

3.2.11 Special Functions

This is directly from "Special Functions" in the *Mathematica* Help Browser

Mathematica includes all the common special functions of mathematical physics found in standard handbooks. We will discuss each of the various classes of functions in turn.

One point you should realize is that in the technical literature there are often several conflicting definitions of any particular special function. When you use a special function in *Mathematica*, therefore, you should be sure to look at the definition given here to confirm that it is exactly what you want.

Gamma and Related Functions

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| <code>Beta[a, b]</code> | Euler beta function $B(a, b)$ |
| <code>Beta[z, a, b]</code> | incomplete beta function $B_z(a, b)$ |
| <code>BetaRegularized[z, a, b]</code> | regularized incomplete beta function $I(z, a, b)$ |
| <code>Gamma[z]</code> | Euler gamma function $\Gamma(z)$ |
| <code>Gamma[a, z]</code> | incomplete gamma function $\Gamma(a, z)$ |
| <code>Gamma[a, z0, z1]</code> | generalized incomplete gamma function $\Gamma(a, z_0) - \Gamma(a, z_1)$ |
| <code>GammaRegularized[a, z]</code> | regularized incomplete gamma function $Q(a, z)$ |
| <code>InverseBetaRegularized[s, a, b]</code> | inverse beta function |
| <code>InverseGammaRegularized[a, s]</code> | inverse gamma function |

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| Pochhammer[a, n] | Pochhammer symbol $(a)_n$ |
| PolyGamma[z] | digamma function $\psi(z)$ |
| PolyGamma[n, z] | n^{th} derivative of the digamma function $\psi^{(n)}(z)$ |

Error Function and Related Functions

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| Erf[z] | error function erf(z) |
| Erf[z_0, z_1] | generalized error function erf(z_1) – erf(z_0) |
| Erfc[z] | complementary error function erfc(z) |
| Erfi[z] | imaginary error function erfi(z) |
| FresnelC[z] | Fresnel integral $C(z)$ |
| FresnelS[z] | Fresnel integral $S(z)$ |
| InverseErf[s] | inverse error function |
| InverseErfc[s] | inverse complementary error function |

Bessel and Related Functions

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| AiryAi[z] and AiryBi[z] | Airy functions Ai(z) and Bi(z) |
| AiryAiPrime[z] and AiryBiPrime[z] | derivatives of Airy functions Ai'(z) and Bi'(z) |
| BesselJ[n, z] and BesselY[n, z] | Bessel functions $J_n(z)$ and $Y_n(z)$ |
| BesselI[n, z] and BesselK[n, z] | modified Bessel functions $I_n(z)$ and $K_n(z)$ |
| StruveH[n, z] and StruveL[n, z] | Struve function $\mathbf{H}_n(z)$ and modified Struve function $\mathbf{L}_n(z)$ |