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:**

**1. State the Hypotheses statement:**

Null Hypothesis = Predicted price is accurate

Alternative Hypothesis = Actual cost is higher than predicted cost

**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)

sample mean (ˉ*x*ˉ) = 3,050

X\_mean = 600

sigma\_x = 25

theoretical mean (*μ*) = $1,000 + $5 \* 600 units

Sigma (σ) = 5\*25 units # Standard Deviation of Cost

Sample size (n) = 25

alpha = 0.05

standard\_error = sigma/ square\_root of Sample Size = 25

**Answer: test\_statistic = - 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: 1.71**

**4. Make a Decision:**

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

if -38 > 1.71:

decision = "Reject null hypothesis"

else:

decision = "Fail to reject null 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.

Conclusion: "There is not enough evidence to say the actual costs are higher."

**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.