cuts

#### For the function itself

07.33.06.0019.01

$$U(a, b, z) \propto e^{-2ib\pi \left[ \frac{\arg(z-x)}{2\pi} \right]} U(a, b, x) + \frac{2i\pi}{\Gamma(a-b+1)} e^{ib\pi \left[ \frac{\arg(z-x)}{2\pi} \right]} {}_1\tilde{F}_1(a; b; x) +$$

$$a \left( \frac{2ie^{ib\pi} \pi \left[ \frac{\arg(z-x)}{2\pi} \right] {}_1\tilde{F}_1(a+1; b+1; x)}{\Gamma(a-b+1)} - e^{-2ib\pi \left[ \frac{\arg(z-x)}{2\pi} \right]} U(a+1, b+1, x) \right) (z-x) +$$

$$\frac{1}{2} (a(a+1)) \left( \frac{2ie^{ib\pi} \pi \left[ \frac{\arg(z-x)}{2\pi} \right] {}_1\tilde{F}_1(a+2; b+2; x)}{\Gamma(a-b+1)} + e^{-2ib\pi \left[ \frac{\arg(z-x)}{2\pi} \right]} U(a+2, b+2, x) \right) (z-x)^2 + \dots /; (z \rightarrow x) \wedge x < 0$$

07.33.06.0020.01

$$U(a, b, z) \propto e^{-2ib\pi \left[ \frac{\arg(z-x)}{2\pi} \right]} U(a, b, x) + \frac{2i\pi}{\Gamma(a-b+1)} e^{ib\pi \left[ \frac{\arg(z-x)}{2\pi} \right]} {}_1\tilde{F}_1(a; b; x) +$$

$$a \left( \frac{2ie^{ib\pi} \pi \left[ \frac{\arg(z-x)}{2\pi} \right] {}_1\tilde{F}_1(a+1; b+1; x)}{\Gamma(a-b+1)} - e^{-2ib\pi \left[ \frac{\arg(z-x)}{2\pi} \right]} U(a+1, b+1, x) \right) (z-x) +$$

$$\frac{1}{2} (a(a+1)) \left( \frac{2ie^{ib\pi} \pi \left[ \frac{\arg(z-x)}{2\pi} \right] {}_1\tilde{F}_1(a+2; b+2; x)}{\Gamma(a-b+1)} + e^{-2ib\pi \left[ \frac{\arg(z-x)}{2\pi} \right]} U(a+2, b+2, x) \right) (z-x)^2 + O((z-x)^3) /; x < 0$$

07.33.06.0021.01

$$U(a, b, z) =$$

$$\sum_{k=0}^{\infty} \frac{(a)_k}{k!} \left( \frac{2i\pi}{\Gamma(a-b+1)} \left[ \frac{\arg(z-x)}{2\pi} \right] e^{b\pi i} {}_1\tilde{F}_1(a+k; b+k; x) + (-1)^k e^{-2b\pi i \left[ \frac{\arg(z-x)}{2\pi} \right]} U(a+k, b+k, x) \right) (z-x)^k /; x < 0$$

07.33.06.0022.01

$$U(a, b, z) \propto e^{-2ib\pi \left[ \frac{\arg(z-x)}{2\pi} \right]} U(a, b, x) + \frac{2i\pi}{\Gamma(a-b+1)} e^{ib\pi \left[ \frac{\arg(z-x)}{2\pi} \right]} {}_1\tilde{F}_1(a; b; x) + O(z-x) /; x < 0$$

**Expansions at  $z = 0$**

**General case**

07.33.06.0001.01

$$U(a, b, z) =$$

$$\frac{\Gamma(1-b)}{\Gamma(a-b+1)} \left( 1 + \frac{az}{b} + \frac{a(1+a)z^2}{2b(1+b)} + \dots \right) + \frac{\Gamma(b-1)}{\Gamma(a)} z^{1-b} \left( 1 + \frac{(1+a-b)z}{2-b} + \frac{(1+a-b)(2+a-b)z^2}{2(2-b)(3-b)} + \dots \right) /; b \notin \mathbb{Z}$$

07.33.06.0002.01

$$U(a, b, z) = \frac{\Gamma(1-b)}{\Gamma(a-b+1)} \sum_{k=0}^{\infty} \frac{(a)_k z^k}{(b)_k k!} + \frac{\Gamma(b-1)}{\Gamma(a)} z^{1-b} \sum_{k=0}^{\infty} \frac{(a-b+1)_k z^k}{(2-b)_k k!} /; b \notin \mathbb{Z}$$

07.33.06.0003.01

$$U(a, b, z) = \frac{\Gamma(b-1)}{\Gamma(a)} z^{1-b} {}_1F_1(a-b+1; 2-b; z) + \frac{\Gamma(1-b)}{\Gamma(a-b+1)} {}_1F_1(a; b; z) /; b \notin \mathbb{Z}$$

07.33.06.0004.01

$$U(a, b, z) \propto \frac{\Gamma(1-b)}{\Gamma(a-b+1)} (1 + O(z)) + \frac{\Gamma(b-1)}{\Gamma(a)} z^{1-b} (1 + O(z)) /; b \notin \mathbb{Z} \wedge (z \rightarrow 0)$$

### Logarithmic case

07.33.06.0005.01

$$U(a, 0, z) = \frac{1}{\Gamma(a+1)} \left( 1 + a z \log(z) {}_1F_1(a+1; 2; z) - \sum_{k=1}^{\infty} \frac{(a)_k}{k!(k-1)!} \left( 2\psi(k) - \psi(a+k) + \frac{1}{k} \right) z^k \right)$$

07.33.06.0006.01

$$U(a, 0, z) \propto \frac{1}{\Gamma(a+1)} (1 + a z (\log(z) + \psi(a+1) + 2\gamma - 1) (1 + O(z))) /; (z \rightarrow 0)$$

07.33.06.0023.01

$$U(a, 1, z) \propto -\frac{1}{\Gamma(a)} \left( \psi(a) + 2\gamma + \log(z) \left( 1 + a z + \frac{1}{4} a(1+a) z^2 + O(z^3) \right) + a z \left( \psi(a+1) - 2(1-\gamma) \right) + \frac{(a+1)z}{4} \left( \psi(a+2) - 2\left(\frac{3}{2} - \gamma\right) \right) + \frac{(a+1)(a+2)z^2}{36} \left( \psi(a+3) - 2\left(\frac{11}{6} - \gamma\right) \right) + O(z^3) \right) /; (z \rightarrow 0)$$

07.33.06.0024.01

$$U(a, n, z) = \frac{(-1)^n}{\Gamma(a-n+1)} \left( \frac{\log(z)}{(n-1)!} \sum_{k=0}^{\infty} \frac{(a)_k z^k}{(n)_k k!} + \sum_{k=0}^{\infty} \frac{(a)_k (\psi(a+k) - \psi(k+1) - \psi(k+n)) z^k}{(k+n-1)! k!} - \sum_{k=1}^{n-1} \frac{(k-1)! z^{-k}}{(1-a)_k (n-k-1)!} \right) /; n \in \mathbb{N}^+$$

07.33.06.0007.01

$$U(a, n, z) = \frac{(-1)^n}{\Gamma(a-n+1)} \left( \frac{\log(z)}{(n-1)!} {}_1F_1(a; n; z) + \sum_{k=0}^{\infty} \frac{(a)_k (\psi(a+k) - \psi(k+1) - \psi(k+n)) z^k}{(k+n-1)! k!} - \sum_{k=1}^{n-1} \frac{(k-1)! z^{-k}}{(1-a)_k (n-k-1)!} \right) /; n \in \mathbb{N}^+$$

