

Derivatives

Definition and Notation

$$y = f(x)$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$y = f(x)$$

$$y = f(x)$$

$$f'(x) = y' = \frac{df}{dx} = \frac{dy}{dx} = \frac{d}{dx} f(x) = Df(x) \quad f'(a) = y'|_{x=a} = \left. \frac{df}{dx} \right|_{x=a} = \left. \frac{dy}{dx} \right|_{x=a} = Df(a) \quad x=a$$

Interpretation of the Derivative

$$y = f(x)$$

Related Rates

i.e.

t
 t

Ex.

-

15 ft

y

x

$\leftarrow x' = -\frac{1}{4}$

y'

y

x

x y x y

x y

$y \sqrt{\quad}$ $\sqrt{\quad}$