$$y = 5x^{4/3} + 12x^{1/3}$$

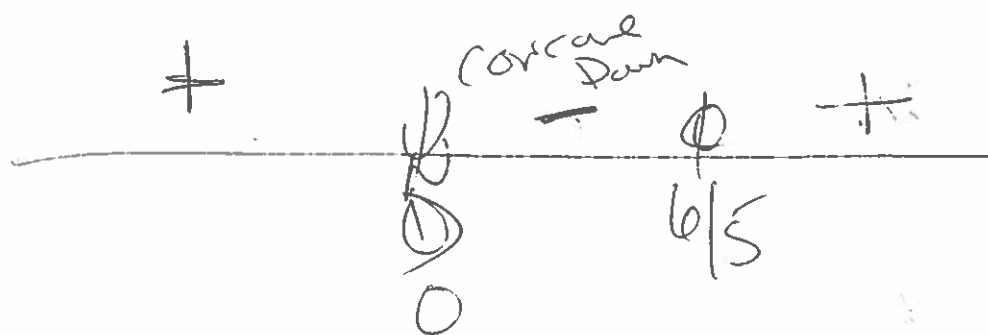Concave __UP__

$$y' = \frac{20}{3}x^{1/3} + 4x^{-2/3}$$

$$y'' = \frac{20}{9}x^{-2/3} + -\frac{8}{3}x^{-5/3} = 0$$

$$x^{-5/3}\left(\frac{20}{9}x^{3/3} - \frac{8}{3}\right) = 0$$

$$\frac{20}{9}x - \frac{8}{3} = 0$$

$$\frac{20}{9}x = \frac{8}{3}$$

$$x = \frac{8}{3} \cdot \frac{9}{20} = \frac{6}{5}$$

+   Concave Down ϕ +

0   6/5

$$\frac{d}{dx} 5x \cdot \cos(8x^3)$$

$$= 5x \cdot \frac{d}{dx} \cos(8x^3) + \cos(8x^3) \cdot 5$$

$$\underbrace{\qquad\qquad}_{\text{Product}}$$

$$= -5x \sin(8x^3) \cdot \frac{d}{dx} 8x^3 + 5\cos(8x^3)$$

$$\underbrace{\qquad}_{\text{Chain}}$$

$$= -5x \sin(8x^3) \cdot 24x^2 + 5\cos(8x^3)$$

$$= -120x^3 \sin(8x^3) + 5\cos(8x^3)$$

$$y = 2'$$

$$z$$

$$x = 10$$

$$\frac{dz}{dt} = \frac{4 ft}{sec}$$

Triangle: legs 2 and 10, hypotenuse $\sqrt{10^2 + 2^2} = \sqrt{104}$
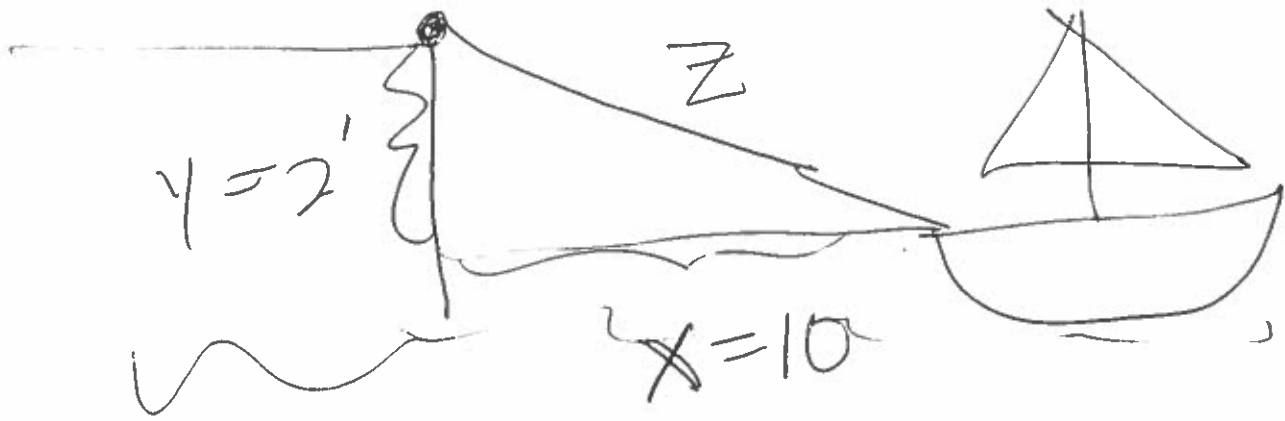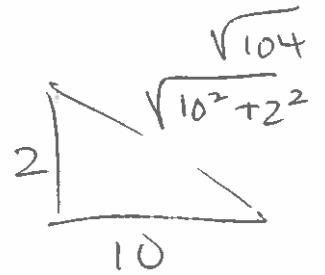
$$x^2 + y^2 = z^2$$

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

$$10\left(\frac{dx}{dt}\right) + 2(0) = \sqrt{104}(4)$$

$$\frac{dx}{dt} = \frac{\sqrt{104} \cdot 4}{10}$$

$$\frac{d}{dx} 3e^{x^4} = 3e^{x^4} \cdot \frac{d}{dx} x^4$$
$$= 3e^{x^4} \cdot 4x^3$$
$$= 12x^3 e^{x^4}$$

$$\frac{d}{dx} \left[\tan^{-1}(x^5) \right]$$
$$\frac{1}{1+(x^5)^2} \cdot \frac{d}{dx} x^5$$
$$\frac{5x^4}{1+x^{10}}$$