07.33.06.0008.01

$$U(a, n, z) \propto \frac{(-1)^n}{\Gamma(a-n+1)} \left( \frac{\log(z)}{(n-1)!} (1 + O(z)) - \frac{(n-2)!}{(1-a)_{n-1}} z^{1-n} (1 + O(z)) \right) /; n \in \mathbb{N}^+$$

07.33.06.0025.01

$$U(a, -n, z) = \frac{(-1)^n}{\Gamma(a)} \left( \sum_{k=0}^{\infty} \frac{(a+n+1)_k (\psi(a+k+n+1) - \psi(k+n+2) - \psi(k+1)) z^{k+n+1}}{(k+n+1)! k!} - \frac{1}{(a)_{n+1}} \sum_{k=0}^n \frac{(-1)^{k+n-1} (a)_k (n-k)! z^k}{k!} + \frac{\log(z) z^{n+1}}{(n+1)!} \sum_{k=0}^{\infty} \frac{(a+n+1)_k z^k}{(n+2)_k k!} \right) /; n \in \mathbb{N}$$

07.33.06.0009.01

$$U(a, -n, z) = \frac{(-1)^n}{\Gamma(a)} \left( \frac{\log(z) z^{n+1}}{(n+1)!} {}_1F_1(a+n+1; n+2; z) + \sum_{k=0}^{\infty} \frac{(a+n+1)_k (\psi(a+k+n+1) - \psi(k+n+2) - \psi(k+1)) z^{k+n+1}}{(k+n+1)! k!} - \frac{1}{(a)_{n+1}} \sum_{k=0}^n \frac{(-1)^{k+n-1} (a)_k (n-k)! z^k}{k!} \right) /; n \in \mathbb{N}$$

07.33.06.0010.01

$$U(a, -n, z) \propto \frac{1}{\Gamma(a)} \left( \frac{n!}{(a)_{n+1}} (1 + O(z)) + \frac{(-1)^n (\log(z) - \psi(n+2) + \psi(a+n+1) + \gamma)}{(n+1)!} z^{n+1} (1 + O(z)) \right) /; n \in \mathbb{N}^+$$

### Asymptotic series expansions

07.33.06.0026.01

$$U(a, b, z) \propto z^{-a} \left( 1 - \frac{a(a-b+1)}{z} + \frac{a(a+1)(a-b+2)(a-b+1)}{2z^2} + \dots \right); (|z| \rightarrow \infty)$$

07.33.06.0027.01

$$U(a, b, z) \propto z^{-a} \left( \sum_{k=0}^n \frac{(-1)^k (a)_k (a-b+1)_k z^{-k}}{k!} + O\left(\frac{1}{z^{n+1}}\right) \right); (|z| \rightarrow \infty)$$

07.33.06.0011.01

$$U(a, b, z) \propto z^{-a} {}_2F_0\left(a, a-b+1; ; -\frac{1}{z}\right); (|z| \rightarrow \infty)$$

07.33.06.0012.01

$$U(a, b, z) \propto z^{-a} \left( 1 + O\left(\frac{1}{z}\right) \right); (|z| \rightarrow \infty)$$

### Residue representations

07.33.06.0013.01

$$U(a, b, z) = \frac{1}{2\pi i \Gamma(a) \Gamma(a-b+1)} \int_{\gamma-i\infty}^{\gamma+i\infty} \Gamma(s) \Gamma(1-b+s) \Gamma(a-s) z^{-s} ds; \max(0, \operatorname{Re}(b)-1) < \gamma < \operatorname{Re}(a)$$

07.33.06.0014.01

$$U(a, b, z) = \frac{1}{\Gamma(a) \Gamma(a-b+1)} \left( \sum_{j=0}^{\infty} \operatorname{res}_s(\Gamma(s) \Gamma(1-b+s) \Gamma(a-s) z^{-s}) (-j) + \sum_{j=0}^{\infty} \operatorname{res}_s(\Gamma(s) \Gamma(1-b+s) \Gamma(a-s) z^{-s}) (b-1-j) \right); b \notin \mathbb{Z}$$

### Limit representations

07.33.09.0001.01

$$U(a, b, z) = z^{-a} \left( \lim_{c \rightarrow \infty} {}_2F_1\left(a, a-b+1; c; 1 - \frac{c}{z}\right) \right)$$

### Differential equations

#### Ordinary linear differential equations and wronskians

For the direct function itself

07.33.13.0003.01

$$z w''(z) + (b-z) w'(z) - a w(z) = 0; w(z) = c_1 {}_1\tilde{F}_1(a; b; z) + c_2 (U(a, b, z) + e^z U(b-a, b, -z))$$

07.33.13.0004.01

$$W_z({}_1\tilde{F}_1(a; b; z), U(a, b, z) + e^z U(b-a, b, -z)) = \frac{e^z (-z)^{-b}}{\Gamma(b-a)} - \frac{e^z z^{-b}}{\Gamma(a)}$$

07.33.13.0005.01

$$z w''(z) + (b-z) w'(z) - a w(z) = 0; w(z) = c_1 U(a, b, z) + c_2 {}_1\tilde{F}_1(a; b; z); -a \notin \mathbb{N}$$

07.33.13.0006.01

$$W_z(U(a, b, z), {}_1\tilde{F}_1(a; b; z)) = \frac{e^z z^{-b}}{\Gamma(a)}$$



07.33.13.0001.01

$$z w''(z) + (b - z) w'(z) - a w(z) = 0 /; w(z) = c_1 U(a, b, z) + c_2 {}_1F_1(a; b; z) \wedge -b \notin \mathbb{N}$$

07.33.13.0002.02

$$W_z(U(a, b, z), {}_1F_1(a; b; z)) = \frac{\Gamma(b)}{\Gamma(a)} e^z z^{-b}$$

07.33.13.0007.01

$$w''(z) + \left( \frac{b g'(z)}{g(z)} - g'(z) - \frac{g''(z)}{g'(z)} \right) w'(z) - \frac{a g'(z)^2}{g(z)} w(z) = 0 /; w(z) = c_1 {}_1\tilde{F}_1(a; b; g(z)) + c_2 U(a, b, g(z))$$

07.33.13.0008.01

$$W_z({}_1\tilde{F}_1(a; b; g(z)), U(a, b, g(z))) = - \frac{g'(z) e^{g(z)} g(z)^{-b}}{\Gamma(a)}$$

07.33.13.0009.01

$$g(z) g'(z) h(z)^2 w''(z) - h(z) (2 g(z) g'(z) h'(z) + h(z) ((g(z) - b) g'(z)^2 + g(z) g''(z))) w'(z) - (a h(z)^2 g'(z)^3 - 2 g(z) h'(z)^2 g'(z) + h(z) ((b - g(z)) h'(z) g'(z)^2 + g(z) h''(z) g'(z) - g(z) h'(z) g''(z))) w(z) = 0 /; w(z) = c_1 h(z) {}_1\tilde{F}_1(a; b; g(z)) + c_2 h(z) U(a, b, g(z))$$

07.33.13.0010.01

$$W_z(h(z) {}_1\tilde{F}_1(a; b; g(z)), h(z) U(a, b, g(z))) = - \frac{h(z)^2 g'(z) e^{g(z)} g(z)^{-b}}{\Gamma(a)}$$

