Math 431, Assignment #9

(due 4/26/01)

This assignment covers sections 5.7, 6.1, 6.2, and 6.3.

Remember, as on the previous assignments, to indicate how many hours you spent on the assignment, and whom you worked with. Also remember to show your work if you want to receive credit.

1. (a) Suppose X is a continuous random variable, and let $Y = e^X$. Express the p.d.f. of Y in terms of the p.d.f. of X.

   (b) Suppose X is a continuous random variable that takes on only positive values, and let $Y = \ln X$. Express the p.d.f. of Y in terms of the p.d.f. of X.

2. Suppose X and Y are jointly continuous random variables that take on only positive values, and that are independent of one another. You are to derive a general formula for the p.d.f. of XY in terms of the p.d.f. of X and the p.d.f. of Y. You are to do this in two different ways:

   (a) Imitate the derivation of formula (3.2) given on page 265, by way of formula (3.1); that is, compute the c.d.f. of XY first, and then differentiate.

   (b) Apply formula (3.2) and the results of problem 1, by using the fact that $XY = e^{\ln X + \ln Y}$.

3. Chapter 6, problem 6.

4. Chapter 6, problem 7.

5. Chapter 6, problem 11.

6. Chapter 6, problem 18.

7. Chapter 6, problem 22.

(more on other side)

8. Chapter 6, problem 28.
9. Chapter 6, problem 30.
10. Chapter 6, theoretical exercise 9.
11. If X, Y and Z are independent random variables, all uniformly distributed on $(0, 1)$, calculate the probability density of $X + Y + Z$.

Each problem is worth 9 points. Additionally, you can get up to 5 bonus points for making a good estimate of your raw score (which will lie between 0 and 100).