

**Assignment 9: Implicit Differentiation (2.8)**  
**Please provide a handwritten response.**

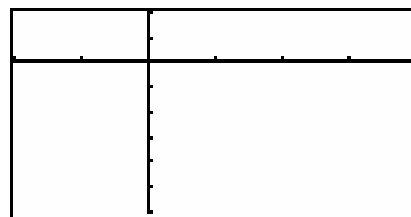
Name \_\_\_\_\_

1. The implicit function  $x^2y^2 - 2x = 4 - 4y$  is readily differentiated by hand. Take the derivative of this function and record the result below.

2. Enter this function into  $Y_1=$  on your calculator as  $Y_1 = x^2y^2 - 2x - 4 + 4y$  and graph it on the axis below using the program **IMPGRAPH** (see Appendix A). This program will graph the implicit function **VERY slowly**.

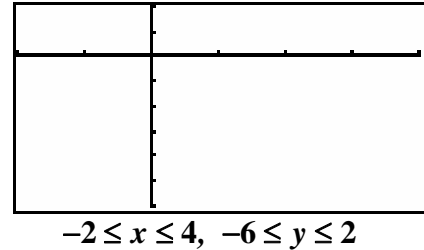
	<b>TI-83 Plus/TI-84 Plus</b>	<b>TI-86</b>
<b>GRAPHING AN IMPLICIT FUNCTION</b>	Enter the implicit function in $Y_1$ and deselect the function by placing the cursor on the = and pressing enter. Set the <b>WINDOW</b> . In this case set $-2 \leq x \leq 4$ , $-6 \leq y \leq 2$ Run the program <b>IMPGRAPH</b> . Save the picture by pressing <b>2ND</b> <b>PRGM (DRAW) STO 1:Store</b> <b>Picture</b> and then adding <b>1</b> to get <b>StoPic 1</b> and press <b>ENTER</b> .	Enter the implicit function in $Y_1$ and deselect the function by placing the cursor on the = and pressing enter. Set the <b>WINDOW</b> . In this case set $-2 \leq x \leq 4$ , $-6 \leq y \leq 2$ Run the program <b>IMPGRAPH</b> . Save the picture by pressing <b>MORE MORE STPIC (F2)</b> and naming the picture <b>IMP1</b> . Press <b>ENTER</b> .

Sketch the graph on the axes provided below. Draw continuous curves, not just the ‘dots’ that occur from the resolution of the calculator screen.



$$-2 \leq x \leq 4, -6 \leq y \leq 2$$

**3a.** Draw a tangent line to the graph at  $(2,-2)$  by running the program **IMPDERIV** and entering  $x^2y^2 - 2x - 4 + 4y$  when prompted for the expression in  $x$  and  $y$ . Also enter  $x = 2, y = -2$  at the prompts. Record the result below.



**3b.** Now run the program again with  $x = 2.235$ . You will need to find the corresponding  $y$  value by entering the equation in **1a** in the **SOLVER** (see assignment 3) and solving for  $y$  when  $x = 2.235$  before running **IMPDERIV**. How many points on this curve satisfy the condition  $x=2.235$ ? Find both corresponding values of  $y$  using the **SOLVER**. Try setting  $y = 1$  or  $y = -1$  and solving for  $y$ . Record these values below and mark them with dots on the curve you drew in part **2**.

**3c.** Run the program **IMPDERIV** twice, once with each value of  $y$  found in **3b** and record both results on the graph below.

