

Inverse of Hyperbolic Functions.

$$\textcircled{1} \cosh^{-1} x = \ln (x + \sqrt{x^2 - 1}) \quad [x \geq 1]$$

$$\textcircled{2} \sinh^{-1} x = \ln (x + \sqrt{x^2 + 1})$$

$$\textcircled{3} \tanh^{-1} x = \frac{1}{2} \ln \left(\frac{1+x}{1-x} \right) \quad [|x| < 1]$$

$$\textcircled{4} \operatorname{sech}^{-1} x = \cosh^{-1} \frac{1}{x} \quad [0 < x \leq 1]$$

$$\textcircled{5} \operatorname{csch}^{-1} x = \sinh^{-1} \frac{1}{x} \quad [x \neq 0]$$

$$\textcircled{6} \operatorname{coth}^{-1} x = \tanh^{-1} \frac{1}{x} \quad (|x| > 1)$$

Derivatives of Inverse Hyperbolic Functions

$$\textcircled{1} \frac{d}{dx} (\cosh^{-1} x) = \frac{1}{\sqrt{x^2 - 1}} \quad [x > 1]$$

$$\textcircled{2} \frac{d}{dx} (\tanh^{-1} x) = \frac{1}{1-x^2} \quad [|x| < 1]$$

$$\textcircled{3} \frac{d}{dx} (\operatorname{sech}^{-1} x) = -\frac{1}{x\sqrt{1-x^2}} \quad [0 < x < 1]$$

$$\textcircled{4} \frac{d}{dx} (\sinh^{-1} x) = \frac{1}{\sqrt{x^2 + 1}}$$

$$\textcircled{5} \frac{d}{dx} (\operatorname{coth}^{-1} x) = \frac{1}{1-x^2} \quad (|x| > 1)$$

$$\textcircled{6} \frac{d}{dx} (\operatorname{csch}^{-1} x) = -\frac{1}{|x|\sqrt{1+x^2}} \quad [x \neq 0]$$