Homework 9

Section 6.3

4. Let $S = \{1, 2, 3, 4\}$.
   (a) List all the 3-permutations of S.
   (b) List all the 3-combinations of S.

10. There are six different candidates for governor of a state. In how many different orders can the names of the candidates be printed on a ballot?

12. How many bit strings of length 12 contain
   (a) exactly three 1s?
   (b) at most three 1s?
   (c) at least three 1s?
   (d) an equal number of 0s and 1s?

18. A coin is flipped eight times where each flip comes up either heads or tails. How many possible outcomes
   (a) are there in total?
   (b) contain exactly three heads?
   (c) contain at least three heads?
   (d) contain the same number of heads and tails?

22. How many permutations of the letters ABCDEFGH contain
   (a) the string ED?
   (b) the string CDE?
   (c) the strings BA and FGH ?
   (d) the strings AB, DE, and GH?
   (e) the strings CAB and BED?
   (f) the strings BCA and ABF ?

Section 6.4

2. Find the expansion of $(x + y)^5$
   (a) using combinatorial reasoning (as in Example 1 of the book).
   (b) using the binomial theorem.

4. Find the coefficient of x^5y^8 in $(x + y)^{13}$.

8. What is the coefficient of x^8y^9 in $(3x + 2y)^{17}$?

23. Prove the identity $\binom{n}{r}\binom{r}{k} = \binom{n}{k}\binom{n-k}{r-k}$ whenever n, r, and k are nonnegative integers with $r \leq n$ and $k \leq r$,
   (a) using a combinatorial argument.
   (b) using an argument based on the formula for the number of r-combinations of a set with n elements.