PolyLog
PolyLog\[n, z\] gives the polylogarithm function \( \text{Li}_n(z) \).
\[ \text{Li}_n(z) = \sum_{k=1}^{\infty} \frac{z^k}{k^n} \]

Zeta\[s\] gives the Riemann zeta function \( \zeta(s) \).
Zeta\[s, a\] gives the generalized Riemann zeta function \( \zeta(s, a) \).
- \( \zeta(s) = \sum_{k=1}^{\infty} k^{-s} \).
- \( \zeta(s, a) = \sum_{k=0}^{\infty} (k + a)^{-s} \), where any term with \( k + a = 0 \) is excluded.
- Zeta\[s\] has no branch cut discontinuities.

- Gamma\[z\] is the Euler gamma function \( \Gamma(z) \).
- Gamma\[a, z\] is the incomplete gamma function \( \Gamma(a, z) \).
- Gamma\[a, z_0, z_1\] is the generalized incomplete gamma function \( \Gamma(a, z_0) - \Gamma(a, z_1) \).

The gamma function satisfies \( \Gamma(z) = \int_0^{-\infty} t^{z-1} e^{-t} \, dt \).
- The incomplete gamma function satisfies \( \Gamma(a, z) = \int_z^{\infty} t^{a-1} e^{-t} \, dt \).
- The generalized incomplete gamma function is given by the integral \( \int_{z_0}^{\infty} t^{a-1} e^{-t} \, dt \).
- Note that the arguments in the incomplete form of Gamma are arranged differently from those in the incomplete form of Beta.
- Gamma\[z\] has no branch cut discontinuities.
- Gamma\[a, z\] has a branch cut discontinuity in the complex \( z \) plane running from \(-\infty\) to \( 0 \).

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- Binomial\[n, m\] gives the binomial coefficient \( \binom{n}{m} \).
- Binomial is evaluated symbolically when possible.
- Example: Binomial\[x + 2, x\] \( \rightarrow ((1 + x) * (2 + x)) / 2 \).
- In general, \( \binom{n}{m} \) is defined by \( \Gamma(n+1) / (\Gamma(m+1) \Gamma(n-m+1)) \) or suitable limits of this.