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Abstract

Requirements for different Definitions of the gamma function The (complete) gamma function Gamma(n) is defined to be an extension of the factorial to complex and real number arguments. It is related to the factorial by $\Gamma(n) = (n-1)!$.

1 Gamma[z]

$\Gamma(z) = ((-1)^k)/(k!)$.

1.1 F(5)Requirements:

It is analytic everywhere except at $z = 0, -1, -2, ...,$ and the residue at $z = -k$,There are no points z at which Gamma(z)=0.

2 Definite integral

$\Gamma(z) = \int_0^\infty (z-1)e^{-t}dt$

2.1 F(5)Requirements:

everywhere except at $Z <= 0$

3 Multiplication Formula

There are three formulas,
$\Gamma(x) = \sqrt{2}x^{x-1/2}e^{-x+\mu(x)}$ where
$\mu(x) = \sum_{n=0}^{\infty}(x+n+\frac{1}{2})log(1+\frac{1}{x+n})1 = \frac{\theta}{12x}$ $n! = \sqrt{2\pi}x^{x-1/2}e^{-n+\frac{\theta}{12n}}$

3.1 F(5)Requirements:

θ everywhere except $\theta < 0$, $\theta > 1$

3.2 F(5)Requirements:

$\pi = 3.141592653589793$

3.3 F(5)Requirements:

in $log(x)$, except $x < 0$

3.4 F(5)Requirements:

e^x everywhere except$x < 0$

References

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