deviation for the old production method. If it appears that the standard deviation is greater, does the new production method appear to be better or worse than the old method? Should the company take any action?

$$-42 \quad 78 \quad -22 \quad -72 \quad -45 \quad 15 \quad 17 \quad 51 \quad -5 \quad -53 \quad -9 \quad -109$$

16. IQ of Professional Pilots The Wechsler IQ test is designed so that the mean is 100 and the standard deviation is 15 for the population of normal adults. Listed below are IQ scores of randomly selected professional pilots. It is claimed that because professional pilots are a more homogeneous group than the general population, they have IQ scores with a standard deviation less than 15. Test that claim using a 0.05 significance level.

$$121 \quad 116 \quad 115 \quad 121 \quad 116 \quad 107 \quad 127 \quad 98 \quad 116 \quad 101 \quad 130 \quad 114$$

Large Data Sets from Appendix B. *In Exercises 17 and 18, use the data set from Appendix B to test the given claim. Identify the null hypothesis, alternative hypothesis, test statistic, P-value or critical value(s), conclusion about the null hypothesis, and final conclusion that addresses the original claim.*

17. Cans of Diet Coke Repeat Exercise 5 using the volumes (oz) of cans of diet Coke.

18. Weights of Pennies Data Set 21 in Appendix B includes a simple random sample of "wheat" pennies. U.S. Mint specifications now use a standard deviation of 0.0230 g for weights of pennies. Use a 0.01 significance level to test the claim that wheat pennies were manufactured so that their weights have a standard deviation equal to 0.0230 g.

8-5 Beyond the Basics

19. Finding Critical Values of χ^2 For large numbers of degrees of freedom, we can approximate critical values of χ^2 as follows:

$$\chi^2 = \frac{1}{2}(z + \sqrt{2k-1})^2$$

Here k is the number of degrees of freedom and z is the critical value(s) found from technology or Table A-2. In Exercise 5 we have df = 35, so Table A-4 does not list an exact critical value. If we want to approximate a critical value of χ^2 in the left-tailed hypothesis test with $\alpha = 0.05$ and a sample size of 36, we let $k = 35$ with $z = -1.645$. Use this approximation to estimate the critical value of χ^2 for Exercise 5. How close is it to the value of $\chi^2 = 22.465$ obtained by using STATDISK and Minitab?

20. Finding Critical Values of χ^2 Repeat Exercise 19 using this approximation (with k and z as described in Exercise 19):

$$\chi^2 = k\left(1 - \frac{2}{9k} + z\sqrt{\frac{2}{9k}}\right)^3$$

Chapter 8 Review

The major topics in an introductory statistics course include methods of descriptive statistics (mean, standard deviation, histogram, etc.) and the two major activities of inferential statistics: estimating population parameters (as with confidence intervals) and hypothesis testing. In this chapter we introduced basic methods for testing claims about a population proportion, population mean, or population standard deviation (or variance).