IVT AP Practice

Hint: Sketch a graph for each problem

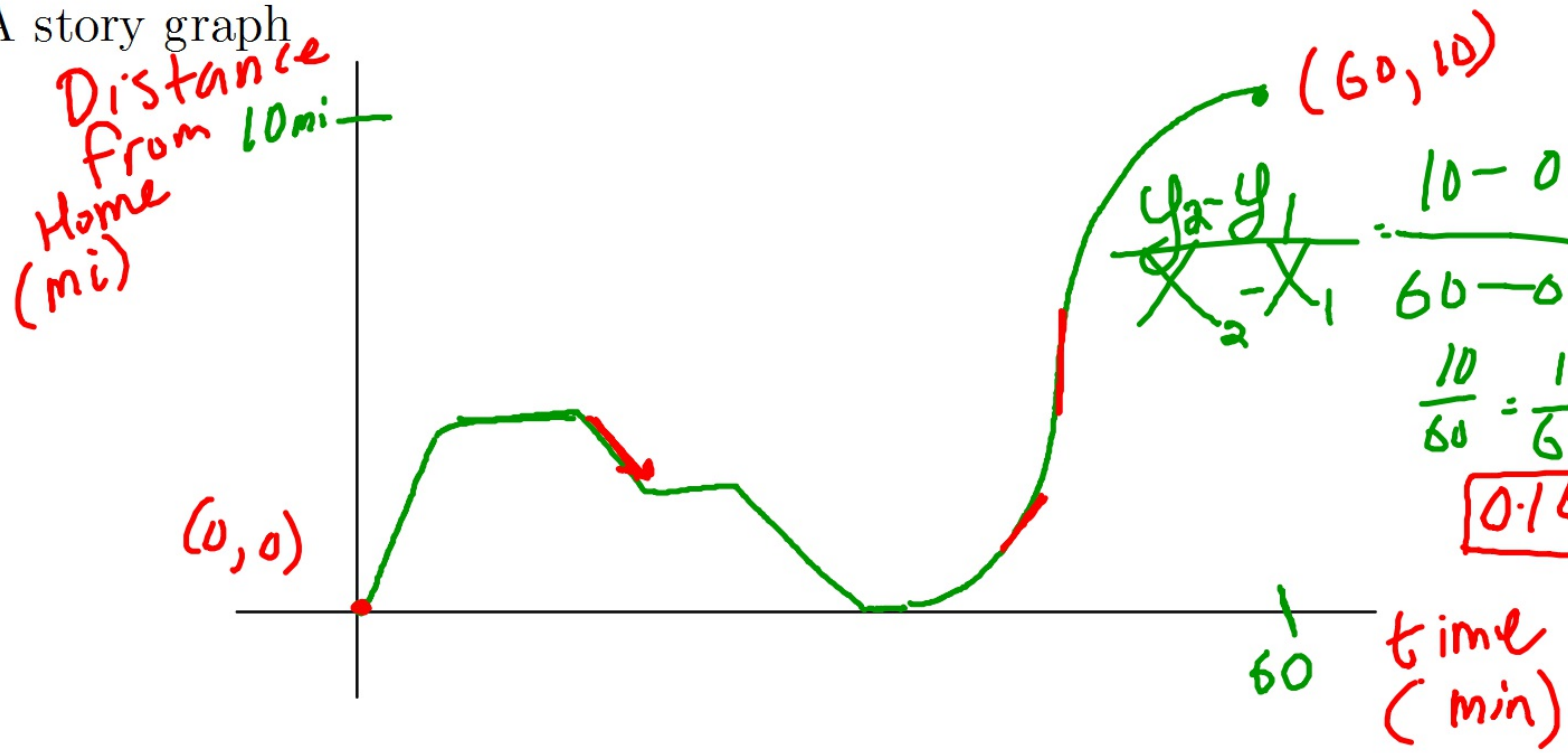
$$\lim_{x \to 0} x \cdot \csc x$$

$$\lim_{x \to 0} x \cdot \frac{1}{\sin x}$$

$$\lim_{x \to 0} \frac{x}{\sin x} = 1$$

Beginning the Derivative (notes)

