Homework 8

Section 6.1

4. A particular brand of shirt comes in 12 colors, has a male version and a female version, and comes in three sizes for each sex. How many different types of this shirt are made?

6. There are four major auto routes from Boston to Detroit and six from Detroit to Los Angeles. How many major auto routes are there from Boston to Los Angeles via Detroit?

8. How many different three-letter initials with none of the letters repeated can people have?

10. How many bit strings are there of length eight?

12. How many bit strings are there of length six or less, not counting the empty string?

16. How many strings are there of four lowercase letters that have the letter x in them?

28. How many license plates can be made using either three digits followed by three uppercase English letters or three uppercase English letters followed by three digits?

Section 6.2

2. Show that if there are 30 students in a class, then at least two have last names that begin with the same letter.

4. A bowl contains 10 red balls and 10 blue balls. A woman selects balls at random without looking at them.
   (a) How many balls (minimum) must she select to be sure of having at least three balls of the same color?
   (b) How many balls (minimum) must she select to be sure of having at least three blue balls?

16. How many numbers must be selected from the set $\{1, 3, 5, 7, 9, 11, 13, 15\}$ to guarantee that at least one pair of these numbers add up to 16?

18. Suppose that there are nine students in a discrete mathematics class at a small college.
   (a) Show that the class must have at least five male students or at least five female students.
   (b) Show that the class must have at least three male students or at least seven female students.

36. A computer network consists of six computers. Each computer is directly connected to at least one of the other computers. Show that there are at least two computers in the network that are directly connected to the same number of other computers.