Derivative Rules Cheat Sheet

Complete derivative rules cheat sheet with power rule, product rule, quotient rule, chain rule, and all differentiation formulas. Free PDF download for calculus students.

Basic Rules

Constant Rule

$$\frac{d}{dx}(c) = 0$$

Derivative of a constant is zero

Power Rule

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

Bring down the exponent, reduce by 1

Constant Multiple

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

Constants factor out

Sum Rule

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

Derivative of sum is sum of derivatives

Difference Rule

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

Derivative of difference is difference of derivatives

Product & Quotient Rules

Product Rule

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

First times derivative of second plus second times derivative of first

Quotient Rule

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

Low d-high minus high d-low over low squared

Chain Rule

Chain Rule

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

Derivative of outer times derivative of inner

General Power

$$\frac{d}{dx}(u^n) = nu^{n-1} \cdot \frac{du}{dx}$$

Power rule with chain rule

Trigonometric Derivatives

Sine

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

Cosine

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

Tangent

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

Cotangent

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

Secant

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

Cosecant

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

Inverse Trigonometric Derivatives

Arcsine

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

Arccosine

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

Arctangent

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

Exponential & Logarithmic

Natural Exponential

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

General Exponential

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

Natural Log

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

General Log

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