07.33.13.0011.01

$$w''(z) z^2 + (-2s + r(-d z^r + b - 1) + 1) z w'(z) + (d r(s - a r) z^r + s(-b r + r + s)) w(z) = 0 /; w(z) = c_1 z^s {}_1\tilde{F}_1(a; b; d z^r) + c_2 z^s U(a, b, d z^r)$$

07.33.13.0012.01

$$W_z(z^s {}_1\tilde{F}_1(a; b; d z^r), z^s U(a, b, d z^r)) = - \frac{d e^{d z^r} r z^{r+2s-1} (d z^r)^{-b}}{\Gamma(a)}$$

07.33.13.0013.01

$$w''(z) - ((d r^z - b + 1) \log(r) + 2 \log(s)) w'(z) + (-a d \log^2(r) r^z + \log^2(s) + (d r^z - b + 1) \log(r) \log(s)) w(z) = 0 /; w(z) = c_1 s^z {}_1\tilde{F}_1(a; b; d r^z) + c_2 s^z U(a, b, d r^z)$$

07.33.13.0014.01

$$W_z(s^z {}_1\tilde{F}_1(a; b; d r^z), s^z U(a, b, d r^z)) = - \frac{d e^{d r^z} r^z (d r^z)^{-b} s^{2z} \log(r)}{\Gamma(a)}$$

## Transformations

### Transformations and argument simplifications

#### Argument involving basic arithmetic operations

07.33.16.0001.01

$$U(a, b, -z) = \frac{\Gamma(b-1)}{\Gamma(a)} \left( \frac{\sin((a-b)\pi)}{\sin(\pi a)} z^{-b} - (-z)^{-b} \right) z e^{-z} {}_1F_1(1-a; 2-b; z) + \frac{\Gamma(1-a)}{\Gamma(a-b+1)} e^{-z} U(b-a, b, z)$$

### Products, sums, and powers of the direct function

**Products of the direct function**

07.33.16.0002.01

$$U(a, b, -z)U(a, b, z) = \frac{\pi(b-2a)(-z)^{-\frac{b}{2}}z^{2-\frac{b}{2}}}{b(b-2)\Gamma(a)\Gamma(a-b+1)} \csc\left(\frac{b\pi}{2}\right) {}_2F_3\left(a-\frac{b}{2}+1, 1-a+\frac{b}{2}; \frac{3}{2}, 2-\frac{b}{2}, \frac{b}{2}+1; \frac{z^2}{4}\right) - \frac{\Gamma(b-1)^2(-z)^{-b}z^{2-b}}{\Gamma(a)^2} {}_2F_3\left(1-a, a-b+1; 2-b, 1-\frac{b}{2}, \frac{3-b}{2}; \frac{z^2}{4}\right) + \frac{\Gamma(1-b)^2}{\Gamma(a-b+1)^2} {}_2F_3\left(a, b-a; \frac{b+1}{2}, \frac{b}{2}, b; \frac{z^2}{4}\right) - \frac{\pi(-z)^{-\frac{b+1}{2}}z^{\frac{3-b}{2}}}{(b-1)\Gamma(a)\Gamma(a-b+1)} \sec\left(\frac{b\pi}{2}\right) {}_2F_3\left(a+\frac{1-b}{2}, \frac{b+1}{2}-a; \frac{1}{2}, \frac{3-b}{2}, \frac{b+1}{2}; \frac{z^2}{4}\right)$$

**Identities**

**Recurrence identities**

**Consecutive neighbors**

07.33.17.0001.01

$$U(a, b, z) = (2a - b + z + 2)U(a + 1, b, z) - (a + 1)(a - b + 2)U(a + 2, b, z)$$

07.33.17.0002.01

$$U(a, b, z) = \frac{1}{(1-a)(a-b)}U(a-2, b, z) + \frac{2-2a+b-z}{(1-a)(a-b)}U(a-1, b, z)$$

07.33.17.0003.01

$$U(a, b, z) = \frac{b+z}{b-a}U(a, b+1, z) - \frac{z}{b-a}U(a, b+2, z)$$

07.33.17.0004.01

$$U(a, b, z) = \frac{b+z-2}{z}U(a, b-1, z) + \frac{a-b+2}{z}U(a, b-2, z)$$

**Distant neighbors**

07.33.17.0009.01

$$U(a, b, z) = C_n(a, b, z)U(a+n, b, z) - (a+n)(a-b+n+1)C_{n-1}(a, b, z)U(a+n+1, b, z) /; C_0(a, b, z) = 1 \wedge C_1(a, b, z) = 2a - b + z + 2 \wedge C_n(a, b, z) = (2a - b + 2n + z)C_{n-1}(a, b, z) - (a+n-1)(a-b+n)C_{n-2}(a, b, z) \wedge n \in \mathbb{N}^+$$

07.33.17.0010.01

$$U(a, b, z) = C_n(a, b, z)U(a-n, b, z) + \frac{1}{(n-a)(a-b-n+1)}C_{n-1}(a, b, z)U(a-n-1, b, z) /;$$

$$C_0(a, b, z) = 1 \wedge C_1(a, b, z) = \frac{b-2a-z+2}{(1-a)(a-b)} \wedge$$

$$C_n(a, b, z) = \frac{2a-b+z-2}{(a-1)(a-b)}C_{n-1}(a, b, z) + \frac{1}{(n-a-1)(a-b-n+2)}C_{n-2}(a, b, z) \wedge n \in \mathbb{N}^+$$

07.33.17.0011.01

$$U(a, b, z) = C_n(a, b, z)U(a, b+n, z) - \frac{z}{b-a+n-1}C_{n-1}(a, b, z)U(a, b+n+1, z) /;$$

$$C_0(a, b, z) = 1 \wedge C_1(a, b, z) = \frac{b+z}{b-a} \wedge C_n(a, b, z) = \frac{b+n+z-1}{b-a+n-1}C_{n-1}(a, b, z) - \frac{z}{b-a+n-2}C_{n-2}(a, b, z) \wedge n \in \mathbb{N}^+$$

07.33.17.0012.01

$$U(a, b, z) = C_n(a, b, z) U(a, b - n, z) + \frac{a - b + n + 1}{z} C_{n-1}(a, b, z) U(a, b - n - 1, z) /;$$

$$C_0(a, b, z) = 1 \bigwedge C_1(a, b, z) = \frac{b + z - 2}{z} \bigwedge C_n(a, b, z) = \frac{b - n + z - 1}{z} C_{n-1}(a, b, z) + \frac{a - b + n}{z} C_{n-2}(a, b, z) \bigwedge n \in \mathbb{N}^+$$

## Functional identities

### Relations between contiguous functions

07.33.17.0005.01

$$U(a - 1, b, z) + a(a - b + 1) U(a + 1, b, z) + (b - 2a - z) U(a, b, z) = 0$$

07.33.17.0006.01

$$(b - a - 1) U(a, b - 1, z) + z U(a, b + 1, z) + (1 - b - z) U(a, b, z) = 0$$

### Relations of special kind

07.33.17.0007.01

$$U(a, b, z) = z^{1-b} U(a - b + 1, 2 - b, z)$$

07.33.17.0013.01

$$U(a, b, z) = e^z \Gamma(1 - a) \left( \frac{1}{\Gamma(a - b + 1)} U(b - a, b, -z) + \csc(b\pi) \left( (-z)^{1-b} \sin(\pi(b - a)) - z^{1-b} \sin(\pi a) \right) {}_1\tilde{F}_1(1 - a; 2 - b; -z) \right)$$