A story graph

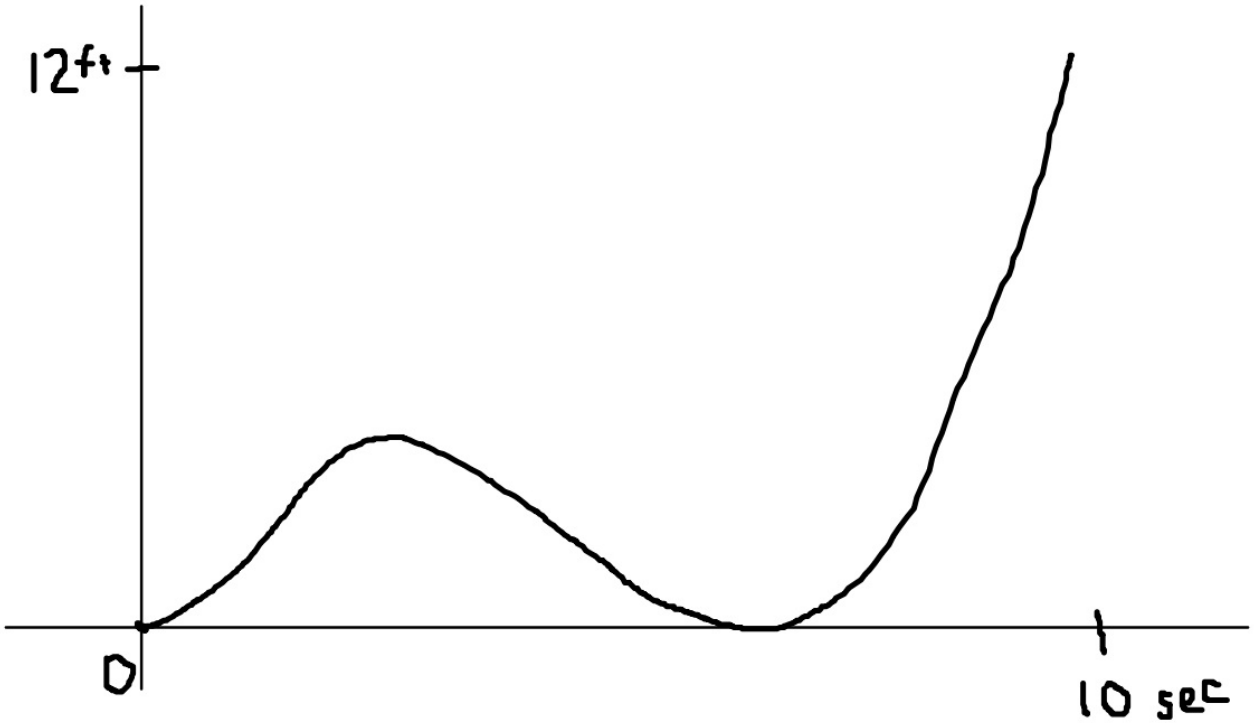


$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{10-0 \text{ mi}}{60-0 \text{ min}}$$

