Assignment 2

Reading Assignment:

1. Chapter 3: Basic Concepts of Probability

Problems:

1. A four-sided die is rolled repeatedly, until the first time (if ever) that an even number is obtained. What is the sample space for this experiement?

2. We roll two fair 6-sided dice. Each one of the 36 possible outcomes is assumed to be equally likely.

   (a) Find the probability that doubles are rolled.

   (b) Given that the roll results in a sum of 4 or less, find the conditional probability that doubles are rolled.

   (c) Find the probability that at least one die roll is a 6.

   (d) Given that the two dice land on different numbers, find the conditional probability that at least one die roll is a 6.

3. A system is composed of 5 components, each of which is either working or failed. Consider an experiment that consists of observing the status of each component, and let the outcome of the experiment be given by the vector $(x_1, x_2, x_3, x_4, x_5)$, where x_i is equal to 1 if component i is working and is equal to 0 if the component i is failed.

   (a) How many outcomes are in the sample space of this experiment?

   (b) Suppose that the system will work if components 1 and 2 are both working, or if components 3 and 4 are both working, or if components 1, 3, and 5 are all working. Let W be the event that the system will work. Specify all the outcomes in W.

   (c) Let A be the event that components 4 and 5 are both failed. How many outcomes are contained in event A?

4. A retail establishment accepts either the American Express or the VISA credit card. A total of 24 percent of its customers carry an American Express card, 61 percent carry a VISA card, and 11 percent carry both. What percentage of its customers carry a credit card that the establishment will accept?

5. Two cards are randomly selected from an ordinary playing deck. What is the probability that they form a blackjack? That is, what is the probability that one of the cards is an ace and the other is either a ten, a jack, a queen, or a king?

6. A 3-person basketball team consists of a guard, a forward, and a center.

(a) If a person is chosen at random from each of three different such teams, what is the probability of selecting a complete team?

(b) What is the probability that all 3 players selected play the same position?