07.33.17.0014.01

$$U(a, b, z) = e^z \Gamma(1 - a) \left( \frac{1}{\Gamma(a - b + 1)} U(b - a, b, -z) - \frac{\Gamma(b - 1) \left( (-z)^{1-b} \sin(\pi(b - a)) - z^{1-b} \sin(\pi a) \right)}{\pi} {}_1F_1(1 - a; 2 - b; -z) \right)$$

### Division on even and odd parts and generalization

07.33.17.0008.01

$$U(a, b, z) = A^-(z) + A^+(z) /; A^+(z) = \frac{1}{2} (U(a, b, z) + U(a, b, -z)) \bigwedge A^-(z) = \frac{1}{2} (U(a, b, z) - U(a, b, -z))$$

## Differentiation

### Low-order differentiation

#### With respect to a

07.33.20.0001.01

$$U^{(1,0,0)}(a, b, z) = \frac{\Gamma(b - 1) z^{1-b}}{\Gamma(a)} \sum_{k=0}^{\infty} \frac{\psi(a - b + k + 1) (a - b + 1)_k z^k}{(2 - b)_k k!} + \frac{\Gamma(1 - b)}{\Gamma(a - b + 1)} \sum_{k=0}^{\infty} \frac{\psi(a + k) (a)_k z^k}{(b)_k k!} - (\psi(a) + \psi(a - b + 1)) U(a, b, z) /; b \notin \mathbb{Z}$$

07.33.20.0002.01

$$U^{(1,0,0)}(a, b, z) = -\frac{\Gamma(1 - b) \psi(a - b + 1)}{\Gamma(a - b + 1)} {}_1F_1(a; b; z) - \frac{\Gamma(b - 1) \psi(a) z^{1-b}}{\Gamma(a)} {}_1F_1(a - b + 1; 2 - b; z) - \frac{\Gamma(-b) z}{\Gamma(a - b + 1)} F_{2 \times 0 \times 1}^{1 \times 1 \times 2} \left( \begin{matrix} a + 1; 1, a; \\ 2, b + 1; a + 1; \end{matrix} z, z \right) - \frac{z^{2-b} \Gamma(b - 2)}{\Gamma(a)} F_{2 \times 0 \times 1}^{1 \times 1 \times 2} \left( \begin{matrix} a - b + 2; 1, a - b + 1; \\ 2, 3 - b; a - b + 2; \end{matrix} z, z \right) /; b \notin \mathbb{Z}$$

07.33.20.0018.01

$$U^{(1,0,0)}(m, n, z) = -(\log(z) + \psi(m)) U(m, n, z) + \frac{1}{(m-1)!} \sum_{k=0}^{n-m-1} \binom{n-m-1}{k} (k+m-1)! \psi(k+m) z^{-k-m} - \frac{1}{(m-1)!} \sum_{k=0}^{n-m-1} \binom{n-m-1}{k} (k+m-1)! (-z)^{-k-m} \left( \sum_{p=1}^{k+m-1} \frac{1}{p} L_{k+m-p-1}^{p-k-m}(-z) L_{p-1}^{-p}(z) - e^z (\text{Shi}(z) - \text{Chi}(z)) L_{k+m-1}^{-k-m}(-z) \right); m \in \mathbb{N}^+ \wedge n \in \mathbb{Z} \wedge n > m$$

Brychkov Yu.A. (2007)

07.33.20.0019.01

$$U^{(1,0,0)}(a, a+n, z) = -U(a, a+n, z) (\log(z) + \psi(a)) - \frac{1}{\Gamma(a)} \sum_{k=0}^{n-1} \binom{n-1}{k} \left( \frac{(-1)^k \pi \csc(a\pi)}{a+k} {}_1F_1(a+k; a+k+1; z) - \frac{\Gamma(a+k)}{z^{a+k}} \left( -\frac{z}{a+k-1} {}_2F_2(1, 1; 2, -a-k+2; z) + \log(z) - \psi(a+k) \right) \right) + \sum_{k=0}^{n-1} \binom{n-1}{k} z^{-a-k} (a)_k \psi(a+k); n \in \mathbb{N}^+$$

Brychkov Yu.A. (2007)

**With respect to b**

07.33.20.0003.01

$$U^{(0,1,0)}(a, b, z) = (\psi(a-b+1) - \pi \cot(b\pi)) U(a, b, z) - \frac{\Gamma(b-1) z^{1-b} \log(z)}{\Gamma(a)} {}_1F_1(a-b+1; 2-b; z) - \frac{\Gamma(b-1) z^{1-b}}{\Gamma(a)} \sum_{k=0}^{\infty} \frac{(a-b+1)_k (\psi(a-b+k+1) - \psi(2-b+k)) z^k}{(2-b)_k k!} - \frac{\Gamma(1-b)}{\Gamma(a-b+1)} \sum_{k=0}^{\infty} \frac{\psi(b+k) (a)_k z^k}{(b)_k k!}; b \notin \mathbb{Z}$$

07.33.20.0004.01

$$U^{(0,1,0)}(a, b, z) = \frac{\Gamma(1-b) (\psi(a-b+1) - \psi(1-b))}{\Gamma(a-b+1)} {}_1F_1(a; b; z) - \frac{\Gamma(b-1) (\log(z) - \psi(b-1))}{\Gamma(a)} z^{1-b} {}_1F_1(a-b+1; 2-b; z) + \frac{az\Gamma(-b)}{b\Gamma(a-b+1)} F_{2 \times 0 \times 1}^{1 \times 1 \times 2} \left( \begin{matrix} a+1; 1; 1, b; \\ 2, b+1; b+1; \end{matrix} z, z \right) + \frac{z^{2-b} \Gamma(b-1)}{(b-2)^2 \Gamma(a)} \left( (a-b+1) F_{2 \times 0 \times 1}^{1 \times 1 \times 2} \left( \begin{matrix} a-b+2; 1; 1, 2-b; \\ 2, 3-b; 3-b; \end{matrix} z, z \right) + (b-2) F_{2 \times 0 \times 1}^{1 \times 1 \times 2} \left( \begin{matrix} a-b+2; 1; 1, a-b+1; \\ 2, 3-b; a-b+2; \end{matrix} z, z \right) \right); b \notin \mathbb{Z}$$

**Mixed derivatives by parameters**

07.33.20.0020.01

$$U^{(1,0,0)}(m, 2m+n, z) + 2 U^{(0,1,0)}(m, 2m+n, z) = -U(m, 2m+n, z) (\log(z) + \psi(m)) + \frac{1}{(m-1)!} \sum_{k=0}^{m+n-1} \frac{\binom{m+n-1}{k} (k+m-1)! \psi(k+m)}{z^{k+m}} + \frac{1}{(m-1)!} \sum_{k=0}^{m+n-1} \binom{m+n-1}{k} (k+m-1)! (-z)^{-k-m} \left( \sum_{j=1}^{k+m-1} \frac{1}{j} L_{j-1}^{-j}(z) L_{k+m-j-1}^{j-k-m}(-z) - e^z (\text{Shi}(z) - \text{Chi}(z)) L_{k+m-1}^{-k-m}(-z) \right); m \in \mathbb{N}^+ \wedge n \in \mathbb{N}$$

Brychkov Yu.A. (2007)

