using TECHNOLOGY

STATDISK Select **Analysis, Hypothesis Testing, Proportion-One Sample,** then enter the data in the dialog box.

MINITAB Select **Stat, Basic Statistics, 1 Proportion,** then click on the button for "Summarized data." Enter the sample size and number of successes, then click on **Options** and enter the data in the dialog box. For the confidence level, enter the complement of the significance level. (Enter 95.0 for a significance level of 0.05.) For the "test proportion" value, enter the proportion used in the null hypothesis. For "alternative," select the format used for the alternative hypothesis. Instead of using a normal approximation, Minitab's default procedure is to determine the *P*-value by using an exact method that is often the same as the one described in Part 2 of this section. (If the test is two-tailed and the assumed value of p is not 0.5, Minitab's exact method is different from the one described in Part 2 of this section.) To use the normal approximation method presented in Part 1 of this section, click on the **Options** button and then click on the box with this statement: "Use test and interval based on normal distribution."

EXCEL Use XLSTAT. Click on **XLSTAT** at the top, click on **Parametric Tests,** then select **Tests for one proportion.** In the screen that appears, enter the sample proportion in the "Proportion" box, enter the sample size in the "Sample size" box, and enter the claimed value of the population proportion in the "Test proportion" box. (This is the same proportion used in the null hypothesis.) Select the "Data Format" of **Proportion,** and be sure that the box next to "z test" is checked. For the "Range" box, enter A1 so that the results will be displayed in a position starting at cell A1. Click on the **Options** tab to select the type of test; select the option including $\neq$ for a two-tailed test, select the option including $<$ for a left-tailed test, or select the option including $>$ for a right-tailed test. Enter the desired "Significance level (%)." For example, enter 5 for a 0.05 significance level. Click **OK.** After the results are displayed, look for the test statistic identified as "z (Observed value)" and the *P*-value. Critical values will also be displayed.

T1-83/84 PLUS Press STAT, select **TESTS,** and then select **1-PropZTest.** Enter the claimed value of the population proportion for p0, then enter the values for x and n, and then select the type of test. Highlight **Calculate,** then press ENTER.

STATCRUNCH Click on **Open StatCrunch.** Click on **Stat,** then select **Proportion.** Select **One sample,** then select **with summary.** Proceed to enter the number of successes and the number of observations, click on **Next,** then select **Hypothesis Test.** Enter the claimed value of the population proportion and select the form of the test, then click on **Calculate.**

8-3 Basic Skills and Concepts

Statistical Literacy and Critical Thinking

1. Hypothesis Tests and Confidence Intervals We can test a claim about a population proportion using the *P*-value method of hypothesis testing or the critical value method of hypothesis testing, or we could base our conclusion on a confidence interval. Assuming that all three methods are based on the same significance level, which two of the three methods always yield the same conclusion?

2. Sample Proportion In a Wakefield Research survey, respondents were asked if they ever hesitated to give a handshake because of a fear of germs. Of the respondents, 411 answered "yes" and 592 said "no." What is the sample proportion of *yes* responses, and what notation is used to represent it?

3. *P*-Value Using the sample data from Exercise 2, we can test the claim that $p < 0.5$, where p denotes the proportion of "yes" responses for the population. Some technologies provide results that include a *P*-value of 5.50E—9. Write that number using ordinary notation. What does the *P*-value suggest about the claim?

4. Notation and *P*-Value

a. Refer to Exercise 2 and distinguish between the value of p and the *P*-value.

b. It was stated that we can easily remember how to interpret *P*-values with this: "If the *P* is low, the null must go." What does this mean?

c. Another memory trick commonly used is this: "If the *P* is high, the null will fly." Given that a hypothesis test never results in a conclusion of proving or supporting a null hypothesis, how is this memory trick misleading?