

HW 14: Section 2.8,2.10

Due: Monday, October 28th in SQRC by 9pm

Learning Goals:

- Use implicit differentiation.
- Find the equation of a tangent line using implicit differentiation.
- State the mean value theorem, and verify that it is true.

1. Problem 2.8.8 Find the derivative $y'(x)$ implicitly

$$\sin(xy) = x^2 - 3.$$

2. Problem 2.8.10 Find the derivative $y'(x)$ implicitly

$$3x + y^3 - \frac{4y}{x+2} = 10x^2.$$

3. Problem 2.8.18 Find the equation of the tangent line at $(1, 2)$ for

$$x^2y^2 = 4x$$

4. Problem 2.8.24 Find the second derivative $y''(x)$. Remember that when taking the derivative the second time, both y and y' are functions of x .

$$x^{2/3} + y^{2/3} = 4$$

5. Problem 2.8.40 Find the location of all vertical and horizontal tangents of the curve

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

6. Use implicit differentiation to find $y'(x)$ for $x^2y - 2y = 4$. Based on this equation, why would you expect to find vertical tangents at $x = \pm\sqrt{2}$ and a horizontal tangent at $y = 0$? Show that there are no points on the curve for these values. To see what's going on, solve the original equation for y and sketch the graph. Describe what's happening at $x = \pm\sqrt{2}$ and $y = 0$.