

## 4.5 Derivatives of Trigonometric Functions

$$\frac{d}{dx}(\sin x) = \cos x$$

$$\frac{d}{dx}(\cos x) = -\sin x$$

$$\frac{d}{dx}(\csc x) = -\csc x \cot x$$

$$\frac{d}{dx}(\sec x) = \sec x \tan x$$

$$\frac{d}{dx}(\tan x) = \sec^2 x$$

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

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*Example* Find the derivative of the following functions

$$y = \sec^2 x + 4 \tan x + x\sqrt{x} + \pi \quad y = \frac{2 \cos x + 1}{\cot x + x} \quad y = \frac{\sin x \cos x}{x^2}$$

*Example:* Find the equation of the tangent line to the graph  $f(x)=2\sin x$  at  $x = \pi/3$ .

*Example :* Find where  $y$  has a horizontal tangent line when  $y=x + 2\sin x$