KroneckerDelta

Notations

Traditional name

Kronecker delta function

Traditional notation

δ_n

Mathematica StandardForm notation

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KroneckerDelta[n]
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Primary definition

04.24.02.0001.01

$$\delta_0 = 1$$

04.24.02.0002.01

$$\delta_n = 0 \;/;\; n \neq 0$$

The below formula accumulates the above definitions for different values n in one expression.

04.24.02.0003.01

$$\delta_n = \begin{cases} 1 & n = 0 \\ 0 & \text{True} \end{cases}$$

Specific values

Values at fixed points

04.24.03.0001.01

$$\delta_0 = 1$$

04.24.03.0002.01

$$\delta_1 = 0$$

04.24.03.0003.01

$$\delta_{-1} = 0$$

04.24.03.0004.01

$$\delta_i = 0$$

Values at infinities

04.24.03.0005.01

$\delta_{\infty} == 0$

04.24.03.0006.01

$\delta_{-\infty} == 0$

General characteristics

Domain and analyticity

δ_n is a nonanalytical function defined on $\mathbb{C}$. Its possible values are 0 and 1.

04.24.04.0001.01

$n \longrightarrow \delta_n :: \mathbb{C} \longrightarrow \{0, 1\}$

Symmetries and periodicities

Parity

δ_n is an even function.

04.24.04.0002.01

$\delta_{-n} = \delta_n$

Periodicity

No periodicity

Transformations

Transformations and argument simplifications

04.24.16.0001.01

$\delta_{-n} = \delta_n$

Differentiation

Low-order differentiation

04.24.20.0001.01

$$\frac{\partial \delta_n}{\partial n} = 0$$

Fractional integro-differentiation

04.24.20.0002.01

$$\frac{\partial^{\alpha} \delta_n}{\partial n^{\alpha}} = \frac{n^{-\alpha} \delta_n}{\Gamma(1-\alpha)}$$

Integration

Indefinite integration

04.24.21.0001.01

$$\int \delta_z \, dz = \delta_z \, z$$

Representations through equivalent functions

04.24.27.0001.01

$$\delta_n == \delta(n)$$

04.24.27.0002.01

$$\delta_n = \delta(n_1, n_2, \ldots, n_m) \,/;\, n_1 = n \bigwedge m = 1$$

04.24.27.0003.01

$$\delta_n = \delta_{n,0}$$

History

– L. Kronecker (1866, 1903)

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