

EXAMPLE (b):

An article in the *Journal of Marketing Research* reports the results of a study to determine whether there is a linear relationship between the time spent in negotiating a sale and the resulting profits.⁵ A random sample of 27 market transactions was collected, and the time taken to conclude the sale as well as the resulting profit were recorded for each transaction. The sample correlation coefficient was computed: $r = 0.424$. Is there a linear relationship between the length of negotiations and transaction profits?

SOLUTION:

We want to conduct the hypothesis test: $H_0: \rho = 0$ versus $H_1: \rho \neq 0$. Using the test statistic in Equation 9-24, we get:

$$t_{(25)} = \frac{r}{\sqrt{(1 - r^2)/(n - 2)}} = \frac{0.424}{\sqrt{(1 - 0.424^2)/25}} = 2.34$$

From Appendix C, Table 3, we find that the critical points for a t distribution with 25 de-

⁴In cases where we want to test $H_0: \rho = a$ versus $H_1: \rho \neq a$, where a is some number other than zero, we may do so by using the Fisher transformation: $z' = (1/2)\log[(1 + r)/(1 - r)]$, where z' is approximately normally distributed with mean $\mu' = (1/2)\log[(1 + \rho)/(1 - \rho)]$ and standard deviation $\sigma' = 1/\sqrt{n - 3}$. (Here $\log$ is taken to mean *natural logarithm*.) Such tests are less common, and a more complete description may be found in advanced texts. As an exercise, the interested reader may try this test on some data. (You need to transform z' to an approximate standard normal: $z = (z' - \mu')/\sigma'$; use the null-hypothesized value of ρ in the formula for μ' .)

⁵L. McAlister, M. Bazerman, and P. Fader, "Power and Goal Setting in Channel Negotiations," *Journal of Marketing Research* (August 1986).

degrees of freedom and $\alpha = 0.05$ are ± 2.060 . Therefore, we reject the null hypothesis of no correlation in favor of the alternative that the two variables are linearly related. Since the critical points for $\alpha = 0.01$ are ± 2.787 , and $2.787 > 2.34$, we would have to accept the null hypothesis of no correlation between the two variables if we wanted to use the 0.01 level of significance. If we wanted to test (before looking at our data) only for the existence of a positive correlation between the two variables, our test would have been $H_0: \rho \leq 0$ versus $H_1: \rho > 0$, and we would have used only the right-hand tail of the t distribution. At $\alpha = 0.05$, the critical point of t with 25 degrees of freedom is 1.708, and at $\alpha = 0.01$ it is 2.485. The null hypothesis would, again, be rejected at the 0.05 level but accepted at the 0.01 level of significance.