**With respect to  $z$**

07.33.20.0005.01

$$\frac{\partial U(a, b, z)}{\partial z} = -a U(a + 1, b + 1, z)$$

07.33.20.0006.01

$$\frac{\partial^2 U(a, b, z)}{\partial z^2} = a(a + 1) U(a + 2, b + 2, z)$$

**Symbolic differentiation**

**With respect to  $a$**

07.33.20.0007.02

$$U^{(n,0,0)}(a, b, z) = \Gamma(b - 1) \left( \sum_{k=0}^{\infty} \frac{\partial^n \frac{(a-b+1)_k}{\Gamma(a)}}{\partial a^n} \frac{z^k}{(2-b)_k k!} \right) z^{1-b} + \Gamma(1-b) \sum_{k=0}^{\infty} \frac{\partial^n \frac{(a)_k}{\Gamma(a-b+1)}}{\partial a^n} \frac{z^k}{(b)_k k!} ; n \in \mathbb{N} \wedge b \notin \mathbb{Z}$$

**With respect to  $b$**

07.33.20.0008.02

$$U^{(0,n,0)}(a, b, z) = \sum_{k=0}^{\infty} \frac{\partial^n \frac{\Gamma(1-b)}{\Gamma(a-b+1)(b)_k}}{\partial b^n} \frac{(a)_k z^k}{k!} + \sum_{k=0}^{\infty} \frac{\partial^n \frac{(a-b+1)_k \Gamma(b-1) z^{1-b}}{(2-b)_k}}{\partial b^n} \frac{z^k}{\Gamma(a) k!} ; n \in \mathbb{N} \wedge b \notin \mathbb{Z}$$

**With respect to  $z$**

07.33.20.0009.02

$$\frac{\partial^n U(a, b, z)}{\partial z^n} = (-1)^n (a)_n U(a + n, b + n, z) ; n \in \mathbb{N}$$

07.33.20.0010.02

$$\frac{\partial^n (z^{a+n-1} U(a, b, z))}{\partial z^n} = (a - b + 1)_n (a)_n z^{a-1} U(a + n, b, z) ; n \in \mathbb{N}$$

07.33.20.0011.02

$$\frac{\partial^n (z^{b-1} U(a, b, z))}{\partial z^n} = (-1)^n (a - b + 1)_n z^{b-n-1} U(a, b - n, z) ; n \in \mathbb{N}$$

07.33.20.0012.02

$$\frac{\partial^n (e^{-z} U(a, b, z))}{\partial z^n} = (-1)^n e^{-z} U(a, b + n, z) ; n \in \mathbb{N}$$

07.33.20.0013.02

$$\frac{\partial^n (e^{-z} z^{b-a+n-1} U(a, b, z))}{\partial z^n} = (-1)^n e^{-z} z^{b-a-1} U(a - n, b, z) ; n \in \mathbb{N}$$

**Fractional integro-differentiation**

**With respect to  $z$**

07.33.20.0014.01

$$\frac{\partial^\alpha U(a, b, z)}{\partial z^\alpha} = \pi \csc(b\pi) \left( \frac{z^{-\alpha}}{\Gamma(a-b+1)} {}_2\tilde{F}_2(1, a; b, 1-\alpha; z) - \frac{z^{1-b-\alpha}}{\Gamma(a)} {}_1\tilde{F}_1(a-b+1; 2-b-\alpha; z) \right); b \notin \mathbb{Z}$$

07.33.20.0015.01

$$\frac{\partial^\alpha U(a, 0, z)}{\partial z^\alpha} = \frac{z^{-\alpha}}{\Gamma(a+1)} \left( \frac{1}{\Gamma(1-\alpha)} + a \sum_{k=1}^{\infty} \frac{(a+1)_k z^{k+1}}{(2)_k k!} \mathcal{FC}_{\log}^{(\alpha)}(z, k+1) - \sum_{k=1}^{\infty} \frac{(a)_k z^k}{\Gamma(k-\alpha+1)(k-1)!} \left( 2\psi(k) - \psi(a+k) + \frac{1}{k} \right) \right)$$

07.33.20.0016.01

$$\frac{\partial^\alpha U(a, n, z)}{\partial z^\alpha} = \frac{(-1)^n z^{-\alpha}}{\Gamma(a-n+1)} \left( \sum_{k=0}^{\infty} \frac{(a)_k (\psi(a+k) - \psi(k+1) - \psi(k+n)) z^k}{(k+n-1)! \Gamma(k-\alpha+1)} - \sum_{k=1}^{n-1} \frac{(k-1)! z^{-k}}{(1-a)_k (n-k-1)!} \mathcal{FC}_{\exp}^{(\alpha)}(z, -k) + \frac{1}{(n-1)!} \sum_{k=0}^{\infty} \frac{(a)_k z^k}{(n)_k k!} \mathcal{FC}_{\log}^{(\alpha)}(z, k) \right); n \in \mathbb{N}^+$$

07.33.20.0017.01

$$\frac{\partial^\alpha U(a, -n, z)}{\partial z^\alpha} = \frac{(-1)^n z^{-\alpha}}{\Gamma(a)} \left( \sum_{k=0}^{\infty} \frac{(a+n+1)_k (\psi(a+k+n+1) - \psi(k+n+2) - \psi(k+1)) z^{k+n+1}}{\Gamma(k+n-\alpha+2) k!} + \frac{1}{(n+1)!} \sum_{k=0}^{\infty} \frac{(a+n+1)_k z^{k+n+1}}{(n+2)_k k!} \mathcal{FC}_{\log}^{(\alpha)}(z, k+n+1) - \sum_{k=0}^n \frac{(-1)^{k+n-1} (a)_k (n-k)! z^k}{(a)_{n+1} \Gamma(k-\alpha+1)} \right); n \in \mathbb{N}^+$$

## Integration

### Indefinite integration

#### Involving only one direct function

07.33.21.0001.01

$$\int z^{\alpha-1} U(a, b, cz) dz = \frac{z^\alpha}{\Gamma(a)\Gamma(a-b+1)} G_{2,3}^{2,2} \left( cz \left| \begin{matrix} 1-a, 1-\alpha \\ 0, 1-b, -\alpha \end{matrix} \right. \right)$$

07.33.21.0002.01

$$\int U(a, b, z) dz = \frac{1}{1-a} U(a-1, b-1, z)$$

#### Involving one direct function and elementary functions

### Involving power function

07.33.21.0003.01

$$\int z^{\alpha-1} U(a, b, z) dz = \frac{1}{\Gamma(a)\Gamma(a-b+1)} G_{2,3}^{2,2} \left( z \left| \begin{matrix} 1, -a+\alpha+1 \\ \alpha, -b+\alpha+1, 0 \end{matrix} \right. \right)$$

07.33.21.0004.01

$$\int z^{\alpha-2} U(a, b, z) dz = \frac{z^{\alpha-1} \Gamma(a-1) \Gamma(a-b) U(a-1, b, z)}{\Gamma(a) \Gamma(a-b+1)}$$

07.33.21.0005.01

$$\int z^{b-1} U(a, b, z) dz = \pi \csc(b\pi) \left( \frac{{}_1\tilde{F}_1(a; b+1; z) z^b}{\Gamma(a-b+1)} + \frac{{}_1\tilde{F}_1(a-b; 1-b; z)}{(a-b)\Gamma(a)} \right)$$

## Involving exponential function and a power function

07.33.21.0006.01

$$\int z^{\alpha-1} e^{-z} U(a, b, z) dz = G_{2,3}^{2,1} \left( z \left| \begin{matrix} 1, a-b+\alpha+1 \\ \alpha, -b+\alpha+1, 0 \end{matrix} \right. \right)$$

