Quiz-Implicit Differentiation 2014 V1.doc Name: _____

Use implicit differentiation to find the derivative of each equation below. Simplify answers as much as possible and leave no negative exponents.

1) $y^5 + 4x^2y^2 + 5x^4 = 12$

$5y^4 \frac{dy}{dx} + 8xy^2 + 4x^2 2y \frac{dy}{dx} + 20x^3 = 0$

$5y^4 \frac{dy}{dx} + 8x^2y \frac{dy}{dx} = -20x^3 - 8xy^2$

$\frac{dy}{dx} = \frac{-20x^3 - 8xy^2}{5y^4 + 8x^2y}$

2) $2\sqrt{y+x} = 3x^2$

$2 \cdot \frac{1}{2}(y+x)^{-1/2}\left(\frac{dy}{dx} + 1\right) = 6x$

$\frac{1}{(y+x)^{1/2}} \frac{dy}{dx} + 1 = 6x$

$\frac{dy}{dx} = 6x(y+x)^{1/2} - 1$

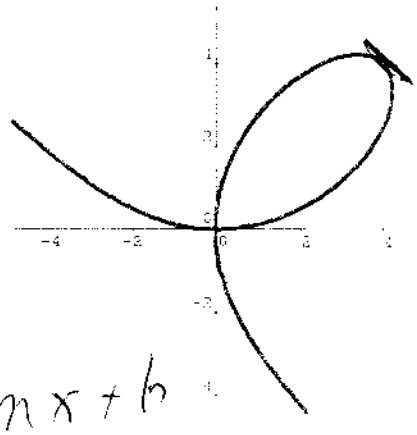
3) $(4y^2-1)^3=(3x^2-x)^4$

$3(4y^2-1)^2(8y\frac{dy}{dx}) = 4(3x^2-x)^3(6x-1)$

$\frac{dy}{dx} = \frac{4(3x^2-x)^3(6x-1)}{3(4y^2-1)^2(8y)}$

$\frac{dy}{dx} = \frac{(3x^2-x)^3(6x-1)}{6y(4y^2-1)^2}$

4) Find the equation of the tangent line to the implicit function $x^3-8xy+y^3=0$ at the point (4,4).



$3x^2-8y-8x\frac{dy}{dx}+3y^2\frac{dy}{dx}=0$

$-8x\frac{dy}{dx}+3y^2\frac{dy}{dx}=8y-3x^2$

$\frac{dy}{dx}=\frac{8y-3x^2}{-8x+3y^2}$

$\frac{dy}{dx}=\frac{8(4)-3(4)^2}{-8(4)+3(4)^2}$

$\frac{dy}{dx}=\frac{32-48}{-32+48}=-1$ slope

$y=mx+b$

$4=(-1)(4)+b$

$b=8$

$y=-x+8$