Name: Date:
Elementary Statistics Chapter 6 Test Review

1. A bone mineral density test is used to identify a bone disease. The result of a bone density test is commonly measured as a z score, and the population of z scores is normally distributed with a mean of 0 and a standard deviation of 1.
    a. For a randomly selected subject, find the probability of a bone density test score less than 2.93.

    b. For a randomly selected subject, find the probability of a bone density test score greater than. -1.53.

    c. For a randomly selected subject, find the probability of a bone density test score between -1.07 and 2.07.

    d. Find P_{30} the bone density test score separating the bottom 30% from the top 70%.

2. Scores on the ACT test have a distribution that is approximately normal with mean 21.1 and a standard deviation 5.1. A sample of 80 ACT scores is randomly selected and the sample mean is computed.
    a. Describe the distribution of such sample means.

    b. What is the mean of all such sample means?

    c. What is the standard deviation of all such sample means?

3. What is an unbiased estimator?

    a. For the following statistics, identify those that are unbiased estimators: mean, median, range, variance, proportion.

    b. Determine whether the following statement is true or false: "The sample standard deviation is a biased estimator, but the bias is relatively small in large samples, so s is often used to estimate σ."

4. When can you use the central limit theorem? What are the requirements?

5. When can you use the normal distribution as an approximation for the binomial distribution? What are the requirements?

6. A particular high school has 5 minutes between classes. Assume that the arrival times to class can be anywhere between 0 and 5 minutes and are uniformly distributed. What is the probability that a student is between 1 and 3 minutes early for class?

7. The Mark VI monorail used at Disney World has doors with a height of 72 in. Heights of men are normally distributed with a mean of 69.5 in. and a standard deviation of 2.4 in. (based on Data Set 1 in Appendix B).

    a. What percentage of adult men can fit through the doors without bending? Does the door design with a height of 72 in. appear to be adequate? Explain.

    b. What doorway height would allow 99% of adult men to fit without bending?

8. Under older Federal Aviation Administration rules, airlines were required to estimate the weight of a passenger as 185 lbs. (That amount is for an adult traveling in winter, and it includes 20 lbs of carry-on baggage.) Rules were revised to use an estimate of 195 lbs. Men now have weights that are normally distributed with a mean of 182.9 lbs and a standard deviation of 40.9 lbs (based on Data Set 1 in Appendix B).

    a. If 1 adult male is randomly selected and is assumed to have 20 lbs of carry-on baggage, find the probability that his total weight is greater than 195 lbs.

b. If a Boeing 767-300 aircraft is full of 213 adult male passengers and each is assumed to have 20 lbs of carry-on baggage, find the probability that the mean passenger weight (including carry-on baggage) is greater than 195 lbs. Based on that probability, does a pilot have to be concerned about exceeding this weight limit?

9. There is an 80% chance that a prospective employer will check the educational background of a job applicant (based on data from the Bureau of National Affairs, Inc.). Sixty-four job applications are randomly selected.

   a. Find the probability that at least 50 of the applicants have their educational backgrounds checked.

   b. Find the probability that exactly 50 of the applicants have their educational backgrounds checked.