Hypotheses Assignment

1. State the Hypotheses Statement:

Null Hypothesis (H_0): The observed mean weekly operating cost is equal to the theoretical mean weekly operating cost predicted by the cost model.

H0:Mean Weekly Operating Cost=$1,000+$5×600

Alternative Hypothesis (H_1): The observed mean weekly operating cost is not equal to the theoretical mean weekly operating cost predicted by the cost model.

H1:Mean Weekly Operating Cost≠$1,000+$5×600

2. Calculate the Test Statistic:

Step 1: Determine the Theoretical Mean Weekly Operating Cost

Using the cost model W=$1,000+$5X

For X=600X = 600X=600 units:

Theoretical Mean Weekly Operating Cost=$1,000+$5×600=$4,000

Step 2: Calculate the Standard Deviation of Weekly Cost

Given:

- Standard deviation of the number of units produced σX=25
- Cost per unit =$5

So, the standard deviation of the weekly cost Σw is:

σW=5×25=125

Step 3: Calculate the Standard Error

The standard error (SE) of the sample mean is:

$$\text{SE} = \frac{\sigma_W}{\sqrt{n}}$$

where n is the sample size (25 restaurants).

$$\text{SE} = \frac{125}{\sqrt{25}} = \frac{125}{5} = 25$$

Step 4: Calculate the Test Statistic

The test statistic t is calculated as:

$$t = \frac{\bar{x} - \mu}{\text{SE}}$$

where:

- $\bar{x}$ is the sample mean weekly cost (Rs. 3,050)
- μ is the theoretical mean weekly cost ($4,000, which we'll assume is in Rs. for comparison)
- SE is the standard error (25)

$$t = \frac{3050 - 4000}{25} = \frac{-950}{25} = -38$$

3. Determine the Critical Value:

For a two-tailed test with α=0.05, we need to find the critical value from the standard normal (Z) distribution table.

The critical value for a two-tailed test at α=0.05 is approximately ±1.96

4. Make a Decision:

Compare the test statistic with the critical value:

- Test Statistic $t = -38$
- Critical Value ± 1.96

Since -38 is far beyond ± 1.96, we reject the null hypothesis.

5. Conclusion:

Based on the decision to reject the null hypothesis, there is strong evidence to suggest that the observed mean weekly operating cost (Rs. 3,050) is significantly different from the theoretical mean weekly operating cost (Rs. 4,000).

Thus, the restaurant owners' claim that the weekly operating costs are higher than the model suggests is supported by the data.