**Exercise 9.8**

An efficiency expert wishes to determine the average time that it takes to drill three holes in a certain metal clamp. How large a sample will she need to be 95% confident that her sample mean will be within 15 seconds of the true mean? Assume that it is known from previous studies that σ = 40 seconds.

**Solution**

This problem can be solved using the following equation:

The value for can be found using the method below:

From the z-table, . Plugging this and the provided values into the initial equation, we get:

When rounding up, we get that a sample size of 28 is required to be 95% confident in the survey.

**Exercise 10.29**

Past experience indicates that the time required for high school seniors to complete a standardized test is a normal random variable with a mean of 35 minutes. If a random sample of 20 high school seniors took an average of 33.1 minutes to complete this test with a standard deviation of 4.3 minutes, test the hypothesis, at the 0.05 level of significance, that minutes against the alternative that minutes.

**Solution**

To start, we state the null and alternative hypotheses. The null hypothesis is that the mean is equal to 35 minutes, and the alternative is that the mean is less than 35 minutes. Stated mathematically:

With an value of 0.05, 19 degrees of freedom, and a one-tailed test, the t-value from a t-table for the null hypothesis is -1.729. To determine the t-value of the provided sample, we use the following equation:

Because this value is less than the computed t statistic for the null hypothesis, we reject the null hypothesis and conclude that the average is less than 35 minutes.

**Summary**

In the first exercise, we determine the number of samples required to determine with 95% confidence whether the measured sample mean is within a certain range of the true mean. In the second exercise, we evaluated the null and alternate hypotheses based off of the provided samples to determine if it is likely that the true mean is less than the provided population mean.