Math-42 Worksheet #20

Permutations and Combinations

1. How many bit strings of length 10 contain:
   (a) Exactly three 1's.
   (b) At most three 1's.
   (c) At least three 1's. (Hint: not zero, one, or two 1's.)
   (d) An equal number of 0's and 1's.

2. There are nine horses running in a horse race. How many ways are there for the horses to come in first (win), second (place), and third (show) when:
   (a) There are no restrictions.
   (b) The number 8 horse is scratched from the race (i.e., drops out).
   (c) The number 4 horse comes in second.
   (d) The number 3 horse comes in first and the number 9 horse comes in third.
   (e) The number 3 horse comes in first and the number 9 horse comes in fifth.

3. How many distinct ways are there to arrange the letters in the word SUCCESS:
   (a) With no restrictions.
   (b) When the two C's must be together.
   (c) When the two C's must be together and the three S's must be together.
   (d) When the E can only follow a C.

4. A standard deck has 52 cards: 4 suits (clubs, diamonds, hearts, spades) and 13 ranks per suit (2–Ace). A poker hand is any 5 of the 52 cards.
   (a) How many possible poker hands are there?

(b) A three-of-a-kind hand consists of 3 cards of the same rank and two additional cards whose ranks do not match the three nor do they match each other (e.g.: AC,AD,AH,2D,5C). How many possible three-of-a-kind hands are there?

(c) A full house is like a three-of-a-kind; however, the two additional cards have the same rank as each other (e.g.: AC,AD,AH,10D,10S). How many full house hands are there?

(d) How many four-of-a-kind hands are there?

5. A committee of 4 people must be selected from a group consisting of 6 men and 4 women. How many possible committees can be formed if:

   (a) There are no restrictions.

   (b) The committee must include at least one woman.

   (c) The committee must include at least two woman.

   (d) Bob and Nancy demand to serve together or not at all.

   (e) Ed and Jose refuse to serve together.