Notes: Implicit Differentiation   (D2) Day 1

<u>Implicit Differentiation:</u> Used when taking a derivative and v<u>ariable</u>s do **NOT** match.

<u>Not Implicit</u>: Variables Match   <u>Implicit:</u> Variables do Not Match

$\frac{d}{dx}[3x^2] =$ _____ $\frac{d}{dx}[3y^2] =$ _____

$\frac{d}{dy}[\cos(2y)] =$ _____ $\frac{d}{dy}[\cos(2x)] =$ _____

$\frac{d}{dq}[e^q] =$ _____ $\frac{d}{dt}[e^x] =$ _____

D
Implicit Differentiation

Example 1: Find $\frac{dy}{dx}$ at $\left(\frac{3}{5},\frac{4}{5}\right)$ for $x^2 + y^2 = 1$. Find the equation of the tangent line and the equation of the normal line.
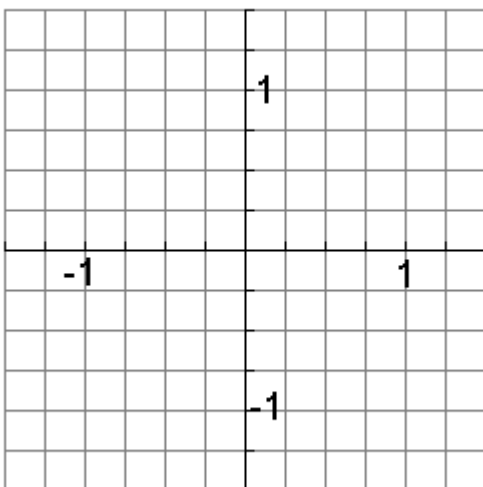
Example 2: Find the derivative with respect to x. Find $\dfrac{d}{dx}$

$y^4 + xy = x^3 - x + 2$

Example 3: Find $\dfrac{dy}{dt}$, where $\cos(ty) = \dfrac{t^2}{y}$

Example 4: A. Find the slope of the tangent line on the curve $e^{xy} = x + y$ at $(-1, 1.28)$. B. Find the equation of the tangent line on the same curve at the same point.

Example 5: Find $\dfrac{d^2y}{dx^2}$ for $x^2 + y^2 = 1$