

Section 6-6 In Section 6-6 we presented procedures for determining whether sample data appear to come from a population that has a normal distribution. Some of the statistical methods covered later in this book have a loose requirement of a normally distributed population. In such cases, examination of a histogram and outliers might be all that is needed. In other cases, normal quantile plots might be necessary because of factors such as a small sample or a very strict requirement that the population must have a normal distribution.

Section 6-7 In Section 6-7 we noted that a normal distribution can sometimes approximate a binomial probability distribution. Consequently, when working with probabilities or proportions or percentages, we can often use a normal distribution. If both $np \geq 5$ and $nq \geq 5$, the binomial random variable x is approximately normally distributed with the mean and standard deviation given as $\mu = np$ and $\sigma = \sqrt{npq}$. Because the binomial probability distribution deals with discrete data and the normal distribution deals with continuous data, we apply the continuity correction, with the interval from $x - 0.5$ to $x + 0.5$ representing the discrete value of x .

Chapter Quick Quiz

1. Identify the values of μ and σ for the standard normal distribution.

Bone Density Test. In Exercises 2–5, assume that scores on a bone mineral density test are normally distributed with a mean of 0 and a standard deviation of 1.

2. Sketch a graph showing the shape of the distribution of bone density test scores.

3. Find the score separating the lowest 98% of scores from the highest 2%.

4. For a randomly selected subject, find the probability of a score greater than -1 .

5. For a randomly selected subject, find the probability of a score between 1.37 and 2.42.

In Exercises 6–10, assume that red blood cell counts of women are normally distributed with a mean of 4.577 and a standard deviation of 0.382.

6. Find the probability that a randomly selected woman has a red blood cell count below the normal range of 4.2 to 5.4.

7. Find the probability that a randomly selected woman has a red blood cell count above the normal range of 4.2 to 5.4.

8. Find P_{80} , the 80th percentile for the red blood cell counts of women.

9. If 25 women are randomly selected, find the probability that the mean of their red blood cell counts is less than 4.444.

10. What percentage of women have red blood cell counts in the normal range from 4.2 to 5.4?

Review Exercises

1. Bone Density Test 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 .