Ch 3.7 Review worksheet

1. Four math books, three ecology books, two music books, and three economics books are to be arranged on a bookshelf. None of the books are identical.
   a. How many different permutations of these books are there?
   b. How many different permutations of these books are there if books on the same subject are to be grouped together?

2. In a certain state, license plates consist of five digits followed by a letter of the alphabet. How many different license plates can be formed if
   a. the first digit cannot be a zero but repetitions are allowed?
   b. no digit can be repeated?
   c. there are no restrictions at all?

3. A baseball manager has selected his nine starting players.
   a. How many different batting orders are possible?
   b. Assuming that all batting orders are equally likely, what is the probability that the pitcher bats last?

4. Bill Clinton is about to enter his six-digit personal identification number into an automatic teller machine (ATM) in a shopping mall. However, he does not recall the sequence of the digits 4, 6, 2, 8, 3, and 9 of his code. How many possibilities are there?

5. The student governing board at Milton University consist of 9 members. A new president, v-p, secretary, and treasurer are to be elected.
   a. How many permutations of the list of these officers is possible from the nine governing members?
   b. If Maureen is a member of the governing board, what is the probability that she will be elected president?
   c. What is the probability that Maureen will be elected to any office?

6. There are ten runners entered in tomorrow's marathon. In how many different ways can four of them finish first, second, third, and fourth?

7. Mrs. Gibbs goes to the playground where seven of her children are playing. She needs three volunteers: one to go to the grocery store, one to do the dishes, and one to do the family laundry. In how many different ways can she select the three volunteers?

8. Nine police officers arrive at Victory Hospital to give blood for a wounded fellow cop. However, the hospital can accept only five volunteers. In how many different ways can these volunteers be selected?

9. The Argavon Corp. believes that it is in the company's best interest to maintain the physical fitness of its 30 employees. It recently purchased six exercise machines to be used by its employees during their lunch break or after work. In how many different ways can 6 of the 30 employees be assigned to these machines?

10. The Metro Automobile Insurance Company received ten auto theft claims on June 12, 1995. Management decides to randomly select four of these claims and to investigate these claims thoroughly for the possibility of fraud. In how many different ways can this be done?

11. Professor Bergen, a psychology teacher, needs six student volunteers to be subjects for her latest personality tests. If 14 students from her class have volunteered to be subjects, in how many different ways can she select the six subjects for the experiment?

12. As presented in *Proceedings of the National Academy of Sciences* (Vol. 86, No. 16) and reported in *Science News* (Vol. 136, August 19, 1989, p. 116), scientists have demonstrated that a newly developed simian immunodeficiency virus (SIV) vaccine can protect rhesus monkeys from infection by a virus closely related to the Aids-causing human immunodeficiency HIV virus. In how many different ways can researchers select three out of a possible nine rhesus monkeys to be injected with this new vaccine to analyze the effectiveness of this new vaccine?

13. A student has eight textbooks that she would like to place in her attaché case. However, regardless of the arrangement, only five books fit into the attaché case. In how many different ways can the five books to be placed in the attaché case be selected?

14. Mrs. Schnowske has a class of 20. If she has 3 questions on the board for bell work, how many different ways can she assign the 3 questions?

15. Mrs. Schnowske is picking her top 5 students from her class of 20, how many different ways can this be done if the first student has the highest gpa and so forth?

16. Mrs. Schnowske is putting students into groups of 4, how many different ways can this be done if there are 20 students?

17. Mrs. Schnowske is handing out math awards for highest gpa in her class, best attendance, and outstanding student of the class. In a class of 20, how many ways can she do this?

18. What is the probability you get a 3 awards from question #17?