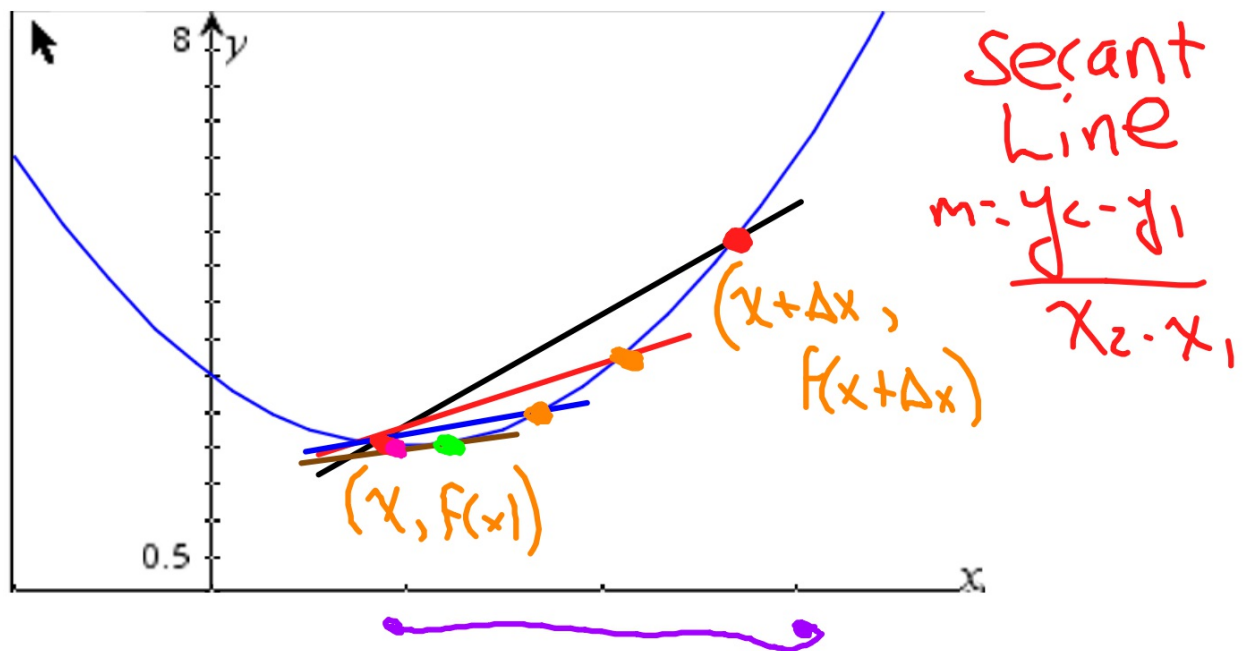
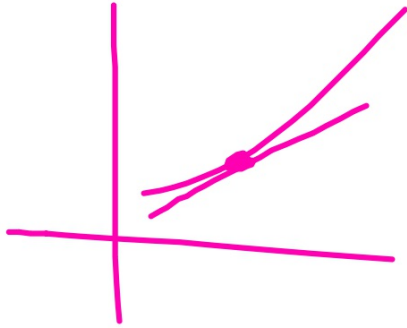


2.1 The Derivative





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

= Slope of tangent
line

60 miles

1 hr

(0,0)

(60,1)

0

0

$$\frac{60-0}{1-0} = 60 \frac{\text{mi}}{\text{hr}}$$

Ex. $f(x) = x^2 + 1$. Find the eqn. of the tangent at $x = -1$. $(-1, 2)$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = -2(x + 1)$$

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

$$\lim_{\Delta x \rightarrow 0} \frac{(x + \Delta x)^2 + 1 - (x^2 + 1)}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} \frac{\cancel{x^2} + 2x\Delta x + \Delta x^2 + 1 - \cancel{x^2} - 1}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} 2x + \Delta x$$

$$m_{\text{tan}} = 2x$$

$$\text{Ex. } f(x) = 2x^2 + 3 \quad ; \quad \underline{x=2}$$

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

$$\lim_{\Delta x \rightarrow 0} \frac{\cancel{2x^2} + 4x\Delta x + \cancel{2\Delta x^2} + \cancel{3} - (\cancel{2x^2} + \cancel{3})}{\Delta x} = \frac{\Delta x(4x + 2\Delta x)}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} 4x + 2\Delta x = 4x$$

2.1 1,2

5-~~17~~ odd

17

25a, 26a