Hypothesis Testing Case Study 1

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# Example 1: Hypo Test - Population Mean - Upper Tailed Test

# A food manufacturer claims that maximum saturated fat content in chip packet is 2 grams with std dev = 0.25

# A test on a sample of 35 packets reveal that mean saturated fat is 2.1 grams

# Should the claim of food manufacturer be rejected?

# Let’s test the null hypothesis at the significance level of 5%.

# Step 1:

# Set up null hypothesis and alternative hypothesis

H0 = mu <= 2 # Null Hypothesis H1 = mu > 2 # Alternative Hypothesis - Upper tailed test

# level of significance

α = 0.05

# Step 2: Compute Test Statistics

# Sample size is 35 therefor more than 30. So, need to calculate Z statistics

# based on the given data

mu = 2 # Population mean  
Xbar = 2.1 # Sample mean  
sigma = 0.25 # Population Std Dev  
n = 35 # Sample Size  
SE = sigma/sqrt(n) # Sample std deviation: 0.0422  
Z = (Xbar - mu)/SE # Z score  
Z

## [1] 2.366432

# Step 3: Compute critical value for significance level = 0.05 or Confidence Interval = 95%

# since we are using critical value approach we are using qnorm

Zα = qnorm(1-α)  
Zα # Critical value for 95% confidence

## [1] 1.644854

# Step 4: Compare Test statistic with critical value and conclude the test

# Decision

# if | Z |< Zα, Z is not significant and the null hypothesis may, therefore, be accepted.

# if | Z |≥ Zα, Z is significant and the null hypothesis is rejected

if ( Z <Zα){  
 print (" Z is not significant and the null hypothesis may, therefore, be accepted")  
} else {  
 print(" Z is significant and the null hypothesis is rejected")  
}

## [1] " Z is significant and the null hypothesis is rejected"

# Conclusion

# With 95% confidence the claim of at most 2 grams of saturated fat in a chips packet should be rejected

# Critical Region

qnorm(.90) # 10% level

## [1] 1.281552

qnorm(.95) # 5% level

## [1] 1.644854

qnorm(.99) # 1 % level

## [1] 2.326348