Hypothesis Testing

**Background:**

Bombay hospitality Ltd. operates a franchise model for producing exotic Norwegian dinners throughout New England. The operating cost for a franchise in a week (W) is given by the equation W = $1,000 + $5X, where X represents the number of units produced in a week. Recent feedback from restaurant owners suggests that this cost model may no longer be accurate, as their observed weekly operating costs are higher.

**Objective:**

To investigate the restaurant owners' claim about the increase in weekly operating costs using hypothesis testing.

**Data Provided:**

* The theoretical weekly operating cost model: W = $1,000 + $5X
* Sample of 25 restaurants with a mean weekly cost of Rs. 3,050
* Number of units produced in a week (X) follows a **normal distribution** with a **mean (μ)** of 600 units and a **standard deviation (σ)** of 25 units

**Assignment Tasks:**

Null Hypothesis: Theoretical Model = W= $1000+$5X

W= $1000+$5\*600=$1000 + $3000= $4000

Null Hypothesis=W= $4000 (Franchise Model)

Alternate Hypothesis= >$4000

**1. State the Hypotheses statement:**

Sample mean = $3,050

Population mean = $4,000

Sample size (n) = 25

Sample std= 25

Std\_error= 25/square root(25) = 5

**2. Calculate the Test Statistic:**

Use the following formula to calculate the test statistic (t):

where:

* ˉ*x*ˉ = sample mean weekly cost (Rs. 3,050)
* *μ* = theoretical mean weekly cost according to the cost model (W = $1,000 + $5X for X = 600 units)
* *σ* = 5\*25 units
* *n* = sample size (25 restaurants)

*t= 3050- (1000+5\*600)/ (5\*25)/square root(25)*

*t= -950/25*

*t= -38*

*Test Static= -38*

**3. Determine the Critical Value:**

Using the alpha level of 5% (α = 0.05), determine the critical value from the standard normal (Z) distribution table.

Critical Value from X-table =p= 1.645

**4. Make a Decision:**

Compare the test statistic with the critical value to decide whether to reject the null hypothesis.

t= -38

p= 1.645

as t value is negative and less than critical value we reject null hypothesis and accepts alternate hypothesis

**5. Conclusion:**

Based on the decision in step 4, conclude whether there is strong evidence to support the restaurant owners' claim that the weekly operating costs are higher than the model suggests.

Based on the observation from step 4, I can say that the Franchise is correct that the operating cost of restaurants is higher that $4000 per month.

**Submission Guidelines:**

* Prepare python file detailing each step of your hypothesis testing process.
* Include calculations for the test statistic and the critical value.
* Provide a clear conclusion based on your analysis.