Problem Set 5
Math 226 - Sections 39583 and 39587

The following problem set is split into three parts: the recommended practice problems, which are not to be handed in; the quiz practice problems, which form the basis for the upcoming quiz, and the homework problems, which will be handed in.

Recommended Practice
These problems are not to be handed in or graded (unless they are repeated below). They are recommended for your practice only.

• Section 11.1: All problems, especially 8-12, 13, 15, 21, 22, 24, 25, 27, 35, 41-46, 47-50.
• Section 11.2: # 1, 2, 3, 5, 6, 9, 13, 26, 27
• Section 11.3: All problems, except for 61-67. (You are well-equipped to do 61-67 as well, and they are interesting(!), but we aren’t including any partial differential equations in our curriculum due to time constraints.)

Quiz Practice Problems
There will be no quiz this week because of the midterm on Friday. Both discussion sessions (on Tuesday and Thursday) will be for discussing the most recent lecture material and preparing for the midterm.

Homework Problems
The solutions to the following problems are due to be handed in at the beginning of your discussion session on Thursday, Feb. 18.

1. • Section 11.1: # 2, 4, 10, 16, 18, 24
   • Section 11.3: # 8, 10, 20, 24 (Consider \(w\) as a function of \(x, y,\) and \(z\)), 32, 42, 52, 68, 82

2. Consider the function, 
   \[ f(x, y) = \frac{y}{x^2 + y^2}. \]
   (a) What is the domain of this function?
   (b) Sketch a contour map.
   (c) Just by looking at the contour map, can you determine whether \(f\) is continuous at the origin or not? Explain.

3. Use the “Squeeze Theorem” to show that
   \[ \lim_{(x, y) \to (0, 0)} \frac{x^2y}{\sqrt{x^2 + y^2}} = 0. \]

4. Find the value of
   \[ \lim_{(x, y) \to (0, 1)} \frac{e^{x+y}\sin(x)}{xy}. \]
   *Hint*: Split this into a product of two functions, of the form \(f(x)g(y)\).