

# Assignment 3

## Reading Assignment:

1. Chapter 4: Conditional Probability

## Problems:

1. Consider 3 urns. Urn  $A$  contains 2 white and 4 red balls; urn  $B$  contains 8 white and 4 red balls; and urn  $C$  contains 1 white and 3 red balls. If 1 ball is selected from each urn, what is the probability that the ball chosen from  $A$  was white, given that exactly 2 white balls were selected?
2. A recent college graduate is planning to take the first three actuarial examinations in the coming summer. She will take the first actuarial exam in June. If she passes that exam, then she will take the second exam in July, and if she also passes that one, then she will take the third exam in September. If she fails an exam, then she is not allowed to take any others. The probability that she passes the first exam is 0.9. If she passes the first exam, then the conditional probability that she passes the second one is 0.8, and if she passes both the first and second exams, then the conditional probability that she passes the third exam is 0.7.
  - (a) What is the probability that she passes all three exams?
  - (b) Given that she did not pass all three exams, what is the conditional probability that she failed the second exam?
3. In a certain community, 36 percent of the families own a dog, and 22 percent of the families that own a dog also own a cat. In addition, 30 percent of the families own a cat. What is
  - (a) the probability that a randomly selected family owns both a dog and a cat;
  - (b) the conditional probability that a randomly selected family owns a dog given that it owns a cat?
4. Fifty-two percent of the students at a certain college are females. Five percent of the students in this college are majoring in computer science. Two percent of the students are women majoring in computer science. If a student is selected at random, find the conditional probability that
  - (a) this student is female, given that the student is majoring in computer science;
  - (b) this student is majoring in computer science, given that the student is female.
5. There are 15 tennis balls in a box, of which 9 have not previously been used. Three of the balls are randomly chosen, played with, and then returned to the box. Later, another 3 balls are randomly chosen from the box. Find the probability that none of these balls has ever been used.

6. There are 3 coins in a box. One is a two-headed coin; another is a fair coin; and the third is a biased coin that comes up heads 75 percent of the time. When one of the 3 coins is selected at random and flipped, it shows heads. What is the probability that it was the two-headed coin?