Disadvantage: A not very serious disadvantage of rank correlation is its efficiency rating of 0.91, as described in Section 13-1. This efficiency rating shows that with all other circumstances being equal, the nonparametric approach of rank correlation requires 100 pairs of sample data to achieve the same results as only 91 pairs of sample observations analyzed through the parametric approach, assuming that the stricter requirements of the parametric approach are met.

Example 1 Are the Best Televisions the Most Expensive?

Table 13-7 lists quality rankings and prices of 37-inch LCD televisions (based on data from *Consumer Reports*). Find the value of the rank correlation coefficient and use it to determine whether there is a correlation between quality and price. Use a 0.05 significance level. Based on the result, does it appear that you can get better quality by spending more?

Table 13-7 Overall Quality Scores and Prices of LCD Televisions

Quality rank	1	2	3	4	5	6	7
Price (dollars)	1900	1200	1300	2000	1700	1400	2700

Solution

Requirement check The only requirement is that the paired data are a simple random sample. The sample data are a simple random sample from the televisions that were tested. ✓

The quality ranks are consecutive integers and are not from a population that is normally distributed, so we use the rank correlation coefficient to test for a relationship between quality and price. The null and alternative hypotheses are as follows:

H_0: $\rho_s = 0$ (There is *no* correlation between quality and price.)

H_1: $\rho_s \neq 0$ (There is a correlation between quality and price.)

Following the procedure of Figure 13-5, we begin by converting the data in Table 13-7 into their corresponding ranks shown in Table 13-8. The lowest prices of $1200 is assigned a rank of 1, the next lowest price of $1300 is assigned a rank of 2, and so on.

Table 13-8 Ranks of Data from Table 13-7

Quality rank	1	2	3	4	5	6	7
Price rank	5	1	2	6	4	3	7
Difference d	4	1	1	2	1	3	0
d^2	16	1	1	4	1	9	0

Neither of the two variables has ties among ranks, so the exact value of the test statistic can be calculated as shown below. We use $n = 7$ (for 7 pairs of data) and $\Sigma d^2 = 16 + 1 + 1 + 4 + 1 + 9 + 0 = 32$.

$$r_s = 1 - \frac{6\Sigma d^2}{n(n^2 - 1)} = 1 - \frac{6(32)}{7(7^2 - 1)}$$

$$= 1 - \frac{192}{336} = 0.429$$