Indeterminate

Notations

Traditional name

An indeterminate numerical quantity

Traditional notation

¿

Mathematica StandardForm notation

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Indeterminate
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Primary definition

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

02.10.02.0001.01

$f(\ldots, ¿, \ldots) = ¿$

General characteristics

¿ 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 approch zero at different speeds (e.g. $\lim_{x \to 0, y \to 0} \frac{x}{y}$).

Limit representations

02.10.09.0001.01

$$¿ = \lim_{z \to \tilde{\infty}} e^z$$

Transformations

Related transformations

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$f(\ldots, ¿, \ldots) = ¿$

Complex characteristics

Real part

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$\mathrm{Re}(¿) == ¿$

Imaginary part

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$\mathrm{Im}(¿) == ¿$

Absolute value

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$|¿| == ¿$

Argument

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$\arg(¿) == ¿$

Conjugate value

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$\overline{¿} == ¿$

Differentiation

Low-order differentiation

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

Integration

Indefinite integration

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$$\int ¿\, dz == ¿$$

Integral transforms

Fourier exp transforms

02.10.22.0001.01

$\mathcal{F}_t[¿](z) == ¿$

Inverse Fourier exp transforms

02.10.22.0002.01

$\mathcal{F}_t^{-1}[¿](z) == ¿$

Fourier cos transforms

02.10.22.0003.01

$\mathcal{F}c_t[¿](z) == ¿$

Fourier sin transforms

02.10.22.0004.01

$\mathcal{F}s_t[¿](z) == ¿$

Laplace transforms

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$\mathcal{L}_t[¿](z) == ¿$

Inverse Laplace transforms

02.10.22.0006.01

$\mathcal{L}_t^{-1}[¿](z) == ¿$

Representations through equivalent functions

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$$¿ == \frac{0}{0}$$

02.10.27.0002.01

$$¿ == 0\,\infty$$

02.10.27.0003.01

$$¿ == \frac{\infty}{\infty}$$

02.10.27.0004.01

$$¿ == \infty - \infty$$

02.10.27.0005.01

$$¿ == 0^0$$

02.10.27.0006.01

$$¿ == \infty^0$$

02.10.27.0007.01

$$¿ == 1^\infty$$

02.10.27.0008.01

$$¿ == 0\,\tilde{\infty}$$

02.10.27.0009.01

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

02.10.27.0010.01

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

02.10.27.0011.01

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

02.10.27.0012.01

$$¿ == \tilde{\infty} - \tilde{\infty}$$

02.10.27.0013.01

$$¿ == 1^{\tilde{\infty}}$$

02.10.27.0014.01

$$¿ == \tilde{\infty} - \infty$$

02.10.27.0015.01

$$¿ == \infty - \tilde{\infty}$$

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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