$$\frac{10}{60} = \frac{1}{6} \approx$$

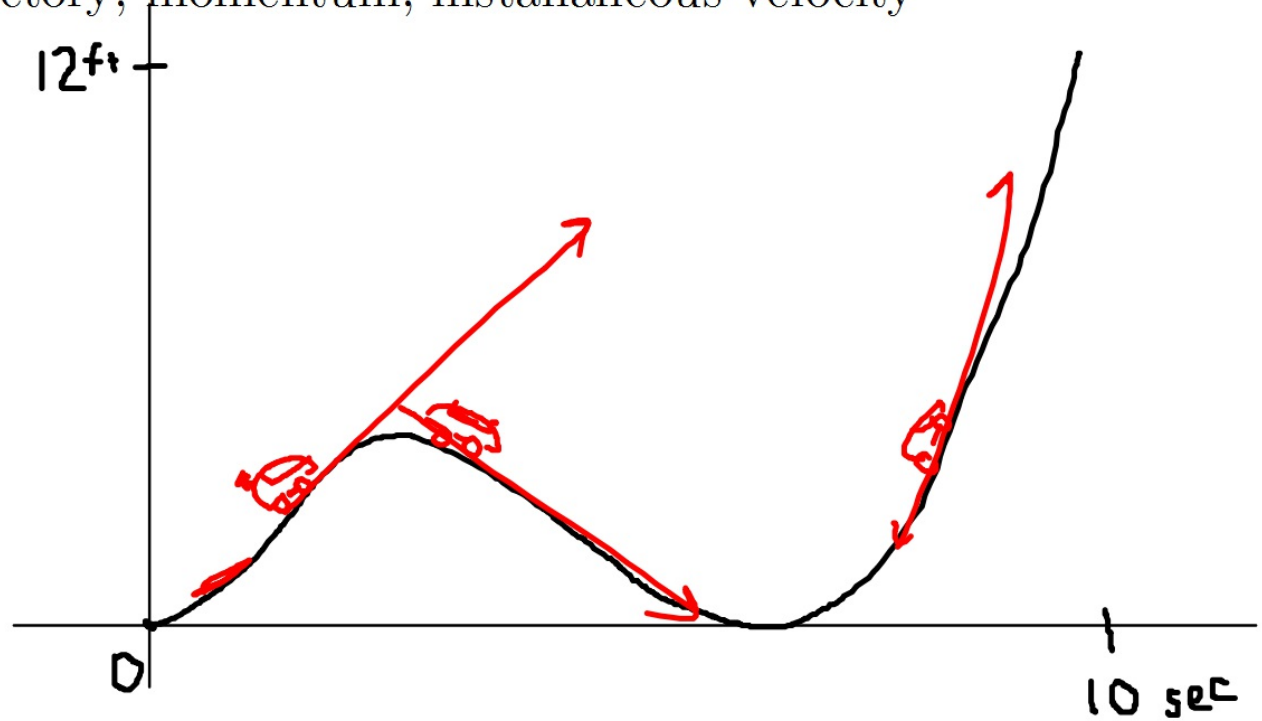
$$\boxed{0.16 \text{ mi/min}}$$

Average Rate of Change vs Instantaneous Rate of Change



"Slope of a Curve"

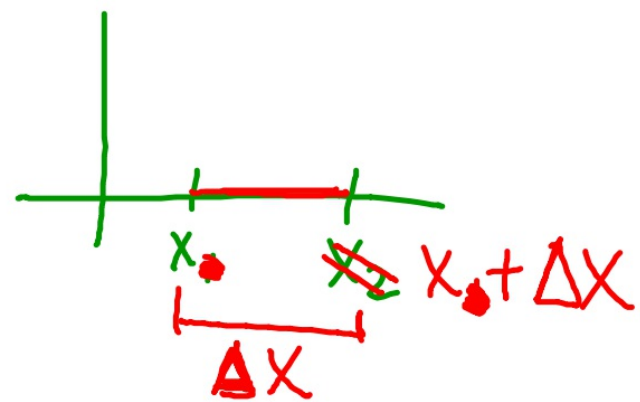
Trajectory; momentum; instananeous velocity



Slope Formula through the Ages

Algebra I: $$\frac{y_2 - y_1}{x_2 - x_1}$$

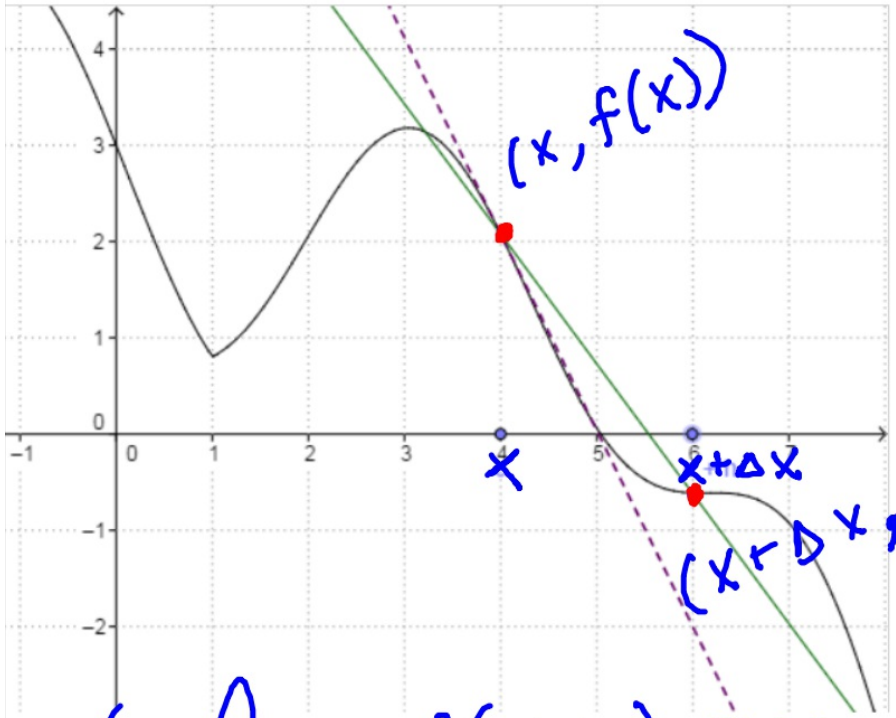
Function Notation: $$\frac{f(x_2) - f(x_1)}{x_2 - x_1}$$



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

"Gap"

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



$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

Slope of Solid line

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

$$\lim_{\Delta x \to 0} m = \boxed{\lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}}$$

Derivative "slope at 1 instant point"