ENTRY FUNCTIONS

[ENTRY FUNCTIONS] Authors: Oliver Knill: 2003, Literature: no

real-valued function

A [real-valued function] is usually assumed to be map to the reals.

abscissa

[abscissa] The x-coordinate in an (x,y) graph of a function. The y-coordinates is called ordinate.

ordinate

[ordinate] The y-coordinate in an (x,y) graph of a function. The x-coordinates is called abscissa.

Airy function

The [Airy function] is defined as the solution of the differential equation $y'' - xy = 0$.

Briggsian logarithm

The [Briggsian logarithm] also called common logarithm is the logarithm to the base 10.

Bessel function

THe [Bessel function] is a special function. Bessel function of the first kind of order zero is defined as $J_0 = \sum_{k=0}^{\infty}(-1)^k(x/2)^{2k}/(k!)^2$.

Sin

The [Sin] is a trigonometric function. It can be defined by its series $\sin(x) = x - x^3/3! + x^5/5! - ...$, where $5! = 54321$ is the factorial of 5. The sine function can also be defined as the imaginary part of $\exp(ix) = \cos(x) + i\sin(x)$, where $i = (-1)^{(1/2)}$ is the imaginary unit. Examples of values $\sin(0) = 0, \sin(\pi/2) = 1, \sin(\pi) = 0, \sin(3\pi/2) = -1$.

Csc

[Csc] The cosecant is defined as $\csc(x) = 1/\sin(x)$.

Arcsin

[Arcsin] The arcsin is the inverse of sin. It is also denoted by $\sin^{(-1)}(x)$ or $\mathrm{asin}(x)$. One has the identities $\arcsin(\sin(x)) = x$, or $\sin(\arcsin(x)) = x$.

Sinh

[Sinh] The hyperbolic sine can be defined as $\sinh(x) = (\exp(x) - \exp(-x))/2$. Examples: $\sinh(0) = 0$.

ArcSinh

[ArcSinh] The inverse of sinh is called arcsinh.

Cos

The trigonometric function [Cos] can be defined by its series $\cos(x) = 1 - x^2/2! + x^4/4! - x^6/6! - ...$, where $4! = 4321$ is the factorial of 4. It can also be defined as the real part of $\exp(ix)$, where $i = (-1)^1/2$ is the imaginary unit, the square root of -1. Examples: $\cos(0) = 1, \cos(pi/2) = 0 \sin(\pi) = -1, \sin(3\pi/2) = 0$.

Arccos

[Arccos] The inverse of the function cos is written $\arccos(x)$, also denoted by $\cos^{(-1)}(x)$ or $\mathrm{acos}(x)$. We have the identities $\arccos(\cos(x)) = x$, or $\cos(\arccos(x)) = x$.

Sec

[Sec] The secant is defined as $\sec(x) = 1/\cos(x)$.

Cosh

[Cosh] The hyperbolic cosine can be defined as $\sinh(x) = (\exp(x) + \exp(-x))/2$. Examples: $\cosh(0) = 1$.

ArcCosh

[ArcCosh] The inverse of cosh is called arccosh.

Tan

The [Tan] is a trigonometric function. It can be defined as $\tan(x) = \sin(x)/\cos(x)$. Examples: $\tan(0) = 0, \tan(\pi/4) = 1$.

Arctan

[Arctan] The inverse of tan is the function $arctan(x)$. It is also called $tan^{(-1)}(x)$. One has $\arctan(\tan(x)) = x$ and $\tan(\arctan(x)) = x$. Examples: $\arctan(1) = \pi/2$.

Cot

[Cot] is a trigonometric function. It can be defined as $\cot(x) = \cos(x)/\sin(x)$. It can also be defined geometrically as the relation of two sides in a right angle triangle if x is one of the angles. Examples: $\cot(\pi/2) = 0, \cot(\pi/4) = 1$.

Exp

[Exp] is the exponential function. It can be defined by its series $\exp(x) = 1 + x + x^2/2! + x^3/3! + x^4/4! + ...$ where $4! = 4321$ is the factorial of 4. Examples: $\exp(0) = 1$, $\exp(1) = e = 2.712....$

Sqr

[Sqr] The square of a number is the product of the number by itself. For example, the square of 4 is 16. The square of a function $\sin(x)$ is denoted by $\sin^2(x)$.

Zeta

[Zeta] $\zeta(s)$ is the Riemann zeta function. It is defined for complex numbers s which have $\text{Re}(s) > 1$ as $\zeta(s) = 1 + 1/2^s + 1/3^s + ...$ The function can be continued to the entire complex plane except at $s = 1$, where the function has a singularity. The zeta function has zeros at $-2, -4, -6$ and also zeros on the real line $\text{Re}(s) = 1/2$. The famous Riemann hypothesis claims that all the nontrivial zeros are on this line. This conjecture remains unproven until today and is considered one of the most important open problems in mathematics.

Log

[Log] The logarithm is the inverse to the exponential function: $\log(\exp(x)) = x$ and $\exp(\log(x)) = x$. For example: $\log(1) = 0$, $\log(e) = 1$. The logarithm function satisfies for example the laws $\log(xy) = \log(x) + \log(y)$, $\log(x/y) = \log(x) - \log(y)$, $\log(x^y) = y\log(x)$.

Sqrt

[Sqrt] The square root of a number x is the number which

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