**Statistical & Predictive Modelling**

**Assignment #2- Hypothesis Testing**

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## The Hypothesis Statement

Suppose the average cholesterol level of individuals who have adhered to a diet program for the past six months significantly deviates from the overall average. In that case, it is considered to influence cholesterol levels.

## Assessment of Normality

The histogram below shows the normality of the provided dataset.

A green and blue line graph

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## Steps to Conduct the hypothesis test.

Step 1. Stating the null and alternative hypothesis:

* Null hypothesis(H0): The population's mean cholesterol remains at 5.95 months after the diet program is said to have had no impact, which means that µ = 5.95
* Alternative hypothesis(H1): After six months, if the diet program is effective, the population's mean cholesterol will change, meaning µ ≠ 5.95.

Step 2: State the significance level:

The significance level is 0.05.

Step 3: Compute the test statistic z:

The test required to conduct is the Two Tail test. The test calculation is following:

Calculate the sample mean and sample standard deviation of cholesterol levels.

Mean (mu0) = **5.148**

Standard Deviation (sd) = **0.9531911**

Let's look at the z parameters:

Using the Rscript , calculated the z parameters

mu0 = **5.148**

alpha = **0.05**

sigma = **0.953**

#Calculate z

Z = (5.95-5.148)/(0.953/sqrt(155L)) (using the formula)

The value of z after the calculation is **10.47725.**

Now we have the value of z, we need to compute the p-value.

Again, using the Rscript , we will calculate the p-value

P value = 2\*pnorm(abs(10.48),lower.tail=FALSE)

The p-value is 1.067437e-25.

Step 4: Comparing the value.

Given that the p-value of 1.067437e-25 is significantly less than the significance level of 0.05, the null hypothesis that µ = 50 is rejected.

Step 5:

We reject the null hypothesis that the population’s mean cholesterol levels is equal to 5.95 at 0.05.

## Analysis using RScript

The R Code is provided below:

**A screenshot of a computer program

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The R Output:

A screenshot of a computer

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## Summary

The results of the hypothesis test, conducted through the analysis, indicate whether there is evidence supporting the effectiveness of the diet plan in reducing cholesterol levels. If the p-value is lower than the chosen significance level, often set at 0.05, it indicates support for the hypothesis that the diet program has an effect. This suggests that the average cholesterol level after following the diet program is significantly distinct from the average cholesterol level of the entire population. If the p-value exceeds the significant level, there is not enough evidence to determine that the diet program has had a substantial impact on cholesterol levels.

The investigation indicates that the p-value is significantly smaller than the chosen significance level. Consequently, we refute the null hypothesis, which posits that the average cholesterol level of the population remains at 5.95 months after the initiation of the diet program with no impact; thus, indicating that µ = 5.95.

## RScript

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## References

Tetikoglu, F.(2024).*Week5- Foundations of Inference Part I*.[Class notes]

[Week5-Data1204 - 202441.13128-DATA-1204-02 - STATISTICAL PRED MODELING (desire2learn.com)](https://durhamcollege.desire2learn.com/d2l/le/content/526287/viewContent/7268017/View)

Tetikoglu, F.(2024).*Week4- Distribution of random variables*.[Class notes]

[Week4-Data1204 - 202441.13128-DATA-1204-02 - STATISTICAL PRED MODELING (desire2learn.com)](https://durhamcollege.desire2learn.com/d2l/le/content/526287/viewContent/7268015/View)