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:**

**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)

**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.

**4. Make a Decision:**

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

**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.