Math 1300-005 - Spring 2017

Implicit Differentiation Intro - 2/27/17

Guidelines: Please work in groups of two or three. This will not be handed in, but is a study resource for Midterm 2.

1. Our goal in this problem is to use implicit differentiation to find an equation of the tangent line to the curve

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

at the point $(1, 1)$.

(a) First, apply d/dx to both sides of $x^2 + xy = 3 - y^2$ and use the chain rule and the guidelines from lecture. Notice the second term on the left-hand side is a product.

(b) Move all terms that have a y' to the left-hand side of the equation from (a) and move terms that do NOT have a y' to the right-hand side of the equation from (a). Solve for y'.

(c) Plug in $x = 1$ and $y = 1$ to your expression for y' to get the slope of the tangent line to the curve at $(1, 1)$.

(d) Write an equation of the tangent line based on your work in (a), (b), and (c).

2. Following the same procedure outline in problem 1, find an equation of the tangent line to the curve

$$y\sin(2x) = x\cos(2y)$$

at the point $(\pi/2, \pi/4)$. Notice that each side of the equation above involves a product.

3. Find dy/dx by implicit differentiation according to steps (a) and (b) in problem 1.

$$\tan(x - y) = \frac{y}{1 + x^2}$$

4. Find dy/dx by implicit differentiation according to steps (a) and (b) in problem 1.

$$e^y \cos(x) = 1 + \sin(xy)$$