ONE SAMPLE Z-TEst

*Step 1*:Stating the Hypotheses

* **Null Hypothesis (H0​)**: The theoretical model accurately predicts the weekly operating cost, meaning the actual mean weekly cost is as predicted by the model, i.e., (μ<=4000).
* **Alternative Hypothesis (H1​)**: The actual mean weekly cost is higher than predicted by the model, i.e., ( μ>4000)

*Step 2*: Calculating the Test Statistic:

Provided information :

Sample mean = 3050

Population mean = 4000

Population std dev = 125

Sample size = 25

Aplha = 0.05

* from statsmodels.stats import weightstats
* import numpy as np
* def one\_sample\_z\_test(sample\_mean, population\_mean, population\_std\_dev, sample\_size):

# Calculate the standard error of the mean

* standard\_error = population\_std\_dev / np.sqrt(sample\_size)

# Calculate the Z score

* z\_score = (sample\_mean - population\_mean) / standard\_error
* return z\_score
* z\_score = one\_sample\_z\_test(sample\_mean, population\_mean, population\_std\_dev, sample\_size)
* print("Z Score", z\_score)

Z Score -38.0

*Step 3*: Determining the Critical Value**:**

Using the alpha level of 5% (α = 0.05)

* critical\_value=stats.norm.ppf(1-aplha)
* print("critical value from z table",critical\_value.round(3))

critical value from z table 1.645

*Step 4*: Computing the P value

* from scipy import stats
* p\_value = stats.norm.cdf(z\_score)
* p\_value

0.0

*Step 5*: Making a Decision**:**

As the Z calculated value is less than the Z table value (-38.0<-1.645) so the value falls under Critical Region than

* Ho is rejected and H1 is accepted.
* Comparing P value with aplha

alpha = 0.05

p\_value = 0.0

if p\_value <alpha:

print("Ho is rejected and H1 is accepted")

else:

print("Ho is accepted and H1 is rejected")

* Ho is rejected and H1 is accepted

*Conclusion*:

We have a significance evidence to say that the actual mean weekly cost is higher than predicted by the model.