

Derivative of Inverse Hyperbolic functions : Example

$$y = \tanh^{-1}(\sin 2x) + \cosh^{-1}(\operatorname{cosec} x) + \operatorname{cosech} \sqrt{x}$$

$$\frac{dy}{dx} = \frac{1}{1 - \sin^2 2x} \cdot \frac{d}{dx}(\sin 2x) + \frac{1}{\sqrt{\operatorname{cosec}^2 x - 1}} \frac{d}{dx}(\operatorname{cosec} x)$$

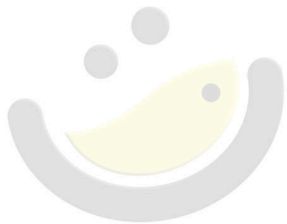
$$+ (-\operatorname{cosech} \sqrt{x} \operatorname{coth} \sqrt{x}) \frac{d}{dx}(\sqrt{x})$$

$$= \frac{1}{\cos^2 2x} \cdot \cos 2x \cdot (2) + \frac{1}{\cot x} \cdot (-\operatorname{cosec} x \operatorname{Cot} x)$$

$$- \operatorname{cosech} \sqrt{x} \cdot \operatorname{coth} \sqrt{x} \cdot \frac{1}{2\sqrt{x}}$$

$$= 2 \sec 2x - \operatorname{cosec} x - \frac{1}{2\sqrt{x}} (\operatorname{cosech} \sqrt{x} \operatorname{coth} \sqrt{x})$$

Ans.



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The poetry of logical ideas.