

Chain Rule

If $y = [f(x)]^n$

then $\frac{dy}{dx} = n[f(x)]^{n-1}f'(x)$

Chain Rule

$$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

where y is a function of u and u is a function of x .

Chain Rule

If $y = f[g(x)]$

then $\frac{dy}{dx} = f'[g(x)]g'(x)$

Product Rule

If $y = uv$

then $\frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$

where u and v are functions of x .

Quotient Rule

$$\text{If } y = \frac{u}{v}$$

$$\text{then } \frac{dy}{dx} = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$$

where u and v are functions of x .

If $y = e^x$

then $\frac{dy}{dx} = e^x$

If $y = e^{f(x)}$

then $\frac{dy}{dx} = f'(x)e^{f(x)}$

If $y = \ln x$

then $\frac{dy}{dx} = \frac{1}{x}$

If $y = \ln[f(x)]$

then $\frac{dy}{dx} = \frac{f'(x)}{f(x)}$

$$\text{If } y = \sin x \\ \text{then } \frac{dy}{dx} = \cos x$$

$$\text{If } y = \cos x \\ \text{then } \frac{dy}{dx} = -\sin x$$

$$\text{If } y = \tan x \\ \text{then } \frac{dy}{dx} = \sec^2 x$$

$$\text{If } y = \operatorname{cosec} x \\ \text{then } \frac{dy}{dx} = -\operatorname{cosec} x \cot x$$

$$\text{If } y = \sec x \\ \text{then } \frac{dy}{dx} = \sec x \tan x$$

$$\text{If } y = \cot x \\ \text{then } \frac{dy}{dx} = -\operatorname{cosec}^2 x$$

$$\text{If } y = \sin f(x) \\ \text{then } \frac{dy}{dx} = f'(x) \cos f(x)$$

$$\text{If } y = \cos f(x) \\ \text{then } \frac{dy}{dx} = -f'(x) \sin f(x)$$

$$\text{If } y = \tan f(x) \\ \text{then } \frac{dy}{dx} = f'(x) \sec^2 f(x)$$

$$\text{If } y = \operatorname{cosec} f(x) \\ \text{then } \frac{dy}{dx} = \\ -f'(x) \operatorname{cosec} f(x) \cot f(x)$$

$$\text{If } y = \sec f(x) \\ \text{then } \frac{dy}{dx} = f'(x) \sec f(x) \tan f(x)$$

$$\text{If } y = \cot f(x) \\ \text{then } \frac{dy}{dx} = -f'(x) \operatorname{cosec}^2 f(x)$$