using TECHNOLOGY

STATDISK First enter the observed frequencies in the first column of the Data Window. If the expected frequencies are not all equal, enter a second column that includes either expected proportions or actual expected frequencies. Select **Analysis** from the main menu bar, then select the option **Goodness-of-Fit.** Choose between "equal expected frequencies" and "unequal expected frequencies" and enter the data in the dialog box, then click on **Evaluate.**

MINITAB Enter observed frequencies in column C1. If the expected frequencies are not all equal, enter them as proportions in column C2. Select **Stat, Tables,** and **Chi-Square Goodness-of-Fit Test.** Make the entries in the window and click on **OK.**

EXCEL First enter the observed frequencies in one column, then compute the values of the corresponding expected frequencies and enter them in another column. Proceed by using XLSTAT. Click on **XLSTAT** at the top, then click on **Parametric tests,** then select **Multinomial goodness of fit test.** In the "Frequencies" box enter the range of cells containing the observed frequencies, such as A1: A10. In the "Expected frequencies" box, enter the range of cells containing the expected frequencies. Put a check next to the box identified as "Chi-square." Enter the significance level. For example, enter 5 for a 0.05 significance level. Click **OK** to get the results, which will include the chi-square test statistic and the *P*-value.

TI-83/84 PLUS Enter the observed frequencies in list L1, then identify the expected frequencies and enter them in list L2. With a TI-84 Plus calculator, press STAT, select **TESTS,** select x^2 **GOF-Test,** then enter L1 and L2 and the number of degrees of freedom when prompted. (The number of degrees of freedom is 1 less than the number of categories.) With a TI-83 Plus calculator, use the program **X2GOF.** Press PRGM, select **X2GOF,** then enter L1 and L2 when prompted. Results will include the test statistic and *P*-value.

STATCRUNCH Click on **Open StatCrunch.** Enter the observed frequencies in one column and enter the expected frequencies in another column. Click on **Stat,** then select **Goodness-of-fit,** then select **Chi-Square test.** Identify the columns to be used, then click on **Calculate.** Results will include the test statistic and *P*-value.

11-2 Basic Skills and Concepts

Statistical Literacy and Critical Thinking

1. Quality Family Time The table below lists days of the week selected by a random sample of 1005 subjects who were asked to identify the day of the week that is best for quality family time (based on results from a Pillsbury survey reported in *USA Today*). Consider the claim that the days of the week are selected with a uniform distribution so that all days have the same chance of being selected. If we test that claim using the goodness-of-fit test described in this section, what is it that we actually test?

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
523	20	9	19	11	41	382

2. Expected Value Exercise 1 includes results from a survey of 1005 randomly selected subjects. Consider the claim that when respondents select days of the week, the seven different days have the same chance of being selected. If that claim is true for the 1005 respondents, what is the expected value for each of the seven days? Identify the values of O and E for Sunday.

3. χ^2 Value Without performing actual calculations, examine the frequencies in the table given with Exercise 1. Do you expect the value of the χ^2 test statistic to be large or small? Do you expect the *P*-value to be large or small? Explain.

4. Goodness-of-Fit Test For the goodness-of-fit test described in Exercise 1, identify the number of degrees of freedom and the critical value of χ^2, assuming a 0.05 significance level.

In Exercises 5–20, conduct the hypothesis test and provide the test statistic, critical value, and/or P-value, and state the conclusion.

5. Quality Family Time The accompanying STATDISK display shows results from the claim and data given in Exercise 1. Test that claim.

STATDISK

Num Categories:	7
Degrees of freedom:	6
Expected Freq:	143.5714
Test Statistic, X^2:	1934.9791
Critical X^2:	12.59157
P-Value:	0.0000