

Table of Derivatives

Power Rule

$$\frac{d}{dx} x^n = nx^{n-1}$$

Product Rule

$$\frac{d}{dx} (f(x)g(x)) = f'g + fg'$$

Quotient Rule

$$\frac{d}{dx} \frac{f(x)}{g(x)} = \frac{f'g - fg'}{g^2}$$

Chain Rule

a.k.a Outside-Inside or Matryoshka Rule

$$\frac{d}{dx} f(g(x)) = f'(g(x)) \cdot g'(x)$$


OR

$$y = u(x)$$

$$\frac{dy}{dx} = \frac{dy}{du} \frac{du}{dx} \quad \text{or} \quad \frac{dy}{dx} = \frac{dy}{du} u'(x)$$

Trigonometric Derivatives

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

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

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

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

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

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

Exponential and Logarithmic Derivatives

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

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

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

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

Derivatives of Inverse Trig Functions

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

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

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