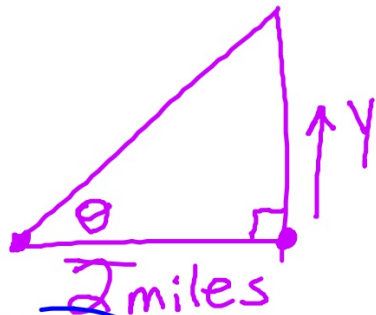


Related Rates

(2)



$$\theta = \frac{\pi}{6}$$

$$\frac{d\theta}{dt} = 2 \text{ rad/min}$$

$$\frac{dy}{dt} = \underline{\hspace{2cm}}$$

$$\tan \theta = \frac{y}{2}$$

$$\sec^2 \theta \frac{d\theta}{dt} = \frac{1}{2} \frac{dy}{dt}$$

$$\left(\sec \frac{\pi}{6}\right)^2 (.2) = \frac{1}{2} \frac{dy}{dt}$$

$$2 \cdot \left(\frac{2\sqrt{3}}{3}\right)^2 \cdot \frac{1}{5} = \frac{dy}{dt}$$

$$2 \cdot \frac{4 \cdot 3}{9} \cdot \frac{1}{5} = \frac{24}{45} \text{ miles/min}$$

Motion

$$s(t) = t^3 - 12t^2 + 36t \quad t \geq 0$$

5c.

at rest

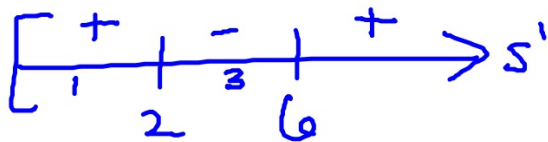
$$v(t) = 0$$

$$s'(t) = 3t^2 - 24t + 36$$

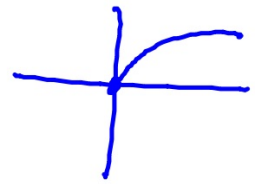
$$0 = 3(t^2 - 8t + 12)$$

$$0 = 3(t - 6)(t - 2)$$

$$t = 2, 6$$



3.1: Absolute/Relative Extrema/Critical Numbers



$$9.) f(x) = \sqrt{x} (x-3)$$

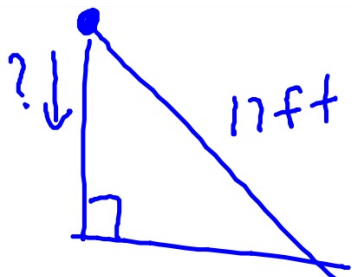
$$f(x) = x^{3/2} - 3x^{1/2}$$

$$f'(x) = \frac{3}{2}x^{1/2} - \frac{3}{2}x^{-1/2}$$

$$= \frac{3x^{1/2}}{2} - \frac{3}{2x^{1/2}} \quad x=0,1$$

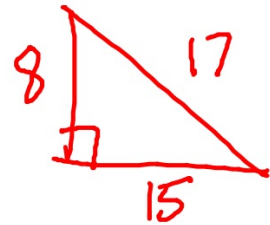
$$f'(x) = \frac{3x-3}{2\sqrt{x}}$$

4



$$\frac{dx}{dt} = 0.5 \text{ ft/sec}$$

$$\frac{dy}{dt} = \text{--- when } y = 8 \text{ ft}$$



$$x^2 + y^2 = c^2$$

$$2x \frac{dx}{dt} + 2y \frac{dy}{dt} = 0$$

$$15 \left(\frac{1}{2} \right) + 8 \frac{dy}{dt} = 0$$

$$8 \frac{dy}{dt} = -\frac{15}{2}$$

$$\frac{dy}{dt} = -\frac{15}{16} \text{ ft/sec}$$