Homework Assignment #1
Due Tuesday, April 10, 2007

1. Calculate the following partial derivatives.
   (a) Let \( f(x, y) = x^2 y^3 \). Find \( \frac{\partial f}{\partial x} \).
   (b) Let \( g(x, y) = \frac{xy}{x-y} \). Find \( \frac{\partial g}{\partial y} \).
   (c) Let \( h(x, y) = (x+1)e^y \). Find \( \frac{\partial^2 h}{\partial x^2} \).
   (d) Let \( h(x, y) = (x+1)e^y \). Find \( \frac{\partial^2 h}{\partial y^2} \).
   (e) Let \( h(x, y) = (x+1)e^y \). Find \( \frac{\partial^2 h}{\partial x \partial y} \).

2. Let \( f(x, y) = \ln(4 - x^2 - y^2) + \sqrt{x^2 + y^2 - 1} \).
   (a) Find the domain of \( f \). Write the domain symbolically using inequalities, and sketch it.
   (b) Sketch a contour map of the function.

3. Let \( f(x, y) = 3x^2 y + xe^y \).
   (a) Find an equation for the tangent plane to the surface \( z = f(x, y) \) at the point \( (1,0,1) \).
   (b) Find the linearization for \( f \) at the point \( (1,0) \).
   (c) Use your answer to (b) to estimate \( f(0.9, 0.2) \).
   (d) Find the differential for \( f \) at the point \( (1,0) \).
   (e) Use your answer to part (d) to estimate the difference between \( f(1,0) \) and \( f(0.9,0.2) \).

Practice Problems
Do not turn these in.

Section 11.1, \# 1, 3, 5, 7, 9, 13, 15, 21, 31, 33, 35, 37, 39

Section 11.3, \# 1, 3, 5, 13, 15, 17, 19, 27, 33, 35, 39, 41, 45, 47, 53, 63, 65, 67, 71

Section 11.4, \# 1, 3, 9, 11, 13, 15, 17, 19, 21, 23, 27, 33, 35
Homework Guidelines

• Show all your work.

• Submit your homework on plain or lined paper with a white background. **Do not use graph paper or colored paper.** If you use pages from a notebook, trim the rough edges.

• Don’t write in several columns. Each problem (or part of a problem) should begin on the left side of the page, and problems should appear in numerical order.

• Leave a 1-inch margin on all sides. Also leave room for me to write comments. Don’t try to squeeze a lot of work into a small space.

• When answering a word problem, your answer should have words, too. In fact, it should have complete sentences.

• Write darkly.

• Write legibly.

In general, anything you submit should look professional. If any of the above criteria are not met, your work may not be accepted for grading. These guidelines apply for all assignments in this course.