STA 4442/5440 Midterm 1
September 26, 2012

Name:

FSUID:

Please sign the following pledge and read all instructions carefully before starting the exam.

Pledge: I have neither given nor received any unauthorized aid in completing this exam, and I have conducted myself within the guidelines of the University Honor Code.

Signature: _____

INSTRUCTIONS:

- This is a closed-book, closed-notes exam. You may **not** refer to your notes, the text, or any other books. You may use a calculator.

- Total time is 70 minutes (11:05 A.M to 12:15 P.M.)

- **Show all work**, clearly and in order, if you want to receive full credit. When you use your calculator, explain all relevant mathematics. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).

- Circle or otherwise indicate your final answers.

- **Answer all the questions in the space provided. You may attach additional sheets if necessary.**

- This test has 4 problems and is worth 80 points. It is your responsibility to make sure that you have all of the problems.

- **Good luck!**

Prob. No.	Max Points	Earned Pts.
1	20	
2	15	
3	15	
4	30	

TOTAL: _____

Question 1. (20 pts.) A packet of seeds contains four seeds that produce white flowers and six seeds that produce pink flowers. Four seeds are to be randomly selected without replacement. Find the probability that:

a) Exactly three of the selected seeds produce pink flowers.

b) At least three of the selected seeds produce pink flowers.

c) All four selected seeds produce flowers of an identical color.

Question 2. (15 pts.) Of 30 rats in a cage, 16 are males and 15 are infected with a virus that causes hemorrhagic fever. Of the 16 male rats, 9 are infected with the virus. One rat is randomly selected from the cage.

a) What is the conditional probability that the rat is female, given that it is not found to be infected?

b) What is the conditional probability that the selected rat is not infected, given that it is male?

Question 3. (15 pts.) Let A and B denote any two events and suppose that the following probabilities are given.

$$P(A) = \frac{1}{3} \qquad P(B \mid A) = \frac{1}{2} \qquad P(B \mid A^c) = \frac{1}{4}$$

Answer the following:

a) What is $P(A \cap B)$?

b) Are A and B independent? Explain your answer.

c) Are A and B mutually exclusive? Explain your answer.

Question 4. (30 pts.) Consider a fair 6 sided dice where two sides are labeled 1, two sides are labeled 5, and the remaining two are labeled 0. The die is rolled twice. Define the events A, B, and C as follows: A=The first die is a 1, B=The first die is a 5, C=The second die is a 0

1. What is the sample space for this experiment?

2. What is the probability associated with each of the sample points?

3. Find the probability of A, B, and C.

4. Find $P(A \cap B)$ and $P(A \cup B)$.

5. Are the events A and B independent, mutually exclusive, or dependent in some other way?

6. Find $P(A \cap C)$ and $P(A \cup C)$.

7. Are the events A and C independent, mutually exclusive, or dependent in some other way?