4-7 Basic Skills and Concepts

Statistical Literacy and Critical Thinking

1. Simulating Dice When two dice are rolled, the total is between 2 and 12 inclusive. A student simulates the rolling of two dice by randomly generating numbers between 2 and 12. Does this simulation behave in a way that is similar to actual dice? Why or why not?

2. Simulating Dice Assume that you have access to a computer that can randomly generate whole numbers between any two values. Describe how this computer can be used to simulate the rolling of a pair of dice.

3. Simulating Birthdays A student wants to conduct the simulation described in Example 2, but no calculator or computer is available, so the student uses 365 individual index cards to write the individual numbers between 1 and 365. The student then shuffles the cards, selects one, and records the result. That card is replaced, the cards are again shuffled and a second number is drawn. This process is repeated until 25 birthdays are generated. Does this simulation behave the same way as the process of selecting 25 people and recording their birthdays? Why or why not?

4. Simulating Coin Flips One student conducted the simulation described in Example 3 and stated that the probability of getting a sequence of six 0s or six 1s is 0.977. What is wrong with that statement?

In Exercises 5–8, describe the simulation procedure. (For example, to simulate 10 births, use a random number generator to generate 10 integers between 0 and 1 inclusive, and consider 0 to be a male and 1 to be a female.)

5. Brand Recognition The probability of randomly selecting an adult who recognizes the brand name of McDonald's is 0.95 (based on data from Franchise Advantage). Describe a procedure for using software or a TI-83/84 Plus calculator to simulate the random selection of 50 adult consumers. Each individual outcome should be an indication of one of two results: (1) The consumer recognizes the brand name of McDonald's; (2) the consumer does not recognize the brand name of McDonald's.

6. Lefties Ten percent of people are left-handed. In a study of dexterity, 15 people are randomly selected. Describe a procedure for using software or a TI-83/84 Plus calculator to simulate the random selection of 15 people. Each of the 15 outcomes should be an indication of one of two results: (1) Subject is left-handed; (2) subject is not left-handed.

7. Shaquille O'Neal Shaquille O'Neal was a professional basketball star who had a reputation for being a poor free-throw shooter. As of this writing, he made 5155 of the 9762 free throws that he attempted, for a success ratio of 0.528. Describe a procedure for using software or a TI-83/84 Plus calculator to simulate his next free throw. The outcome should be an indication of one of two results: (1) The free throw is made; (2) the free throw is missed.

8. Simulating Hybridization When Mendel conducted his famous hybridization experiments, he used peas with green pods and yellow pods. One experiment involved crossing peas in such a way that 75% of the offspring peas were expected to have green pods, and 25% of the offspring peas were expected to have yellow pods. Describe a procedure for using software or a TI-83/84 Plus calculator to simulate 20 peas in such a hybridization experiment. Each of the 20 individual outcomes should be an indication of one of two results: (1) The pod is green; (2) the pod is yellow.