Implicit Differentiation Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Consider the equation of a circle of radius one (the unit circle): 
   1. Draw a picture of this circle.
   2. What would you guess the slope of the tangent line is to the circle at ? Why do you say this?
   3. Check your work by first finding a formula for  = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

and then finding the slope of the tangent line at . Does your answer make sense with your picture? Why or why not? (Discuss this one in your groups, as it isn’t trivial.)

1. In your own words, what is implicit differentiation and when is it useful?
2. Use implicit differentiation to find .
   1. - y2 = 1
   2. 
   3. 
   4. 
3. Pick two of the problems from #3 and find the second derivative with respect to x.
   1. What was different (or notable) about this process?
4. Find the slope of the tangent line at the given point.
   1.  at (-1,-1)
   2.  at (1,1)
5. For those of you who need/want a challenge, try this problem. Consider the function and let (a,b) be a point in the plane. Find conditions a and b such that
   1. there are no tangent lines to *f* that pass through (a,b).
   2. there is exactly one tangent line to *f* that passes through (a,b).
   3. there are two tangent lines to *f* that pass through (a,b).