Test Statistic: Because we are using the Wilcoxon signed-ranks test, the test statistic is calculated by using the eight-step procedure presented earlier in this section. Those steps include examples illustrating the calculation of the test statistic with the sample data in Table 13-4, and the result is the test statistic of $T = 11$.

Critical Value: The sample size is $n = 11$, so the critical value is found in Table A-8. Using a 0.05 significance level with a two-tailed test, the critical value from Table A-8 is found to be 11.

Conclusion: Table A-8 includes a note stating that we should reject the null hypothesis if the test statistic T is less than or equal to the critical value. Because the test statistic of $T = 11$ is equal to the critical value of 11, we reject the null hypothesis.

Interpretation

We conclude that the taxi-out times and the taxi-in times do *not* appear to be about the same. The large number of positive differences indicates that most flights appear to have longer taxi-out times than taxi-in times.

Claims about the Median of a Single Population

The Wilcoxon signed-ranks test can also be used to test a claim that a single population has some claimed value of the median. The preceding procedures can be used with one simple adjustment:

When testing a claim about the median of a single population, create matched pairs by pairing each sample value with the claimed value of the median. The preceding procedure can then be used.

Example 2 Body Temperatures

Data Set 3 in Appendix B includes measured body temperatures of adults. Use the 106 temperatures listed for 12 A.M. on Day 2 with the Wilcoxon signed-ranks test to test the claim that the median is less than 98.6°F.

Solution

Requirement check (1) By pairing each individual sample value with the median of 98.6°F, we satisfy the requirement of having matched pairs. The design of the experiment that led to the data in Data Set 3 justifies treating the sample as a simple random sample. (2) The requirement of an approximately symmetric distribution of differences is satisfied, because a histogram of those differences is approximately symmetric. ✔

Shown in the margin is the STATDISK display resulting from this hypothesis test. We see that $T = 661$ (which converts to the test statistic $z = -5.67$). The test statistic of $z = -5.67$ falls in the critical region below -1.96, so we reject the null hypothesis that the population of differences between body temperatures and the claimed median of 98.6°F is zero. There is sufficient evidence to support the claim that the median body temperature is less than 98.6°F. This is the same conclusion that results from the sign test, as in Example 4 in Section 13-2.

STATDISK

Num Unequal pairs:	91
Using Approximation	
Test Statistic, T:	661.0000
Mean, μ:	2093
St Dev:	252.6589
Test Statistic, z:	-5.6677
Critical z:	±1.959962