Interpretation

We can't reject the claim that the sequence of 107 genders listed in Data Set 3 of Appendix B is random. The runs test does not address the issue that there are 92 males and 15 females, so the selection process does not appear to be a random selection of members from the general population.

using TECHNOLOGY

STATDISK First determine the values of n_1, n_2, and the number of runs G. Select **Analysis** from the main menu bar, then select **Runs Test** and enter the required data in the dialog box. The STATDISK display will include the test statistic (G or z as appropriate), and critical values.

MINITAB Minitab will do a runs test with a sequence of numerical data only, but see the *Minitab Student Laboratory Manual and Workbook* for ways to circumvent that constraint. Enter numerical data in column C1, then select **Stat, Nonparametrics,** and **Runs Test.** In the dialog box, enter C1 for the variable, then choose to test either for randomness above and below the mean or enter a value to be used. Click **OK.** The Minitab results include the number of runs and the P-value.

EXCEL Excel is not programmed for the runs test for randomness.

TI-83/84 PLUS The TI-83/84 plus calculator is not programmed for the runs test for randomness.

STATCRUNCH StatCrunch is not yet programmed for the runs test for randomness.

13-7 Basic Skills and Concepts

Statistical Literacy and Critical Thinking

1. Testing for Bias The last 106 baseball seasons (as of this writing) ended with 62 World Series wins by American League teams and 44 wins by National League teams. Can the runs test be used to show that the American League is better because disproportionately more World Series contests are won by American League teams?

2. Notation Listed below are the most recent (as of this writing) winners of the NBA basketball championship game. The letter W denotes a winner from the Western Conference, and E denotes the winner is from the Eastern Conference. Use that sequence to identify the values of n_1, n_2, and G that would be used in the runs test for randomness.

W W E E E E E W W W W W E W E W E W W W

3. Runs Test If we use a 0.05 significance level to test for randomness of the sequence given in Exercise 2, we conclude that there is not sufficient evidence to reject randomness.

a. Rearrange the sequence so that randomness is rejected because the number of runs is very low.

b. Rearrange the sequence so that randomness is rejected because the number of runs is very high.

4. Good Sample? Given a sequence of data, such as the one from Exercise 2, if we fail to reject the claim that the sequence appears to be random, does it follow that the sampling method is suitable for statistical methods? Explain.

Using the Runs Test for Randomness. ***In Exercises 5–10, use the runs test with a significance level of $\alpha = 0.05$. (All data are listed in order by row.)***

5. Testing for Randomness of Presidential Election Winners The political parties of the winning candidates for a recent sequence of presidential elections are listed below.