

# Math 140 Worksheet 6

## Week 6: Implicit Differentiation and Inverse Functions

**Instructions.** Write clear solutions on your own paper. Show enough work to justify your answers. Upload a single PDF of your work to Canvas.

1. Use implicit differentiation to find  $\frac{dy}{dx}$ .

$$x^2 + xy + y^2 = 7$$

2. Differentiate the following functions.

(a)  $f(x) = e^{x^2}$

(b)  $g(x) = \ln(3x^2 + 1)$

3. Differentiate the function

$$y = \arcsin(2x).$$

4. Let the curve be defined by

$$x^2 + y^2 = 5.$$

(a) Find  $\frac{dy}{dx}$ .

(b) Find the equation of the tangent line at the point  $(1, 2)$ .

5. Find the derivative of  $y = \arctan(x)$  by differentiating the implicit equation

$$\tan(y) = x$$

and solving for  $dy/dx$ . Use a right triangle to write your answer as a function of  $x$ .