Chapter 5 Review Sheet (Probability)

- 1. The distribution of blood types among white Americans is approximately as follows: 37% type A, 13% type B, 44% type O, and 6% type AB. Suppose that the blood types of married couples are independent and that both the husband and the wife follow this distribution.
 - a. An individual with type B blood can safely receive transfusions only from persons with type B or type O blood. What is the probability that the husband of a woman with type B blood is an acceptable blood donor for her?
 - b. What is the probability that in a randomly chosen couple the wife has the type B blood and the husband has type A?
 - c. What is the probability that one of a randomly chosen couple has type A blood and the other has type B?
 - d. What is the probability that at least one of a randomly chosen couple has type O? (Draw a tree diagram)
- 2. A flashlight manufacturer produces flashlights that have a defect 1% of the time. A shipment of 20 go out to a store. What is the probability that all 20 flashlights are free from any defects?
- 3. ELISA tests are used to screen donated blood for the presence of the AIDS virus. The test actually detects antibodies when the virus is present. When antibodies are present, ELISA is positive with probability about 0.997 and negative with probability 0.003. When the blood tested is not contaminated with AIDS antibodies, ELISA gives a positive result with probability 0.015. Suppose that 1% of a large population carries the AIDS antibody in their blood.
 - a. Draw a tree diagram or a frequency table.
 - b. What's the probability that a person has the antibody if the ELISA test is positive?
- 4. You have a torn tendon and are facing surgery to repair it. The orthopedic surgeon explains the risks to you. Infection occurs in 3% of such operations, the repair fails in 14%, and both infection and failure occur together in 1%. What % of these operations succeed and are free from infections?
- 5. A bag of marbles contains 4 yellow and 3 green marbles. Draw three marbles and replace the marble before drawing another.
 - a. Find the probability of drawing exactly 2 yellow marbles.
 - b. Find the probability of drawing at least 2 yellow marbles.
- 6. A bag of marbles contains 4 yellow and 3 green marbles. Draw three marbles WITHOUT replacement. A tree diagram is very very helpful!
 - a. Find the probability of drawing exactly 2 yellow marbles.
 - c. Find the probability of drawing at least 2 yellow marbles.
- 7. A survey of a machine shop reveals the following information about its employees:
 - 44 employees can run a lathe
 - 49 employees can run a milling machine
 - 56 employees can operate a punch press
 - 27 employees can run a lathe and a milling machine
 - 19 employees can run a milling machine and operate a punch press
 - 24 employees can run a lathe and operate a punch press
 - 10 employees can operate all three machines
 - 9 employees cannot operate any of the three (the cleaners)
 - d. How many people are employed at the machine shop?
 - e. What percent of people operate a punch press only?
 - f. What percent of people operate both the lathe and the milling machine, but not all 3?

8. In establishing admission for academic programs, the University of Hudson makes use of H.A.T (the Hudson Admission Test). If a person has the ability to succeed at university, the probability of passing the test is 0.97. If a person does not have the ability, the probability of passing the test is 0.10. It is also known that 60% of the applicants are suitable for success in his/her university studies.

- a. What is the probability that a person passes the test?
- b. What is the probability that a person who passes the test is not suitable for university?

9. Suppose a major league baseball has a current batting average of .320 where batting average = (number of hits)/(number of at-bats).

- g. Describe an assignment of random numbers to possible results in order to simulate the player's next 20 at-bats.
- h. Carry out the simulation for 20 repetitions, and report your results. What is the relative frequency of at-bats in which the player gets a hit?
- i. Compare your simulated experimental results with the player's actual batting average of .320.