

# 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  $x = 1$ ,  $y = 1$ ,  $z = 2$ , 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.