Math 244-Final Exam

Name:_____

December 17, 2007 **Student #:** _____

Instructor: Dhar

Must show all work for full credit!!!

I pledge that I have not violated the NJIT code of honor_____

1. In how many ways can 6 people be seated in a row if
   a. there are no restrictions on the seating arrangement;
   b. there are 4 men and they must sit next to each other;
   c. there are 3 men and 3 women and no 2 men or 2 women can sit next to each other? (12 points) page 16, #10.

2. A laboratory blood test is 95 percent effective in detecting a certain disease when it is in fact, present. However, the test also yields a "false positive" result for 2 percent of the healthy persons tested. (That is, if a healthy person is tested, then, with probability 0.02 the test result will imply he or she has the disease.) If 0.5 percent of the population actually has the disease, what is the probability a person has the disease given that the test result is positive (test result shows person has disease)? (12 points) page 75, Example 3d.

3. Suppose that the distribution function of X is given by

$$F(b) = \begin{cases} 0 & b < 0, \\ \frac{b}{8} & 0 \le b < 1 \\ \frac{1}{2} + \frac{b-1}{4} & 1 \le b < 2 \\ \frac{4}{5} & 2 \le b < 3 \\ 1 & 3 \le b. \end{cases}$$

Page 189 #19. (12 points)

Find

(a) $P\{\frac{1}{2} < X < \frac{3}{2}\}$,

(b) P(X = 0),

(c) P(X = 3) and

(d) P(1< X ≤ 2).

4. Each item produced by a certain manufacturer is, independently, of acceptable quality with probability 0.90. Approximate the probability that at most 15 of the next 150 items produced are unacceptable. Page 20, #25. (12 points)

5. Suppose that the number of accidents occurring on a highway each day is a Poisson random variable with mean =2/day. Find the probability that there will be at least two accidents during the weekend (Saturday and Sunday). (12 points) (Quiz #4)

6. If X_1 and X_2 are independent and identically distributed uniform random variables on (0, 1). Find the joint density function of $Y_1 = X_1 + X_2$ and $Y_2 = \frac{X_1}{X_2}$. p. 319, #55a (12 points)

7. Let X and Y have joint density given by $f(x,y) = \begin{cases} 2, & 0 < x < y, 0 < y \le 1, \\ 0, & elsewhere. \end{cases}$

(a) Compute Cov (X, Y). (12 points) (b) Is X independent of Y? Why or why not? (last homework)

(3 points)

8. The gross weekly sales at a certain restaurant is a normal random variable with mean $ 2100 and standard deviation $220. What is the probability that

(a) the total gross sales over the next two weeks exceeds $ 4500; (7 points)

(b) weekly sales exceed $ 2000 in exactly two of the next three weeks? (6 points) (#32 page 317)

END