value in the table." Because $x = 3$ is *not* less than or equal to the critical value of 1, we fail to reject the null hypothesis.)

There is not sufficient evidence to warrant rejection of the claim that the median of the differences is equal to 0.

Interpretation

We conclude that there is not sufficient evidence to warrant rejection of the claim of no difference between taxi-out times and taxi-in times. There does not appear to be a difference.

Claims Involving Nominal Data with Two Categories

In Chapter 1 we defined nominal data to be data that consist of names, labels, or categories only. The nature of nominal data limits the calculations that are possible, but we can identify the *proportion* of the sample data that belong to a particular category, and we can test claims about the corresponding population proportion p. The following example uses nominal data consisting of genders (girls/boys). The sign test is used by representing girls with positive (+) signs and boys with negative (−) signs. (Those signs are chosen arbitrarily—honest.)

Example 3 Gender Selection

The Genetics and IVF Institute conducted a clinical trial of its methods for gender selection. As of this writing, 879 of 945 babies born to parents using the XSORT method of gender selection were girls. Use the sign test and a 0.05 significance level to test the claim that this method of gender selection is effective in increasing the likelihood of a baby girl.

Solution

Requirement check The only requirement is that the sample data be a simple random sample. Based on the design of this experiment, we can assume that the sample data are a simple random sample. ✔

Let p denote the population proportion of baby girls. The claim that girls are more likely with the XSORT method can be expressed as $p > 0.5$, so the null and alternative hypotheses are as follows:

H_0: $p = 0.5$ (the proportion of girls is equal to 0.5)

H_1: $p > 0.5$ (girls are more likely)

Denoting girls by positive signs (+) and boys by negative signs (−), we have 879 positive signs and 66 negative signs. Using the sign test procedure summarized in Figure 13-1, we let the test statistic x be the smaller of 879 and 66, so $x = 66$ boys. *Instead of trying to determine whether 879 girls is high enough to be significant, we proceed with the equivalent goal of trying to determine whether 66 boys is low enough to be significant, so we treat the test as a left-tailed test.*

The sample data do not contradict the alternative hypothesis because the sample proportion of girls is 879/945, or 0.930, which is greater than 0.5, as in the above alternative hypothesis. Continuing with the procedure in Figure 13-1,