### Definite integration

#### For the direct function itself

07.33.21.0007.01

$$\int_0^\infty t^{\alpha-1} U(a, b, t) dt = \frac{\Gamma(a-\alpha) \Gamma(1-b+\alpha) \Gamma(\alpha)}{\Gamma(a) \Gamma(a-b+1)} /; \max(0, \operatorname{Re}(b)-1) < \operatorname{Re}(\alpha) < \operatorname{Re}(a)$$

#### Involving the direct function

07.33.21.0008.01

$$\int_0^\infty t^{\alpha-1} e^{-t} U(a, b, t) dt = \frac{\Gamma(1-b+\alpha) \Gamma(\alpha)}{\Gamma(a-b+\alpha+1)} /; \max(0, \operatorname{Re}(b)-1) < \operatorname{Re}(\alpha)$$

07.33.21.0009.01

$$\int_0^\infty t^{\alpha-1} e^{-tz} U(a, b, t) dt = \frac{\pi^2 (\cot(\pi(b-\alpha)) + \cot(\pi\alpha)) \csc(b\pi) \Gamma(a-\alpha)}{\Gamma(a) \Gamma(a-b+1) \Gamma(1-\alpha) \Gamma(b-\alpha)} {}_2F_1(\alpha, -b+\alpha+1; -a+\alpha+1; z) - \frac{\pi z^{\alpha-\alpha} \csc(\pi(a-\alpha))}{\Gamma(a-\alpha+1)} {}_2F_1(a, a-b+1; a-\alpha+1; z) /; \operatorname{Re}(z) > 0 \wedge \operatorname{Re}(\alpha) > 0 \wedge \operatorname{Re}(a-b+1) > 0$$

## Representations through more general functions

### Through hypergeometric functions

#### Involving ${}_1F_1$

07.33.26.0001.01

$$U(a, b, z) = \frac{\Gamma(b-1)}{\Gamma(a)} z^{1-b} {}_1F_1(a-b+1; 2-b; z) + \frac{\Gamma(1-b)}{\Gamma(a-b+1)} {}_1F_1(a; b; z) /; b \notin \mathbb{Z}$$

#### Involving ${}_1\tilde{F}_1$

07.33.26.0002.01

$$U(a, b, z) = \pi \csc(b\pi) \left( \frac{1}{\Gamma(a-b+1)} {}_1\tilde{F}_1(a; b; z) - \frac{1}{\Gamma(a)} z^{1-b} {}_1\tilde{F}_1(a-b+1; 2-b; z) \right) /; b \notin \mathbb{Z}$$

#### Involving ${}_pF_q$

07.33.26.0003.01

$$U(a, b, -z)U(a, b, z) = \frac{\pi(b-2a)(-z)^{-\frac{b}{2}}z^{2-\frac{b}{2}}}{b(b-2)\Gamma(a)\Gamma(a-b+1)} \csc\left(\frac{b\pi}{2}\right) {}_2F_3\left(a - \frac{b}{2} + 1, 1 - a + \frac{b}{2}; \frac{3}{2}, \frac{3}{2}, 2 - \frac{b}{2}, \frac{b}{2} + 1; \frac{z^2}{4}\right) -$$

$$\frac{\Gamma(b-1)^2(-z)^{-b}z^{2-b}}{\Gamma(a)^2} {}_2F_3\left(1 - a, a - b + 1; 2 - b, 1 - \frac{b}{2}, \frac{3-b}{2}; \frac{z^2}{4}\right) + \frac{\Gamma(1-b)^2}{\Gamma(a-b+1)^2} {}_2F_3\left(a, b - a; \frac{b+1}{2}, \frac{b}{2}, b; \frac{z^2}{4}\right) -$$

$$\frac{\pi(-z)^{-\frac{b+1}{2}}z^{\frac{3-b}{2}}}{(b-1)\Gamma(a)\Gamma(a-b+1)} \sec\left(\frac{b\pi}{2}\right) {}_2F_3\left(a + \frac{1-b}{2}, \frac{b+1}{2} - a; \frac{1}{2}, \frac{3-b}{2}, \frac{b+1}{2}; \frac{z^2}{4}\right)$$

## Through Meijer G

### Classical cases for the direct function itself

07.33.26.0004.01

$$U(a, b, z) = \frac{1}{\Gamma(a)\Gamma(a-b+1)} G_{1,2}^{2,1}\left(z \left| \begin{matrix} 1-a \\ 0, 1-b \end{matrix} \right.\right)$$

07.33.26.0005.01

$$U(a, b, z) + U(a, b, -z) = \frac{2^{a-b}}{\sqrt{\pi}\Gamma(a)\Gamma(a-b+1)} G_{2,4}^{3,2}\left(-\frac{z^2}{4} \left| \begin{matrix} \frac{1-a}{2}, 1 - \frac{a}{2} \\ 0, \frac{1-b}{2}, 1 - \frac{b}{2}, \frac{1}{2} \end{matrix} \right.\right)$$

07.33.26.0006.01

$$U(a, b, z) - U(a, b, -z) = -\frac{2^{a-b-1}z}{\sqrt{\pi}\Gamma(a)\Gamma(a-b+1)} G_{2,4}^{3,2}\left(-\frac{z^2}{4} \left| \begin{matrix} -\frac{a}{2}, \frac{1-a}{2} \\ 0, -\frac{b}{2}, \frac{1-b}{2}, -\frac{1}{2} \end{matrix} \right.\right)$$

### Classical cases involving exp

07.33.26.0007.01

$$e^{-z}U(a, b, z) = G_{1,2}^{2,0}\left(z \left| \begin{matrix} a-b+1 \\ 0, 1-b \end{matrix} \right.\right)$$

### Classical cases involving exp and cosh

07.33.26.0017.01

$$e^{-\frac{z}{2}} \cosh\left(\frac{z}{2}\right)U(a, b, z) = \frac{1}{2\Gamma(a)\Gamma(a-b+1)} G_{1,2}^{2,1}\left(z \left| \begin{matrix} 1-a \\ 0, 1-b \end{matrix} \right.\right) + \frac{1}{2} G_{1,2}^{2,0}\left(z \left| \begin{matrix} a-b+1 \\ 0, 1-b \end{matrix} \right.\right)$$

### Classical cases involving exp and sinh

07.33.26.0018.01

$$e^{-\frac{z}{2}} \sinh\left(\frac{z}{2}\right)U(a, b, z) = \frac{1}{2\Gamma(a)\Gamma(a-b+1)} G_{1,2}^{2,1}\left(z \left| \begin{matrix} 1-a \\ 0, 1-b \end{matrix} \right.\right) - \frac{1}{2} G_{1,2}^{2,0}\left(z \left| \begin{matrix} a-b+1 \\ 0, 1-b \end{matrix} \right.\right)$$

### Classical cases for products of hypergeometric U

07.33.26.0008.01

$$U(a, b, -z)U(a, b, z) = \frac{2^{-b}}{\sqrt{\pi}\Gamma(a)\Gamma(a-b+1)} G_{2,4}^{4,1}\left(-\frac{z^2}{4} \left| \begin{matrix} 1-a, a-b+1 \\ 0, \frac{1-b}{2}, 1 - \frac{b}{2}, 1-b \end{matrix} \right.\right)$$



07.33.26.0009.01

$$U(a, b, -z) U(a - b + 1, 2 - b, z) = \frac{2^{-b} z^{b-1}}{\sqrt{\pi} \Gamma(a) \Gamma(a - b + 1)} G_{2,4}^{4,1} \left( -\frac{z^2}{4} \left| \begin{matrix} 1 - a, a - b + 1 \\ 0, \frac{1-b}{2}, 1 - \frac{b}{2}, 1 - b \end{matrix} \right. \right)$$

