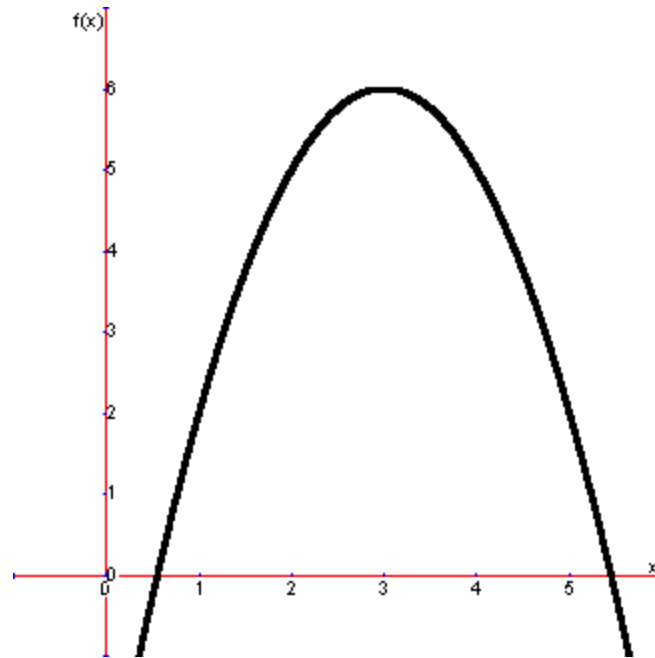


Episode 2 Follow Along: Derivatives and Their Definition

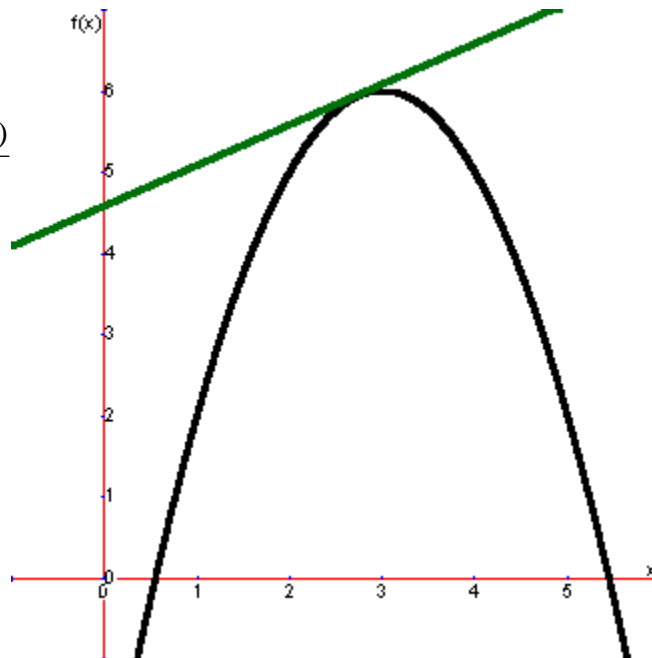
Slope Formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$$



Tangent Line:

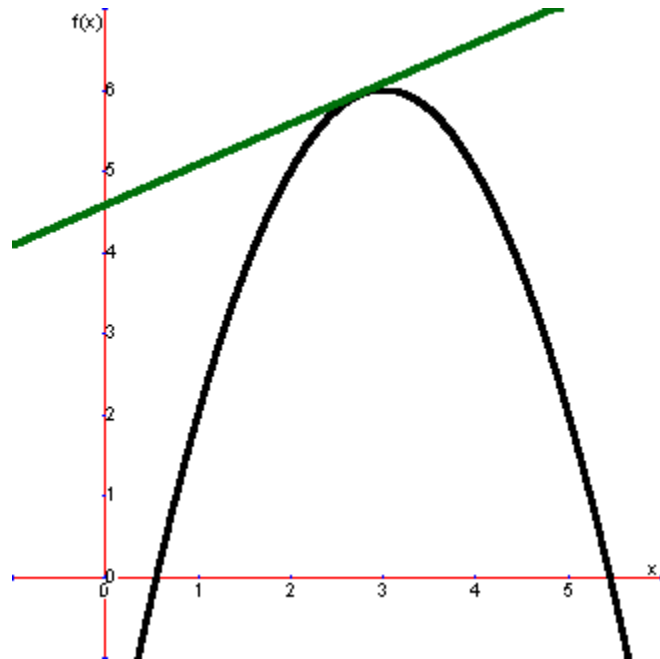
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$



Tangent Line, Example 2

$$m = \frac{f(x + \Delta x) - f(x)}{(x + \Delta x) - x} =$$

$$= \frac{f(x + \Delta x) - f(x)}{\Delta x}$$



Derivative Formula:

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

Practice Problem:

$$f(x) = x^2$$

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

$$\frac{dy}{dx} = \lim_{\Delta x \rightarrow 0}$$