

Let $y = \sin^{-1} x$

$\neq \frac{1}{\sin x}$
 $(\sin x)^{-1}$

Find $\frac{dy}{dx}$

$x = \sin y$

derivative

ex) $\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$

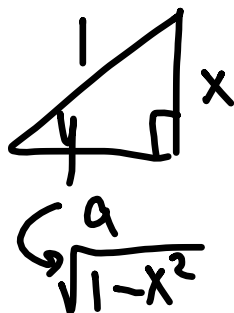
$\sin^{-1} \frac{\sqrt{3}}{2} = \frac{\pi}{3}$

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

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

We know,

$x = \sin y$



$a^2 + x^2 = 1$

$a = \sqrt{1-x^2}$

$\cos y = \sqrt{1-x^2}$

$f(x)$ $f'(x)$ $\sin^{-1}x$ $\frac{1}{\sqrt{1-x^2}}$ $\cos^{-1}x$ $\frac{-1}{\sqrt{1-x^2}}$ $\tan^{-1}x$ $\frac{1}{1+x^2}$

Let $y = \cos^{-1} x$

Find $\frac{dy}{dx}$

$$x = \cos y$$

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

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

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

$$x = \cos y$$



$$a^2 + b^2 = 1^2$$

$$a = \sqrt{1-x^2}$$

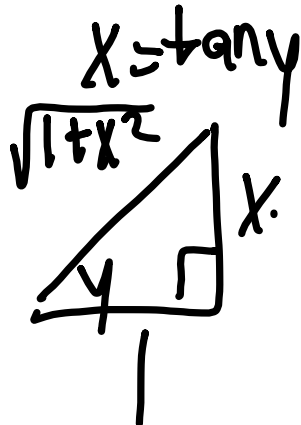
$$\text{Let } y = \tan^{-1} x$$

Find $\frac{dy}{dx}$.

$$x = \tan y$$

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

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



$$1^2 + x^2 = c^2$$

$$c = \sqrt{1+x^2}$$

$$\frac{1}{\sec^2 y} = \cos^2 y$$

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

$$= \left(\frac{1}{\sqrt{1+x^2}} \right)^2$$

*) $\sqrt{x^2} = |x|$

$(\sqrt{x})^2 = x, \quad x \geq 0$

Let $y = \cot^{-1} x$

Find $\frac{dy}{dx}$ $x = \cot y \Rightarrow \frac{d}{dx} = -\csc^2 y \frac{dy}{dx}$

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

$$a = \sqrt{1+x^2}$$



$$= \frac{1}{(\sqrt{1+x^2})^2} \leftarrow \frac{\text{hyp}}{\text{opp}} = \frac{1}{1+x^2}$$