**Classical cases involving exp and products of hypergeometric  $U$**

07.33.26.0010.01

$$e^{-z} U(a, b, z) U(b - a, b, z) = \frac{2^{-b}}{\sqrt{\pi}} G_{2,4}^{4,0} \left( \frac{z^2}{4} \left| \begin{matrix} a - b + 1, 1 - a \\ \frac{1-b}{2}, 1 - \frac{b}{2}, 1 - b, 0 \end{matrix} \right. \right); -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

**Classical cases involving  ${}_1F_1$**

07.33.26.0014.01

$${}_1F_1(a; b; -\sqrt{z}) U(a, b, \sqrt{z}) = \frac{2^{-b} \Gamma(b)}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z}{4} \left| \begin{matrix} 1 - a, a - b + 1 \\ 0, \frac{1-b}{2}, 1 - \frac{b}{2}, 1 - b \end{matrix} \right. \right)$$

07.33.26.0011.01

$${}_1F_1(a; b; -z) U(a, b, z) = \frac{2^{-b} \Gamma(b)}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z^2}{4} \left| \begin{matrix} 1 - a, a - b + 1 \\ 0, \frac{1-b}{2}, 1 - \frac{b}{2}, 1 - b \end{matrix} \right. \right); -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

**Classical cases involving  ${}_1\tilde{F}_1$**

07.33.26.0019.01

$${}_1\tilde{F}_1(a; b; -\sqrt{z}) U(a, b, \sqrt{z}) = \frac{2^{-b}}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z}{4} \left| \begin{matrix} 1 - a, a - b + 1 \\ 0, \frac{1-b}{2}, 1 - \frac{b}{2}, 1 - b \end{matrix} \right. \right)$$

07.33.26.0020.01

$${}_1\tilde{F}_1(a; b; -z) U(a, b, z) = \frac{2^{-b}}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z^2}{4} \left| \begin{matrix} 1 - a, a - b + 1 \\ 0, \frac{1-b}{2}, 1 - \frac{b}{2}, 1 - b \end{matrix} \right. \right); -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

**Classical cases involving exp and  ${}_1F_1$**

07.33.26.0015.01

$$e^{-\sqrt{z}} {}_1F_1(b - a; b; \sqrt{z}) U(a, b, \sqrt{z}) = \frac{2^{-b} \Gamma(b)}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z}{4} \left| \begin{matrix} 1 - a, a - b + 1 \\ \frac{1-b}{2}, 1 - \frac{b}{2}, 0, 1 - b \end{matrix} \right. \right)$$

07.33.26.0012.01

$$e^{-z} {}_1F_1(b - a; b; z) U(a, b, z) = \frac{2^{-b} \Gamma(b)}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z^2}{4} \left| \begin{matrix} 1 - a, a - b + 1 \\ \frac{1-b}{2}, 1 - \frac{b}{2}, 0, 1 - b \end{matrix} \right. \right); -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

**Classical cases involving exp and  ${}_1\tilde{F}_1$**

07.33.26.0016.01

$$e^{-\sqrt{z}} {}_1\tilde{F}_1(b - a; b; \sqrt{z}) U(a, b, \sqrt{z}) = \frac{2^{-b}}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z}{4} \left| \begin{matrix} 1 - a, a - b + 1 \\ \frac{1-b}{2}, 1 - \frac{b}{2}, 0, 1 - b \end{matrix} \right. \right)$$

07.33.26.0013.01

$$e^{-z} {}_1\tilde{F}_1(b - a; b; z) U(a, b, z) = \frac{2^{-b}}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z^2}{4} \left| \begin{matrix} 1 - a, a - b + 1 \\ \frac{1-b}{2}, 1 - \frac{b}{2}, 0, 1 - b \end{matrix} \right. \right); -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

**Classical cases involving Laguerre  $L$**

07.33.26.0021.01

$$U(a, 1, z) L_{-a}(-z) = \frac{\Gamma(1-a) \sin(a\pi)}{2\pi^{3/2}} G_{2,4}^{3,1} \left( \frac{z^2}{4} \left| \begin{matrix} 1-a, a \\ 0, 0, \frac{1}{2}, 0 \end{matrix} \right. \right); -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

07.33.26.0022.01

$$U(a, b, z) L_{-a}^{b-1}(-z) = \frac{2^{-b} \Gamma(b-a) \sin(a\pi)}{\pi^{3/2}} G_{2,4}^{3,1} \left( \frac{z^2}{4} \left| \begin{matrix} 1-a, a-b+1 \\ 0, \frac{1-b}{2}, 1-\frac{b}{2}, 1-b \end{matrix} \right. \right); -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

**Classical cases involving exp and LaguerreL L**

07.33.26.0023.01

$$e^{-z} U(a, 1, z) L_{a-1}(z) = \frac{1}{2\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z^2}{4} \left| \begin{matrix} 1-a, a \\ 0, 0, \frac{1}{2}, 0 \end{matrix} \right. \right); -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

07.33.26.0024.01

$$e^{-z} U(a, b, z) L_{a-b}^{b-1}(z) = \frac{2^{-b}}{\sqrt{\pi} \Gamma(a-b+1)} G_{2,4}^{3,1} \left( \frac{z^2}{4} \left| \begin{matrix} 1-a, a-b+1 \\ 0, \frac{1-b}{2}, \frac{2-b}{2}, 1-b \end{matrix} \right. \right); -\frac{\pi}{2} < \arg(z) \leq \frac{\pi}{2}$$

**Generalized cases for the direct function itself**

07.33.26.0025.01

$$U(a, b, -z) + U(a, b, z) = \frac{2^{a-b}}{\sqrt{\pi} \Gamma(a) \Gamma(a-b+1)} G_{2,4}^{3,2} \left( \frac{\sqrt{-z^2}}{2}, \frac{1}{2} \left| \begin{matrix} \frac{1-a}{2}, 1-\frac{a}{2} \\ 0, \frac{1-b}{2}, 1-\frac{b}{2}, \frac{1}{2} \end{matrix} \right. \right)$$

07.33.26.0026.01

$$U(a, b, z) - U(a, b, -z) = -\frac{2^{a-b-1} z}{\sqrt{\pi} \Gamma(a) \Gamma(a-b+1)} G_{2,4}^{3,2} \left( \frac{\sqrt{-z^2}}{2}, \frac{1}{2} \left| \begin{matrix} -\frac{a}{2}, \frac{1-a}{2} \\ 0, -\frac{b}{2}, \frac{1-b}{2}, -\frac{1}{2} \end{matrix} \right. \right)$$

**Classical cases for products of hypergeometric U**

07.33.26.0027.01

$$U(a, b, -z) U(a, b, z) = \frac{2^{-b}}{\sqrt{\pi} \Gamma(a) \Gamma(a-b+1)} G_{2,4}^{4,1} \left( \frac{\sqrt{-z^2}}{2}, \frac{1}{2} \left| \begin{matrix} 1-a, a-b+1 \\ 0, \frac{1-b}{2}, 1-\frac{b}{2}, 1-b \end{matrix} \right. \right)$$

07.33.26.0028.01

$$U(a, b, -z) U(a-b+1, 2-b, z) = \frac{2^{-b} z^{b-1}}{\sqrt{\pi} \Gamma(a) \Gamma(a-b+1)} G_{2,4}^{4,1} \left( \frac{\sqrt{-z^2}}{2}, \frac{1}{2} \left| \begin{matrix} 1-a, a-b+1 \\ 0, \frac{1-b}{2}, 1-\frac{b}{2}, 1-b \end{matrix} \right. \right)$$

