Math 1210 #14
Implicit Derivatives

Given the equation $2y^3 - y^2 = x^2 + 5$

How do we find $\frac{dy}{dx}$?

Let's check to see if implicit differentiation is reasonable.

Differentiate $x^2 + 2x^2y + 3xy = 0$ in two ways.

Implicit

Explicit

EX 1

Find $\frac{dy}{dx}$ for the following equations.

1a)

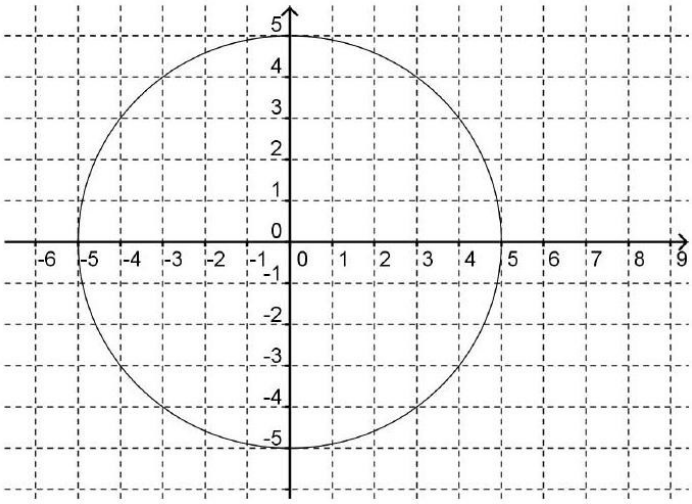
$x\sqrt{y+1} = xy + 1$

1b)

$9x^2 + 4y^2 = 36$

To convince ourselves that is works, let's look at a familiar equation.
Find the equation of the tangent line at the point $(-4,3)$ on this circle.

$$x^2 + y^2 = 25$$



$$x^2 + y^2 = 25$$

EX 2

Find the equation of the tangent line at the indicated point.

$$y + \cos(xy^2) + 3x^2 = 4 \text{ at } (1,0)$$

Power Rule (revisited): Basically the power rule can now be used with rational exponents.

EX 3

Find y' if $y = \sqrt[3]{x} - 2x^{\frac{7}{2}}$

$$\frac{x^2}{9}+\frac{y^2}{4}=2$$
$$\frac{1}{9}\frac{d}{dx}x^2+\frac{1}{4}\frac{d}{dx}y^2=\frac{d}{dx}2$$
$$\frac{1}{9}2x+\frac{1}{4}\frac{dy}{dx}2y=0$$
$$\frac{2y}{4}\frac{dy}{dx}=-\frac{2x}{9}$$
$$\frac{dy}{dx}=\frac{-2x(4)}{9(2y)}$$
$$\frac{dy}{dx}=\frac{-8x}{18y}=\frac{-4x}{9y}$$