Name (Please Print) _____

Finite Applications of Math - MATH 312
Exam 2
Spring 1999

Show <u>all</u> work. No notes, books, reference material are allowed. Correct answers without supporting work will receive no credit.

In questions #1 and #4 you may leave your answer in factored form.

1. Compute

(6) a) $\binom{12}{4}$

(6) b) $P(12, 4)$

(6) c) $\binom{12}{5, 3, 2, 2}$

(6) d) The number of subsets of a set that has 10 elements.

(9) 2. 1,000 car owners who have owned only Japanese, American or German cars are surveyed. 650 people have owned a Japanese car, 900 people have owned an American car, 200 people have owned a German car, and 50 people have owned all three types. How many people have owned <u>only one</u> kind of car?

<u>Hint</u>: First find the number of people who have owned at least two kinds. It will help to draw a Venn diagram.

(9) 3. Show that the set of positive integer multiples of 3 is equivalent to (has the same number of elements as) the set of positive integer multiples of 7.

(9) 4. A class has 10 women and 12 men. How many committees of 3 women and 2 men can be formed from the class?

5. Three students A, B, and C each <u>randomly</u> select a digit (0 through 9).

(8) a) What is the probability that student A selects 0?

(7) b) What is the probability that student A selects 9, student B selects 3, and student C selects 6?

(7) c) What is the probability that at least two students select the same digit?

(9) 6. A fair coin is flipped 5 times. Find the probability that the first four flips are heads given that at least four flips are heads.

(9) 7. Suppose urn 1 contains 2 red balls and 4 white balls while urn 2 contains 1 red ball and 4 white balls. A ball is chosen at random from urn 1 and transferred to urn 2, and then a ball is chosen at random from urn 2. Given that the ball chosen from urn 2 is red, what is the probability that a red ball was transferred from urn 1? First draw a probability tree and label it.

(9) 8. A fair coin is flipped 4 times and the results are noted. Suppose E is the event that there is at least one head and one tail. Suppose F is the event that there is at most one tail. Determine whether or not E and F are independent.

<u>Extra Credit</u>

(9) Prove that the set, D, of all decimals between (and including) 0 and 1 is <u>not</u> equivalent to the set, N, of positive integers. (Use the back of this sheet.)