and Figure 10-3. Because the test statistic $r = 0.591$ is between the critical values of -0.878 and 0.878, we fail to reject H_0: $\rho = 0$.

Interpretation

We conclude that there is not sufficient evidence to support the claim of a linear correlation between shoe print lengths and heights.

P-Value Method for a Hypothesis Test for Linear Correlation

The preceding method of hypothesis testing using the test statistic *r* involves relatively simple calculations. Software packages and the TI-83/84 Plus calculator typically use a *P*-value method based on a *t* test. The key components of the *t* test are as follows.

Hypothesis Test for Correlation (Using *P*-Value from a *t* Test)

Hypotheses

H_0: $\rho = 0$ (There is no linear correlation.)

H_1: $\rho \neq 0$ (There is a linear correlation.)

Test Statistic

$$t = \frac{r}{\sqrt{\frac{1 - r^2}{n - 2}}}$$

***P*-value:** Use software or a TI-83/84 Plus calculator or use Table A-3 with $n - 2$ degrees of freedom to find the *P*-value corresponding to the test statistic *t*.

Conclusion

- **Correlation** If the *P*-value is less than or equal to the significance level, reject H_0 and conclude that there is sufficient evidence to support the claim of a linear correlation.
- **No Correlation** If the *P*-value is greater than the significance level, fail to reject H_0 and conclude that there is not sufficient evidence to support the claim of a linear correlation.

Example 8 Hypothesis Test Based on *P*-Value from *t* Test

Use the paired shoe print lengths and heights in Table 10-1 to conduct a formal hypothesis test of the claim that there is a linear correlation between the two variables. Base the conclusion on a *P*-value and use a 0.05 significance level.

Solution

Requirement check The solution in Example 1 already includes verification that the requirements are satisfied. ✓

To claim that there is a linear correlation is to claim that the population linear correlation coefficient ρ is different from 0. We therefore have the following hypotheses:

H_0: $\rho = 0$ (There is no linear correlation.)

H_1: $\rho \neq 0$ (There is a linear correlation.)