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Chapter: 9 - Gas Prices

Problem Definition: I want to test and find out if gas prices are higher in my area for a gallon of self-serve unleaded gasoline than the average price in the US of \$3.16 indicated by a report.

Hypothesis:

$H_0: \mu = 3.16$

$H_1: \mu > 3.16$

Decision Rule: If the critical ratio is greater than the critical value 2.492 then the null is rejected.

Test:

Descriptive Statistics

| N | Mean | StDev | SE Mean | 99% Lower Bound for μ |
|----|--------|--------|---------|------------------------------|
| 25 | 3.1948 | 0.0889 | 0.0178 | 3.1505 |

μ : population mean of Gasoline Prices

Test

Null hypothesis $H_0: \mu = 3.16$
Alternative hypothesis $H_1: \mu > 3.16$

| T-Value | P-Value |
|---------|---------|
| 1.96 | 0.031 |

Conclusion:

- 1) The critical ratio of 1.96 is less than the critical value 2.492, failing to reject the null hypothesis. There is a chance of a type 2 beta error, with $\beta = 0.0773$, or 8% chance, and a power of 0.93 failing to reject a false null has occurred.
- 2) P-value of 0.031 $>$ 0.01 alpha α failing to reject the null hypothesis.
- 3) The hypothesized value of $\mu = 3.16$ falls within the confidence interval lower bound of 3.1505 failing to reject the null hypothesis.

Interpretation: The gasoline prices in my area are not significantly higher than the average price in the US of \$3.16 / Gallon. I would pay approximately the same price for fuel in my area as the average US price. Not concerned that I pay a higher price.

Assumptions: With an independently and randomly selected sample size of 25, a boxplot of the data is used to approximate normality. The median is centered, the whiskers are approximately equal, and the variability is similar on both sides of the IQR. There is a negative skew and approximate normality can be assumed under the central limit theorem.

