CHAPTER 2

1. According to the U.S. census, in 2005 25% of homicide victims were known to be female, 8.7% were known to be under the age of 18 and 2.7% were known to be females under the age of 18. What is the probability that a murder victim was known to be female or under the age of 18 based on these 2005 estimates?

2. According to a survey of American households, the probability that the residents own 2 cars if annual household income is over $30,000 is 70%. Of the households surveyed, 50% had incomes over $30,000 and 70% had 2 cars. The probability that the residents of a household own 2 cars and have an income over $30,000 a year is:

3. According to a survey result, 79.6% of respondents favored the gun law, 77.8% favored the death penalty for those convicted of murder and 62.7% were in favor of both. What is the probability that a randomly selected respondent was in favor of either the gun law or the death penalty for persons convicted of murder?

4. The probability of a New York teenager owning a skateboard is 0.37, of owning a bicycle is 0.81 and of owning both is 0.36. If a New York teenager is chosen at random, what is the probability that the teenager owns a skateboard or a bicycle?

5. 14% of students take drama and computer classes, 67% take drama class, 30% take computer class. What is the probability that a student takes computer class given that the student does not take drama class?

6. A computer program consists of two blocks written independently by two different programmers. The first block and the second block have an error with probability 0.3 and 0.4, respectively. Suppose that the program returns an error. What is the probability that there is an error in the first block?

7. In a shipment of 100 televisions, 6 are defective. If a person buys two televisions from that shipment, what is the probability that at least one television are defective?

8. A jar contains 6 red balls, 3 green balls, 5 white balls and 7 yellow balls. Two balls are chosen from the jar, with replacement. What is the probability that both balls chosen are green?

9. On a math test, 5 out of 20 students got an A. If three students are chosen at random without replacement, what is the probability that all three got an A on the test?

10. Three cards are drawn from an ordinary 52-card deck without replacement. Find the probability that none of the three cards is a heart.

11. A company has 2 machines that produce widgets. An older machine produces 23% defective widgets, while the new machine produces only 8% defective widgets. In addition, the new machine produces 3 times as many widgets as the older machine does. Given a randomly chosen widget was tested and found to be defective, what is the probability it was produced by the new machine?

12. In Orange County, 51% of the adults are males. One adult is randomly selected for a survey involving credit card usage. It is later learned that the selected survey subject was smoking a cigar. Also, 7.5% of males smoke cigars, whereas 1.9% of females smoke cigars. Use this additional information to find the probability that the selected subject is a male.

13. An aircraft emergency locator transmitter (ELT) is a device designed to transmit a signal in the case of a crash. The Altigauge Manufacturing Company makes 85% of the ELTs, the Bryant Company makes 10% of them, and the Chartair Company makes the other 5%. The ELTs made by Altigauge have a 3% rate of defects, the Bryant ELTs have a 5% rate of defects, and the Chartair ELTs have a 10% rate of defects. If a randomly selected ELT is then tested and is found to be defective, find the probability that it was made by the Altigauge Manufacturing Company.

14. The probability is 5% that an electrical connector that is kept dry fails during the warranty period of a portable computer. If the connector is ever wet, the probability of a failure during the warranty period is 20%. If 90% of the connectors are kept dry and 10% are wet, what proportion of connectors fail during the warranty period?

15. According to a survey of American households, the probability that the residents own 3 cars if annual household income is over $25,500 is 83%. Of the households surveyed, 62% had incomes over $25,500 and 84% had 3 cars. The probability that annual household income is over $25,500 if the residents of a household own 3 cars is:

16. You enter a chess tournament where your probability of winning a game is 0.3 against half the players (call them type 1), 0.4 against a quarter of the players (call them type 2), and 0.5 against the remaining quarter of the players (call them type 3). You play a game against a randomly chosen opponent. What is the probability of winning?

17. There are three bags that each contain 100 marbles: bag 1 has 70 red and 30 blue marbles; bag 2 has 65 red and 35 blue marbles; bag 3 has 55 red and 45 blue marbles. One person chooses one of the begs at random and then pick a marble from the chosen bag, also at random. What is the probability that the chosen marble is red?

18. A paper bag contains three red balls and two blue balls. A plastic bag contains two red balls and one blue ball. A coin is tossed. If it falls heads up, the paper bag is selected and a ball is drawn. If the coin falls tails up, the plastic bag is selected and a ball is drawn. If a red ball is selected what is the probabitity that it came from the paper bag.

19. Let P(A) = 0.1; P(B) = 0.2. Which of the followings are true?

a) If A and B are independent, they are mutually exclusive.
b) If A and B are disjoint, they are independent.
c) If P(A ∪ *B*) = 0.28, A and B are independent,
d) If P(A∪B) = 0.3, A and B are mutually exclusive.

20**.** Given events *C* and *D* with probabilities P(*C*) = 0.3, P(*D*) = 0.2, and P(*C* and *D*) = 0.1, are *C* and *D* independent?

21. Suppose that P(A|B) = 0.6, P(A) = 0.5 and P(B) = 0.1. Find the value of P(B|A).