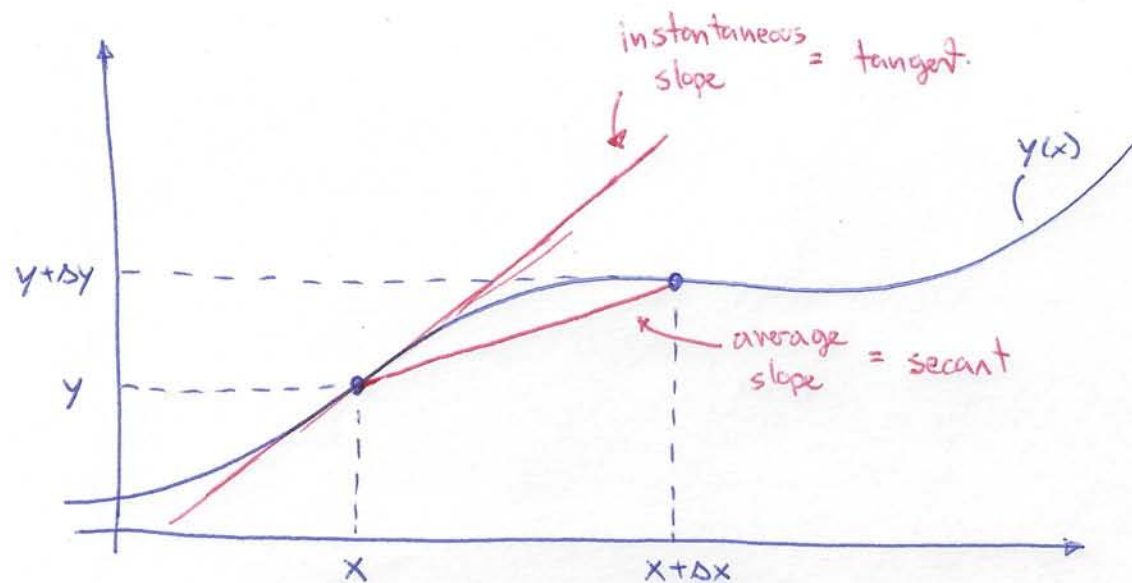


Slope



$$m_{\text{average}} = \text{average slope} = \frac{\text{rise}}{\text{run}} = \frac{(y + \Delta y) - (y)}{(x + \Delta x) - (x)} = \frac{y(x + \Delta x) - y(x)}{\Delta x}$$

$$m_{\text{instantaneous}} = \text{tangent slope} = \frac{\text{rise}}{\text{run}} = \lim_{\Delta x \rightarrow 0} \frac{(y + \Delta y) - (y)}{(x + \Delta x) - (x)} = \lim_{\Delta x \rightarrow 0} \frac{y(x + \Delta x) - y(x)}{\Delta x} = \frac{dy}{dx}$$

infinitesimal
size $\Delta x \rightarrow 0$.

$$\boxed{\frac{dy}{dx} = \lim_{\Delta x \rightarrow 0} \frac{y(x + \Delta x) - y(x)}{\Delta x}}$$

Definition of the Derivative.