

# Math 122 HW #1

⊙

6.4 # 9, 14, 21

6.5 # 9, 23

6.4 #9

$$2\sqrt{x} + 4\sqrt{y} = 5y$$

$$2x^{1/2} + 4y^{1/2} = 5y$$

$$x^{-1/2} + 2y^{-1/2} \cdot \frac{dy}{dx} = 5 \frac{dy}{dx}$$

$$x^{-1/2} = 5 \frac{dy}{dx} - 2y^{-1/2} \frac{dy}{dx} = \frac{dy}{dx} (5 - 2y^{-1/2})$$

$$\frac{dy}{dx} = \frac{x^{-1/2}}{5 - 2y^{-1/2}}$$

6.4 #14

$$x^2 e^y + y = x^3$$

$$x^2 \cdot e^y \frac{dy}{dx} + e^y \cdot 2x + \frac{dy}{dx} = 3x^2$$

$$x^2 e^y \frac{dy}{dx} + \frac{dy}{dx} = 3x^2 - e^y \cdot 2x$$

$$\frac{dy}{dx} (x^2 e^y + 1) = 3x^2 - e^y \cdot 2x$$

$$\frac{dy}{dx} = \frac{3x^2 - e^y \cdot 2x}{x^2 e^y + 1}$$

6.4 #21

$$2y^2 - x^{1/2} = 4$$

eqn for tangent line at (16, 2)

$$4y \frac{dy}{dx} - \frac{1}{2} x^{-1/2} = 0$$

$$\frac{dy}{dx} = \frac{\frac{1}{2} x^{-1/2}}{4y}$$

plug  $x=16$   $y=2$

$$\frac{dy}{dx} = \frac{\frac{1}{2}(16)^{-1/2}}{4 \cdot 2} = \frac{1}{64}$$

pt. slope form:

$$y - 2 = \frac{1}{64} (x - 16)$$

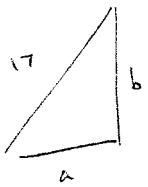
6.5 #9

$$C = .2x^2 + 10000$$

$$\frac{dC}{dt} = .4x \frac{dx}{dt}$$

$$= .4 \cdot 80 \cdot 12 = 384 \text{ ~~1000~~ } \$/\text{month } (?)$$

6.5 #23



$$a^2 + b^2 = 17^2$$

$$2a \frac{da}{dt} + 2b \frac{db}{dt} = 0$$

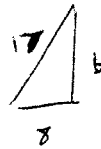
$$\frac{da}{dt} = 9$$

$$a = 8$$

$$b = ?$$

$$b = 15$$

when  $a=8$ , it's



$$8^2 + b^2 = 17^2$$

$$b^2 = 225$$

$$b = 15$$

$$\text{so } 2 \cdot 8 \cdot 9 + 2 \cdot 15 \cdot \frac{db}{dt} = 0$$

$$144 + 30 \frac{db}{dt} = 0$$

$$30 \frac{db}{dt} = -144$$

$$\frac{db}{dt} = -4.8 \text{ ft/min}$$