

MTH 232 Chapter 23 Derivative Rules

$$\frac{df(x)}{dx} = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \text{slope of the line tangent to } f(x) \text{ at } (x,y)$$

Rule	Rule Number
$\frac{dc}{dx} = 0$	1
$\frac{dx^n}{dx} = nx^{n-1}$ with $\frac{dx}{dx} = \frac{dx^1}{dx} = 1$ and recall that $\sqrt[n]{a} = a^{1/n}$	2
$\frac{d(cu)}{dx} = c \frac{du}{dx}$	3
$\frac{d(u+v)}{dx} = \frac{du}{dx} + \frac{dv}{dx}$ and $\frac{d(u-v)}{dx} = \frac{du}{dx} - \frac{dv}{dx}$	4
$\frac{d(uv)}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$	5
$\frac{d\left(\frac{u}{v}\right)}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$	6
$\frac{du^n}{dx} = nu^{n-1} \frac{du}{dx}$	7

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Derivative:	Find $\frac{df(x)}{dx}$	d(f(x),x)
Second derivative:	Find $\frac{d}{dx} \left(\frac{df(x)}{dx} \right) = \frac{d^2 f(x)}{dx^2}$	d(f(x),x,2)
Implicit derivative:	Find $\frac{dy}{dx}$ from $f(x,y)$	impDif(f(x,y),x,y)
Second order implicit derivative:	Find $\frac{d^2 y}{dx^2}$ from $f(x,y)$	impDif(f(x,y),x,y,2)