

Math 121

HW #1

6.4 # 9, 12, 14, 21, 35

6.4 #9

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

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

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

6.4 #12

$$(xy)^{4/3} + x^{1/3} = y^6 + 1$$

$$\frac{4}{3}(xy)^{1/3} \cdot (x \frac{dy}{dx} + y) + \frac{1}{3}x^{-2/3} = 6y^5 \frac{dy}{dx}$$

$$\frac{4}{3}x^{4/3}y^{1/3} \frac{dy}{dx} + \frac{4}{3}x^{1/3}y^{4/3} + \frac{1}{3}x^{-2/3} = 6y^5 \frac{dy}{dx}$$

$$\frac{dy}{dx} = \frac{\frac{4}{3}x^{1/3}y^{4/3} + \frac{1}{3}x^{-2/3}}{6y^5 - \frac{4}{3}x^{4/3}y^{1/3}}$$

6.4 #14

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

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

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

6.4 #21

$$2y^2 - \sqrt{x} = 4$$

tgt line at (16, 2)

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

$$\frac{dy}{dx} = \frac{\frac{1}{2}x^{-1/2}}{4y} = \frac{1}{8y\sqrt{x}}$$

plug (16, 2), slope is $m = \frac{1}{8 \cdot 2 \cdot \sqrt{16}} = \frac{1}{64}$

pt-slope form: $y - y_0 = m(x - x_0)$

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

6.4 #35

$$3(x^2 + y^2)^2 = 25(x^2 - y^2)$$

tgt line at (2, 1)

$$6(x^2 + y^2)(2x + 2y \frac{dy}{dx}) = 50x - 50y \frac{dy}{dx}$$

follo: $6(2x^3 + 2xy^2 + 2x^2y \frac{dy}{dx} + 2y^3 \frac{dy}{dx}) = 50x - 50y \frac{dy}{dx}$

~~at~~ at $x=2, y=1$:

$$6(2 \cdot 8 + 2 \cdot 2 + 2 \cdot 4 \frac{dy}{dx} + 2 \cdot \frac{dy}{dx}) = 100 - 50 \frac{dy}{dx}$$

$$6(16 + 4 + 10 \frac{dy}{dx}) = 100 - 50 \frac{dy}{dx}$$

$$120 + 60 \frac{dy}{dx} = 100 - 50 \frac{dy}{dx}$$

$$20 = -110 \frac{dy}{dx}$$

$$\frac{dy}{dx} = -\frac{2}{11}$$

$$y - y_0 = m(x - x_0)$$

$$y - 1 = -\frac{2}{11}(x - 2)$$