Review for Test on Chapters 2, 5, 6 and 8

Note: The test will only have ten questions. As usual calculators will not be permitted.

Problem 1. Suppose A is a subset of universal set U. What are $A \cap A'$ and $A \cup A'$?

Problem 2. Blood samples of 100 people were tested. The A, B, and Rh antigens were found in the blood of 32, 33, and 74 people, respectively. None of the antigens was found in 13 samples. Ten samples contained the A and Rh antigens only, 9 contained the B and Rh antigens only, 6 contained the B antigen only, and 3 contained the A and B antigens only.

Draw a Venn diagram displaying the given data and the number of elements in each basic region. How many samples do not contain the Rh antigen?

Problem 3. Calculate $C(4,4) + C(4,3) + C(4,2) + C(4,1) + 1$.

Problem 4. Calculate $P(6,4)$.

Problem 5. (Be familiar with each type of problem in 5.6. This is just one such problem.) Suppose an experiment consists of tossing a coin seven times and recording the sequence of heads and tails.

    a. How many outcomes are possible?

    b. How many outcomes have exactly 3 heads?

    c. How many outcomes have at most 3 heads?

Problem 6. Urn A contains three red balls and one white ball. Urn B contains two red balls and two white balls. An urn is chosen at random, and a ball is chosen. If the ball is red what is the probability that urn A was chosen?

Problem 7. A company tests its employees for a certain drug. The test for the drug produces a false negative five percent of the time and a false positive eight percent of the time. Suppose twelve percent of employees use the drug. If an employee tests negative, what is the probability that they are not using the drug?

Problem 8. Solve the following system of linear equations using the Gaussian elimination method. If there is no solution, state so; if there are infinitely many solutions, find two of them. Use matrix notation and indicate your moves at each step.

$$\begin{cases} x - 3y - 5z = 1 \\ -3x + 7y + 9z = 1 \\ x + 4z = -5 \end{cases}$$

Problem 9. Solve for X in the matrix equation $X = AX + D$.

Problem 10. Find the inverse of the following matrix. Check you answer by matrix multiplication.

$$\begin{bmatrix} -1 & 2 & -4 \\ 1 & -1 & 3 \\ 0 & 0 & 1 \end{bmatrix}.$$

Problem 11. Suppose that the people in a certain city are catching cold. It is observed that after one week, 40 percent of the people who were sick are still sick. Of the people who were well, 30 percent are sick after one week.

If, at some particular time, 20 percent of the people are ill, what is the proportion of people who are sick after one week?

Problem 12. Suppose 70 percent of the children of college graduates also graduate from college. Of the children of noncollege graduates, 20 percent will graduate from college. (Assume that college graduates and noncollege graduates have the same number of children.)

If this trend continues, then in the long run, what is the proportion of the population that will be graduates of college?