

NAME _____

ACSC/MATH 347/447 Exam #2h 100 Points Total November 21, 2005

Exam 2 Grade: Course Average:

You must show enough work, or give sufficient explanation, in each problem to clearly indicate how you obtain your answer. **No credit** will be given for a problem if there is insufficient work/explanation.

1. (8 points) Flaws in a certain type of drapery material appear on the average of one in 150 square feet. If we assume the Poisson distribution, find the probability of at most one flaw in 225 square feet.

2. (8 points) Suppose that 5% of the individuals in a large population have a certain disease. If 15 individuals are selected at random, what is the probability that no more than three have the disease?

You must show enough work, or give sufficient explanation, to indicate clearly how you obtain your answer. **No credit** will be given for a problem if there is insufficient work/explanation.

3. (12 points) The United States Senate has 100 members. Suppose there are 54 Republicans and 46 Democrats. A committee of 15 senators is selected at random.
 - a. What is the probability that there will be 9 Republicans and 6 Democrats on this committee?
 - b. What is the expected number of Republicans on this committee?
 - c. What is the variance of the number of Republicans on this committee?

You must show enough work, or give sufficient explanation, to indicate clearly how you obtain your answer. **No credit** will be given for a problem if there is insufficient work/explanation.

4. (16 points) If you roll a pair of fair dice, the probability of getting an 11 is $1/18$. If you roll the dice repeatedly:
- What is the probability that the first 11 occurs on the 8th roll?
 - What is the probability that you must roll the dice at least eight times until the first 11 appears?
 - What is the mean number of roles it takes in order to get the first 11?

You must show enough work, or give sufficient explanation, to indicate clearly how you obtain your answer. **No credit** will be given for a problem if there is insufficient work/explanation.

5. (12 points) Suppose that the length of a phone call in minutes is an exponential random variable with mean equal to 10 minutes. If someone arrives immediately ahead of you at a public telephone booth, find the probability that you will have to wait:
- more than 10 minutes;
 - between 10 and 20 minutes.

You must show enough work, or give sufficient explanation, to indicate clearly how you obtain your answer. **No credit** will be given for a problem if there is insufficient work/explanation.

6. (12 points) You arrive at a bus stop at 10:00, knowing that the bus will arrive at some time uniformly distributed between 10 and 10:30.
 - a. What is the probability that you'll have to wait longer than 10 minutes?
 - b. If at 10:15 the bus has not yet arrived, what is the probability that you'll have to wait at least an additional 10 minutes?

You must show enough work, or give sufficient explanation, to indicate clearly how you obtain your answer. **No credit** will be given for a problem if there is insufficient work/explanation.

7. (8 points) Let Y be a normal random variable with mean 12 and variance 4. Find the value of c such that $P(Y > c) = 0.10$.

You must show enough work, or give sufficient explanation, to indicate clearly how you obtain your answer. **No credit** will be given for a problem if there is insufficient work/explanation.

8. (24 points) A random variable Y has distribution function (cdf), $F(y)$, at the right.

- Find $P(1 < y \leq 3)$.
- Find the density function $f(y)$ of Y .
- Find the mean and variance of Y .

$$F(y) = \begin{cases} 0 & y \leq 0 \\ \frac{y}{8} & 0 < y \leq 2 \\ \frac{y^2}{16} & 2 < y \leq 4 \\ 1 & y > 4. \end{cases}$$