

Indeterminate

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Notations

Traditional name

An indeterminate numerical quantity

Traditional notation

i

Mathematica StandardForm notation

Indeterminate

Primary definition

Indeterminate is a symbol that represents a numerical quantity whose magnitude cannot be determined.

02.10.02.0001.01

$f(\dots, i, \dots) = i$

General characteristics

i is the special symbol. It represents an unknown or not exactly determined point (potentially with magnitude infinity) of the complex plane. Often it results from a double limit where two infinitesimal parameters approach zero at different speeds (e.g. $\lim_{x \rightarrow 0, y \rightarrow 0} \frac{x}{y}$).

Limit representations

02.10.09.0001.01

$i = \lim_{z \rightarrow \infty} e^z$

Transformations

Related transformations

02.10.16.0001.01

$f(\dots, i, \dots) = i$

Complex characteristics

Real part

02.10.19.0001.01

$$\operatorname{Re}(i) = i$$

Imaginary part

02.10.19.0002.01

$$\operatorname{Im}(i) = i$$

Absolute value

02.10.19.0003.01

$$|i| = i$$

Argument

02.10.19.0004.01

$$\arg(i) = i$$

Conjugate value

02.10.19.0005.01

$$\bar{i} = i$$

Differentiation

Low-order differentiation

02.10.20.0001.01

$$\frac{\partial i}{\partial z} = i$$

Integration

Indefinite integration

02.10.21.0001.01

$$\int i dz = i$$

Integral transforms

Fourier exp transforms

02.10.22.0001.01

$$\mathcal{F}_i[i](z) = i$$

Inverse Fourier exp transforms

02.10.22.0002.01

$$\mathcal{F}_t^{-1}[i](z) = i$$

Fourier cos transforms

02.10.22.0003.01

$$\mathcal{F}_c[i](z) = i$$

Fourier sin transforms

02.10.22.0004.01

$$\mathcal{F}_s[i](z) = i$$

Laplace transforms

02.10.22.0005.01

$$\mathcal{L}[i](z) = i$$

Inverse Laplace transforms

02.10.22.0006.01

$$\mathcal{L}^{-1}[i](z) = i$$

Representations through equivalent functions

02.10.27.0001.01

$$i = \frac{0}{0}$$

02.10.27.0002.01

$$i = 0 \infty$$

02.10.27.0003.01

$$i = \frac{\infty}{\infty}$$

02.10.27.0004.01

$$i = \infty - \infty$$

02.10.27.0005.01

$$i = 0^0$$

02.10.27.0006.01

$$i = \infty^0$$

02.10.27.0007.01

$$i = 1^\infty$$

02.10.27.0008.01

$$i = 0 \tilde{\infty}$$

02.10.27.0009.01

$$i = \frac{\tilde{\infty}}{\tilde{\infty}}$$

$$i = \frac{\infty}{\tilde{\infty}} \quad 02.10.27.0010.01$$

$$i = \frac{\tilde{\infty}}{\infty} \quad 02.10.27.0011.01$$

$$i = \tilde{\infty} - \infty \quad 02.10.27.0012.01$$

$$i = 1^{\tilde{\infty}} \quad 02.10.27.0013.01$$

$$i = \tilde{\infty} - \infty \quad 02.10.27.0014.01$$

$$i = \infty - \tilde{\infty} \quad 02.10.27.0015.01$$

History

- L'Hospital (1696) treated the sign $\frac{0}{0}$ as an indeterminate value
- Johann Bernoulli (1704, 1730) discussed symbol $\frac{0}{0}$
- G.Cramer (1732) used special notation for $\frac{0}{0}$.
- D'Alembert (1754) discussed symbol $\frac{0}{0}$.

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