

# Inverse Trigonometric Derivatives

①  $y = \sin^{-1} x$

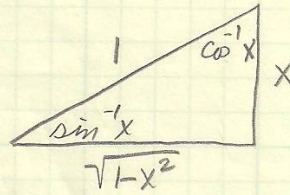
$\sin y = x$

$\cos y \frac{dy}{dx} = 1$

$\frac{dy}{dx} = \frac{1}{\cos y}$

$\frac{dy}{dx} = \frac{1}{\cos(\sin^{-1} x)}$

$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$



②  $y = \cos^{-1} x$

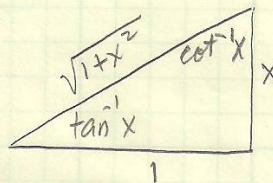
$\cos y = x$

$-\sin y \frac{dy}{dx} = 1$

$\frac{dy}{dx} = -\frac{1}{\sin y}$

$\frac{dy}{dx} = -\frac{1}{\sin(\cos^{-1} x)}$

$\frac{dy}{dx} = -\frac{1}{\sqrt{1-x^2}}$



③  $y = \tan^{-1} x$

$\tan y = x$

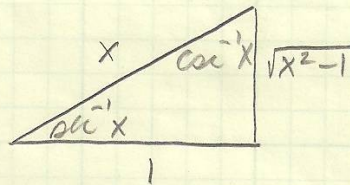
$\sec^2 y \frac{dy}{dx} = 1$

$\frac{dy}{dx} = \frac{1}{\sec^2 y}$

$\frac{dy}{dx} = \frac{1}{\sec^2(\tan^{-1} x)}$

$\frac{dy}{dx} = \frac{1}{(\sqrt{1+x^2})^2}$

$\frac{dy}{dx} = \frac{1}{1+x^2}$



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42,385 200 RECYCLED WHITE 8 SQUARE  
42,386 200 RECYCLED WHITE 8 SQUARE  
Made in U.S.A.



$$④ \quad y = \sec^{-1} x$$

$$\sec y = x$$

$$\sec y \tan y \frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = \frac{1}{\sec y \tan y}$$

$$\frac{dy}{dx} = \frac{1}{\sec(\sec^{-1} x) \tan(\sec^{-1} x)}$$

$$\frac{dy}{dx} = \frac{1}{|x| \sqrt{x^2 - 1}}$$



$$⑤ \quad y = \csc^{-1} x$$

$$\csc y = x$$

$$-\csc y \cot y \frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = -\frac{1}{\csc y \cot y}$$

$$\frac{dy}{dx} = -\frac{1}{\csc(\csc^{-1} x) \cot(\csc^{-1} x)}$$

$$\frac{dy}{dx} = -\frac{1}{|x| \sqrt{x^2 - 1}}$$

$$⑥ \quad y = \cot^{-1} x$$

$$\cot y = x$$

$$-\csc^2 y \frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = -\frac{1}{\csc^2 y}$$

$$\frac{dy}{dx} = -\frac{1}{\csc^2(\cot^{-1} x)}$$

$$\frac{dy}{dx} = -\frac{1}{(\sqrt{1+x^2})^2}$$

$$\frac{dy}{dx} = -\frac{1}{1+x^2}$$