

General Rules k is a constant, u, v functions of x .

(1) If k is a constant, then $\frac{d}{dx}k = 0$.

(2) If n is a real number, then $\frac{dx^n}{dx} = nx^{n-1}$.

(3) $\frac{d(ku)}{dx} = k\frac{du}{dx}$.

(4) $\frac{d(u+v)}{dx} = \frac{du}{dx} + \frac{dv}{dx}$.

(5) (Product rule) $\frac{d(u \cdot v)}{dx} = u\frac{dv}{dx} + v\frac{du}{dx}$.

(6) (Quotient rule) $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$.

Specific Functions

- For a constant, $\frac{da^x}{dx} = \ln a \cdot a^x$. In particular $\frac{de^x}{dx} = e^x$.

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

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