b. When the bank changed from multiple waiting lines to a single line, how was the variation among waiting times affected?

c. What improvement occurred with the change from multiple waiting lines to a single line?

d. What procedure can be used to determine that the single waiting line is better?

2. Requirements If we want to use the sample data from Exercise 1 to test the claim that the sample is from a population with a standard deviation less than 1.8 min, we must satisfy the requirements of having a simple random sample and a normally distributed population. In Exercise 1 it was stated that the sample is a simple random sample.

a. In general, how does the normality requirement for a hypothesis test of a claim about a standard deviation differ from the normality requirement for a hypothesis test of a claim about a mean?

b. What methods can be used to determine whether the normality requirement is satisfied?

3. Confidence Interval Method of Hypothesis Testing Assume that we want to use the sample data from Exercise 1 to test the claim that the sample is from a population with a standard deviation less than 1.8 min; we will use a 0.05 significance level to test that claim. If we want to use the confidence interval method of testing hypotheses, what level of confidence should be used for the confidence interval? Will the conclusion based on the confidence interval be the same as the conclusion based on a hypothesis test that uses the *P*-value method or the critical value method?

4. Hypothesis Test For the sample data from Exercise 1, we have $s = 0.5$ and we want to use that sample to test the claim that the sample is from a population with a standard deviation less than 1.8 min (as it was in the past with multiple waiting lines).

a. Identify the null and alternative hypotheses.

b. Find the value of the test statistic.

c. Using technology, the *P*-value is found to be 0.0001. What should we conclude about the null hypothesis?

d. Given that the *P*-value is 0.0001, what should we conclude about the original claim?

e. What does the conclusion suggest about the effectiveness of the change from multiple waiting lines to a single line?

Testing Claims About Variation. ***In Exercises 5–16, 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. Assume that a simple random sample is selected from a normally distributed population.***

5. Cans of Coke Data Set 19 in Appendix B includes volumes (oz) of a simple random sample of 36 cans of regular Coke. Those volumes have a mean of 12.19 oz and a standard deviation of 0.11 oz, and they appear to be from a normally distributed population. If we want the filling process to work so that almost all cans have volumes between 11.8 oz and 12.4 oz, the range rule of thumb can be used to estimate that the standard deviation should be less than 0.15 oz. Use the sample data to test the claim that the population of volumes has a standard deviation less than 0.15 oz. Use a 0.05 significance level.

6. Cans of Pepsi Repeat the preceding exercise using these statistics from a simple random sample of cans of regular Pepsi: $n = 36$, $\bar{x} = 12.29$ oz, $s = 0.09$ oz.

7. Weights of Pennies Data Set 21 in Appendix B includes a simple random sample of 37 weights of post-1983 pennies. Those 37 weights have a mean of 2.49910 g and a standard