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10/13/2024

Project 3.1

Problem 9.8:

The first step is to calculate the sample size needed to achieve the specified confidence level and margin of error. The formula for determining the sample size 𝑛 is:

Where:

is the critical value corresponding to the desired confidence level (for 95% = 1.96)

= 40 seconds (the standard deviation)

= 15 seconds (the margin of error)

Using the formula, we calculate:

Since the sample size must be a whole number, we round up to 28.

Thus, the sample size needed is 28.

Problem 10.29:

This is a hypothesis test where we are testing:

Null Hypothesis ): 𝜇= 35 minutes

Alternative Hypothesis  μ<35 minutes

Given:

Sample mean = 33.1 minutes

Population mean 35

Sample standard deviation s = 4.3

Sample size n = 20

Significance level = 0.05

We will use a one-sample t-test because the population standard deviation is unknown. The test statistic 𝑡 is calculated as:

Next, we find the critical value of 𝑡 for a one-tailed test with 𝑛−1=19 degrees of freedom at 𝛼=0.05. From the t-distribution table, ≈−1.729.

Since 𝑡=−1.974 is less than −1.729, we reject the null hypothesis. Therefore, there is enough evidence to conclude that 𝜇<35 minutes at the 0.05 significance level.