

# Derivative Rules You Should Know!

**Derivative of a constant:**  $\frac{d}{dx}(c) = 0$

**Rule for a constant multiple:**  $\frac{d}{dx}[c \cdot f(x)] = c \cdot f'(x)$

**Derivative of a sum or difference:**  $\frac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x)$

**Power Rule:**  $\frac{d}{dx}(x^n) = n \cdot x^{n-1}$

## Derivatives of Trig Functions:

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

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

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

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

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

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

## Derivatives of Log & Exponential Functions:

$$\frac{d}{dx}(a^x) = a^x \ln a$$

$$\frac{d}{dx}(e^x) = e^x$$

$$\frac{d}{dx}(\log_a x) = \frac{1}{x} \cdot \frac{1}{\ln a}$$

$$\frac{d}{dx}(\ln x) = \frac{1}{x}$$

## Derivatives of Inverse Trig Functions:

$$\frac{d}{dx}(\arcsin x) = \frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}(\arccos x) = \frac{d}{dx}(\cos^{-1} x) = \frac{-1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}(\arctan x) = \frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$$

**Product Rule:**  $\frac{d}{dx}[f(x) \cdot s(x)] = F(x) \cdot S'(x) + S(x) \cdot F'(x)$

Note:  $F$  and  $S$  stand for first and second functions.

**Quotient Rule:**  $\frac{d}{dx}\left[\frac{H(x)}{L(x)}\right] = \frac{L(x) \cdot H'(x) - H(x) \cdot L'(x)}{[L(x)]^2}$

Note:  $L$  and  $H$  stand for low and high functions. There is a little yodel you can learn to remember the quotient rule... it goes low-dee-hi, hi-dee-low...low low.

**Chain Rule:**  $\frac{d}{dx}[f(g(x))] = f'(g(x)) \cdot g'(x)$