

Expansions for Small Quantities

These truncated Taylor series expansions are valid for argument $x \ll 1$.

General Functions	$(1 - x)^n \approx 1 - nx + n(n - 1)x^2/2 - \dots$ $e^x \approx 1 + x + x^2/2 + \dots$ $\ln(1 + x) \approx x - x^2/2 + \dots$
Trigonometric Functions	$\sin x \approx x - x^3/6 + \dots$ $\cos x \approx 1 - x^2/2 + \dots$ $\tan x \approx x + x^3/3 \dots$ $\csc x \approx 1/x + x/6 + \dots$ $\sec x \approx 1 + x^2/2 + \dots$ $\cot x \approx 1/x - x/3 - \dots$
Inverse Trigonometric Functions	$\sin^{-1} x \approx x + x^3/6 + \dots$ $\cos^{-1} x \approx \pi/2 - x - \dots$ $\tan^{-1} x \approx x - x^3/3 + \dots$ $\csc^{-1} x \approx 1/x + 1/(6x^3) + \dots$ $\sec^{-1} x \approx \pi/2 - 1/x - \dots$ $\cot^{-1} x \approx \pi/2 - x + \dots$
Hyperbolic Functions	$\sinh x \approx x + x^3/6 + \dots$ $\cosh x \approx 1 + x^2/2 + \dots$ $\tanh x \approx x - x^3/3 + \dots$ $\operatorname{sech} x \approx 1 - x^2/2 + \dots$ $\operatorname{csch} x \approx 1/x - x/6 + \dots$ $\operatorname{coth} x \approx 1/x + x/3 + \dots$
Inverse Hyperbolic Functions	$\sinh^{-1} x \approx x - x^3/6 + \dots$ $\cosh^{-1} x \approx \ln(2x) - 1/(4x^2) - \dots$ $\tanh^{-1} x \approx x + x^3/3 + \dots$ $\operatorname{sech}^{-1} x \approx \ln(2/x) - x^2/4 - \dots$ $\operatorname{csch}^{-1} x \approx 1/x - 1/(6x^3) + \dots$ $\operatorname{coth}^{-1} x \approx 1/x + 1/(3x^3) + \dots$