Math 211 – Multivariate Calculus – Homework 1

Due: Friday September 9th

You may use the textbook and your notes, and you're welcome to discuss the problems with one another or with me. However, your final answers should be written on your own and in your own words.

At the top of the first page, please list any classmates you collaborated with while working on these exercises (so that we know to expect similar solutions).

- 1. (a) State the chain rule.
 - (b) Compute the derivative of the function

$$f(x) = x\sqrt{4 - x^2}$$

- (c) Find the minimum and maximum values taken by the function f(x) for x in the closed interval [-1,2] (that is, for $-1 \le x \le 2$).
- 2. (a) State the fundamental theorem of calculus.
 - (b) Can one use the fundamental theorem of calculus to find the area between the graph of the function $|x|^{-1/2}$ and the *x*-axis, for *x* between -1 and 1? Why or why not?
 - (c) Determine the area described in part (b) using any valid method. Make sure to show your work in full.
- 3. (a) Find an equation for the tangent line of the curve

$$y = \frac{e^x + 1}{e^x - 1}$$

where x = 1.

(b) Use implicit differentiation to find an equation for the tangent line of the curve

$$2(x^2 + y^2)^2 = 25(x^2 - y^2)$$

at the point (3, 1).