Acumen Tutoring™

Calculus Memorize Me™

Common Derivatives

Combined Functions Rules

Given two functions $u(x)$ and $v(x)$:

Product Rule

$$(uv)' = u'v + v'u$$

Quotient Rule

$$\left(\frac{u}{v}\right)' = \frac{u'v - v'u}{v^2}$$

Chain Rule

$$u(v)' = u'(v) \cdot v'$$

Note this is "u-prime-of-v," not "u-prime-times-v."

Common Derivatives

Trigonometric Functions

$$\frac{d}{dx}\sin x = \cos x \qquad \frac{d}{dx}\cos x = -\sin x \qquad \frac{d}{dx}\tan x = \sec^2 x$$

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

$$\frac{d}{dx}\sin^{-1} x = \frac{1}{\sqrt{1-x^2}} \qquad \frac{d}{dx}\cos^{-1} x = -\frac{1}{\sqrt{1-x^2}} \qquad \frac{d}{dx}\tan^{-1} x = \frac{1}{1+x^2}$$

$$\frac{d}{dx}\sec^{-1} x = \frac{1}{|x|\sqrt{x^2-1}} \qquad \frac{d}{dx}\csc^{-1} x = -\frac{1}{|x|\sqrt{x^2-1}} \qquad \frac{d}{dx}\cot^{-1} x = -\frac{1}{1+x^2}$$

Exponents and Logarithms

In the following, a represents a constant value.

$$\frac{d}{dx}e^x = e^x \qquad \frac{d}{dx}\ln x = \frac{1}{x}$$

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

Derivative of Inverse, Reciprocal, and absolute value functions

$$(f^{-1})'(a) = \frac{1}{f'(f^{-1}(a))} \qquad \left(\frac{1}{f(x)}\right)' = \frac{f'(x)}{f(x)^2} \qquad \frac{d}{dx}|x| = \frac{x}{|x|}$$

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