Practice Exam 1

1. How many subsets of $\{a, b, c, d\}$ contain the subset $\{a\}$?

2. If U is the single-digit numbers $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$, then how many subsets of U are there? If $A = \{0, 1, 2\}$ and $B = \{2, 3, 4\}$, then what is $A \cap B'$?

3. A committee has 5 male and 6 female members. How many subcommittees of four can be formed which consist of 2 male and 2 female members?

4. A coin is tossed 5 times. How many outcomes consist of getting four heads out of five? How many outcomes consist of getting four heads in a row?

5. In an eight-team football conference, each of the 8 teams must play every other team exactly once. How many games must be played?

6. How many different poker hands are there? How many different poker hands are there that contain exactly 2 kings? How many pokers hands are there that consist entirely of clubs?

7. Suppose A, B, C are subsets of a universal set U, and

$$n(A) = 20 \qquad n(B) = 40 \qquad n(C) = 60$$
$$n(A \cap B \cap C) = 10 \quad n(A \cap B) = 15 \quad n(B \cap C) = 20.$$

   Draw a Venn diagram which portrays the situation. What is $n(A' \cap B \cap C')$? What is $n(A' \cap B \cap C)$? Can you determine $n(A' \cap B' \cap C')$? If not, what more information would you need?

8. A license plate from a certain state consists of two different letters followed by four different digits. How many possible licence plates are there? How many license plates are there if the letters are in alphabetical order and the digits are in increasing order?

9. You, a friend, and four other people are to sit in 6 chairs. How many seating arrangements are there so that you get to sit next to your friend?

10. Nine students need to be assigned one of three jobs each: a typer, a reader, or a checker. To complete the task there needs to be 5 readers, 3 typers, and 1 checker. How many different ways can the nine students be assigned one of the three jobs to complete the task?

11. How many eight-letter words consist of two R's, one I, four F's, and one A?