Math 380, Section N1

Homework 4

Due September 28, 2006, before class

**Problem 1.** Textbook page 100, Exercises 1 and 2.

**Problem 2.** Textbook page 100, Exercises 7 and 9.

**Problem 3.** Textbook page 104, Exercise 1 parts (a) and (c).

**Problem 4.** Textbook page 105, Exercises 2 and 3 part (a) only at both.

**Problem 5.** Textbook page 105, Exercise 5.

**Problem 6.** Show that
\[ e^{xz} + e^{yz} + z - 1 = 0 \]
defines \( z \) as a function of \( x \) and \( y \) near \( (x_0, y_0, z_0) = (0, 0, -1) \). This means you have to check the hypothesis of the implicit function theorem. Then compute \( \frac{\partial z}{\partial x}, \frac{\partial z}{\partial y} \) at \( x = 0, y = 0 \) and at nearby points \( (x, y) \).

**Problem 7.** Show that
\[ x^2 + y^2 + z^2 - u^2 + v^2 = 1, \quad x^2 - y^2 + z^2 + u^2 + 2v^2 = 21 \]
define \( u, v \) as functions of \( x, y \) and \( z \) near \( x = 1, y = 1, z = 2, u = 3, v = 2 \). Then compute \( du, dv \) in terms of \( dx, dy \) and \( dz \) at \( x = 1, y = 1, z = 2, u = 1.1, y = 1.2, z = 1.8 \), and approximate the values of \( u \) and \( v \) at \( x = 1.1, y = 1.2, z = 1.8 \).

**Problem 8.** Textbook page 121, Exercise 6. Make sure you understand each step, do not just plug in formulas from Exercise 5.

**Problem 9.** Textbook page 127, Exercise 1 and 2.

**Problem 10.** Textbook page 128-129, Exercises 8 (b) and (c), 11 (b) and 12.