

Section 3.3: Derivatives of Trigonometric Functions

Derivative Rules

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

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

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

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

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

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

Example: Find the derivatives of these functions.

A) $y = 5 \tan(x) + 3 \sec(x)$

B) $y = x^3 \cot(x)$

C) $y = \frac{\sin(x)}{1 + \csc(x)}$

Example: Compute $\frac{d^{99}}{dx^{99}} \sin(x)$

Example: Find where the tangent line is horizontal.

$$y = x + 2 \cos(x)$$