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 $\dfrac{dy}{dx}$.

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

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 $\dfrac{dy}{dx}$.

   (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.