**Generalized cases involving exp and products of hypergeometric U**

07.33.26.0029.01

$$e^{-z} U(a, b, z) U(b-a, b, z) = \frac{2^{-b}}{\sqrt{\pi}} G_{2,4}^{4,0} \left( \frac{z}{2}, \frac{1}{2} \left| \begin{matrix} a-b+1, 1-a \\ \frac{1-b}{2}, 1-\frac{b}{2}, 1-b, 0 \end{matrix} \right. \right)$$

**Generalized cases involving  ${}_1F_1$**

07.33.26.0030.01

$${}_1F_1(a; b; -z) U(a, b, z) = \frac{2^{-b} \Gamma(b)}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z}{2}, \frac{1}{2} \left| \begin{matrix} 1-a, a-b+1 \\ 0, \frac{1-b}{2}, 1-\frac{b}{2}, 1-b \end{matrix} \right. \right)$$

**Generalized cases involving exp and  ${}_1F_1$**

07.33.26.0031.01

$$e^{-z} {}_1F_1(b-a; b; z) U(a, b, z) = \frac{2^{-b} \Gamma(b)}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z}{2}, \frac{1}{2} \mid 1-a, a-b+1 \mid 0, \frac{1-b}{2}, 1-\frac{b}{2}, 1-b \right)$$

**Generalized cases involving exp and  ${}_1\tilde{F}_1$**

07.33.26.0032.01

$$e^{-z} {}_1\tilde{F}_1(b-a; b; z) U(a, b, z) = \frac{2^{-b}}{\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z}{2}, \frac{1}{2} \mid 1-a, a-b+1 \mid \frac{1-b}{2}, 1-\frac{b}{2}, 0, 1-b \right)$$

**Generalized cases involving Laguerre  $L$**

07.33.26.0033.01

$$U(a, 1, z) L_{-a}(-z) = \frac{\Gamma(1-a) \sin(a\pi)}{2\pi^{3/2}} G_{2,4}^{3,1} \left( \frac{z}{2}, \frac{1}{2} \mid 1-a, a \mid 0, 0, \frac{1}{2}, 0 \right)$$

07.33.26.0034.01

$$U(a, b, z) L_{-a}^{b-1}(-z) = \frac{2^{-b} \Gamma(b-a) \sin(a\pi)}{\pi^{3/2}} G_{2,4}^{3,1} \left( \frac{z}{2}, \frac{1}{2} \mid 1-a, a-b+1 \mid 0, \frac{1-b}{2}, 1-\frac{b}{2}, 1-b \right)$$

**Generalized cases involving exp and Laguerre  $L$**

07.33.26.0035.01

$$e^{-z} U(a, 1, z) L_{a-1}(z) = \frac{1}{2\sqrt{\pi} \Gamma(a)} G_{2,4}^{3,1} \left( \frac{z}{2}, \frac{1}{2} \mid 1-a, a \mid 0, 0, \frac{1}{2}, 0 \right)$$

07.33.26.0036.01

$$e^{-z} U(a, b, z) L_{a-b}^{b-1}(z) = \frac{2^{-b}}{\sqrt{\pi} \Gamma(a-b+1)} G_{2,4}^{3,1} \left( \frac{z}{2}, \frac{1}{2} \mid 1-a, a-b+1 \mid 0, \frac{1-b}{2}, \frac{2-b}{2}, 1-b \right)$$

**Representations through equivalent functions**

**With related functions**

07.33.27.0001.01

$$U(a, b, z) = \frac{\Gamma(1-b)}{\Gamma(a-b+1)} {}_1F_1(a; b; z) + \frac{\Gamma(b-1)}{\Gamma(a)} z^{1-b} {}_1F_1(a-b+1; 2-b; z) ; b \notin \mathbb{Z}$$

07.33.27.0002.01

$$U(a, b, z) = -\csc(b\pi) \left( \Gamma(b-a) \sin(a\pi) z^{1-b} L_{b-a-1}^{1-b}(z) + \Gamma(1-a) \sin(\pi(a-b)) L_{-a}^{b-1}(z) \right) ; b \notin \mathbb{Z}$$

07.33.27.0003.01

$$U(a, b, z) = \frac{e^{z/2} z^{-\frac{b}{2}} \Gamma(b-1)}{\Gamma(a)} M_{\frac{b}{2}-a, \frac{1}{2}-\frac{b}{2}}(z) + \frac{e^{z/2} z^{-\frac{b}{2}} \Gamma(1-b)}{\Gamma(a-b+1)} M_{\frac{1}{2}(b-2a), \frac{b-1}{2}}(z) ; b \notin \mathbb{Z}$$

07.33.27.0004.01

$$U(a, b, z) = e^{z/2} z^{-\frac{b}{2}} W_{\frac{1}{2}(b-2a), \frac{b-1}{2}}(z)$$

## Theorems

---

### The Green's function of the time-independent Schrödinger equation for the Coulomb problem in 3 dimensions

The Green's function  $G(\mathbf{x}', \mathbf{x}; \varepsilon)$  of the time-independent Schrödinger equation for the Coulomb problem in 3 dimensions

$$-\Delta G(\mathbf{x}', \mathbf{x}; \varepsilon) + \frac{\alpha}{|\mathbf{x}|} G(\mathbf{x}', \mathbf{x}; \varepsilon) - \varepsilon G(\mathbf{x}', \mathbf{x}; E) = -i \delta(\mathbf{x}' - \mathbf{x})$$

is given by

$$G(\mathbf{x}', \mathbf{x}; \varepsilon) = \frac{i}{8\pi r r_+} \left( e^{iz(r_-+r_+)/2} \Gamma(1-i\nu) (2 {}_1F_1(1-i\nu; 2; -izr_-) (i(i+\nu) U(-i\nu, -1, -izr_+) + U(-i\nu, 0, -izr_+)) r_- - U(-i\nu, 0, -izr_+) (2 {}_1F_1(1-i\nu; 2; -izr_-) - z(i+\nu) {}_1F_1(2-i\nu; 3; -izr_-) r_-) r_+) \right) /;$$

$$r_+ = |\mathbf{x}| + |\mathbf{x}'| + |\mathbf{x} - \mathbf{x}'| \wedge r_- = |\mathbf{x}| + |\mathbf{x}'| - |\mathbf{x} - \mathbf{x}'| \wedge z = \sqrt{s} \wedge \nu = \alpha / (4\sqrt{s}).$$

## History

---

-F. Tricomi (1927)

---

## Copyright

---

This document was downloaded from [functions.wolfram.com](http://functions.wolfram.com), a comprehensive online compendium of formulas involving the special functions of mathematics. For a key to the notations used here, see <http://functions.wolfram.com/Notations/>.

Please cite this document by referring to the [functions.wolfram.com](http://functions.wolfram.com) page from which it was downloaded, for example:

<http://functions.wolfram.com/Constants/E/>

To refer to a particular formula, cite [functions.wolfram.com](http://functions.wolfram.com) followed by the citation number.

*e.g.*: <http://functions.wolfram.com/01.03.03.0001.01>

This document is currently in a preliminary form. If you have comments or suggestions, please email [comments@functions.wolfram.com](mailto:comments@functions.wolfram.com).

© 2001-2008, Wolfram Research, Inc.