NAME:

Counting Problems

1) Determine the value of each of the following permutations:

    a. $_4P_3$ =

    b. $_{15}P_4$ =

    c. $_6P_2$ =

    d. $_{10}P_0$ =

    e. $_8P_8$ =

2) Determine the value of each of the following combinations:

    a. $_4C_3$ =

    b. $_{15}C_4$ =

    c. $_6C_2$ =

    d. $_{10}C_0$ =

    e. $_8C_8$ =

3) One man and one woman are to be selected from a group consisting of 12 women and 8 men. How many different choices are possible?

4) How many different 7-place license plates are possible when the first 3 places are for letters and the last 4 are for digits?

5) How many different groups of size 2 can be selected from the items {*a, b, c*}?

6) How many different groups of size 2 can be chosen from a set of 6 people?

7) How many different groups of size 3 can be chosen from a set of 6 people?

8) In the United States, telephone numbers consist of a three-digit area code followed by a seven digit local number. Suppose neither the first digit of an area code nor the first digit of a local number can be a zero but that all other choices are acceptable.
   a. How many different area codes are possible?

   b. For a given area code, how many local telephone numbers are possible?

   c. How many telephone numbers are possible?

Probability Problems
9) If events A and B are mutually exclusive, what is the value of P(A and B)?

10) If events A and B are independent, what is the relationship between P(A) and P(A | B)?

11) You're given the information that P(A) = 0.30 and P(B) = 0.40.
   a. Do you have enough information to compute P(A and B)? Explain.

   b. Do you have enough information to compute P(A or B)? Explain.

   c. If you know that events A and B are independent, do you have enough information to compute P(A and B)? Explain.

    d. If you know that events A and B are independent, do you have enough information to compute P(A or B)? Explain.

    e. If you know that events A and B are mutually exclusive, do you have enough information to compute P(A or B)? Explain.

12) Your best friend is considering two facial cosmetic surgeries. The probability of success for each surgery is 0.90. And their outcomes are independent.
    a. What is the probability of success for both of the surgeries?

    b. What is the probability of failure for both of the surgeries?

    c. What is the probability of success in only one of the surgeries?

    d. If the probability of success for both surgeries is less than 0.85, you will advise your friend not to have the surgeries. What will you tell your friend?

13) Of 12 bottles in a case of wine, 3 are bad. Suppose 2 bottles are randomly chosen from the case. Find the probability that:
    a. The first bottle chosen is good.

    b. The second bottle chosen is good.

    c. Both bottles are good.

    d. Both bottles are bad.

    e. One is good, and one is bad.

14) One professor grades homework by randomly choosing 5 out of 12 problems to grade.
  a. How many different groups of 5 problems can be chosen from the 12 problems?

  b. Jerry did only 5 problems of one assignment. What is the probability that the problems he did comprised the group that was selected to be graded?

  c. Silvia did 7 problems. How many different groups of 5 did she complete?

  d. What is the probability that one of the groups of 5 she completed comprised the group selected to be graded?

15) At Springfield College of Nursing, 85% of incoming freshmen students are female and 15% are male. Recent records indicate that 70% of the entering female students will graduate with a BSN degree, while 90% of the male students will obtain a BSN degree. *Here's a hint to help you answer the following questions: consider using a crosstable based on some of the given info.*

	Will graduate	Won't graduate	*Total*
Female Male	____% ____%	? ?	*85%* *15%*
Total	?	?	*100%*

If an incoming freshman student is selected at random, find:
  a. P(student will graduate | student is female)

  b. P(student will graduate *and* student is female)

  c. P(student will graduate | student is male)

  d. P(student will graduate *and* student is male)

  e. P(student will graduate)

16) The following table is based on information about Customer Loyalty. The rows represent regions of the Unites States. The columns represent length of customer loyalty at a primary supermaket.

	less than 1 year	1 - 2 years	3 - 4 years	5 - 9 years	10 - 14 years	15 + years	*Total*
East	32	54	59	112	77	118	*452*
Midwest	31	68	68	120	63	173	*523*
South	53	92	93	158	106	158	*660*
West	41	56	67	78	45	86	*373*
Total	*157*	*270*	*287*	*468*	*291*	*535*	*2008*

What is the probability that a customer chosen at random:
   a. has been loyal 10 to 14 years?

   b. has been loyal 10 to 14 years, given that he or she is from the east?

   c. has been loyal **at least** 10 years?

   d. has been loyal **at least** 10 years, given that he or she is from the west?

   e. is from either the west **or** south?

   f. is from the west **and** south?

   g. is from the west, given that he or she has been loyal less than 1 year?

   h. is from the south, given that he or she has been loyal less than 1 year?

   i. has been loyal **1 or more years**, given that he or she is from the east?

   j. has been loyal **1 or more years**, given that he or she is from the west?

   k. Are the events "from the east" and "loyal 15 or more years" independent? Explain.