

Sri Lanka Institute of Information Technology



Lab Submission
Lab sheet No.10

IT24102009

Bandara D.B.A.H.W.

Probability and Statistics | IT2120

B.Sc. (Hons) in Information Technology

Exercise

Instructions: Create a folder in your desktop with your registration number (Eg: " IT....."). You need to save the R script file and take screenshots of the command prompt with answers and save it in a word document inside the folder. Save both R script file and word document with your registration number (Eg: " IT....."). After you finish the exercise, zip the folder and upload the zip file to the submission link.

1. A vending machine owner claims that customers choose the four snack types (A, B, C, D) with equal probability. To test this claim, a researcher records the number of purchases for each snack type during one week and results are given below.

Snack_Type	Count
A	120
B	95
C	85
D	100

- i. State the null and alternative hypotheses for the test.
 - Null Hypothesis : Customers choose the four snack types with equal probability.
 - Alternative Hypothesis : The probabilities of choosing snack types are not all equal.
- ii. Perform a suitable chi-squared test to test the null hypothesis.

```
> # ii)
> # Store the observed counts for each snack type
> observed_counts <- c(120, 95, 85, 100)
> # Define the probabilities under the null hypothesis (all equal)
> probabilities <- c(0.25, 0.25, 0.25, 0.25)
> # Perform the Chi-Squared test
> test_result <- chisq.test(x = observed_counts, p = probabilities)
> # Print the results of the test
> print(test_result)
```

Chi-squared test for given probabilities

```
data: observed_counts
X-squared = 6.5, df = 3, p-value = 0.08966
```

iii. Give your conclusions based on the results.

- Conclusion: Since the p-value (0.08226) is greater than the significance level (0.05), we do not reject the null hypothesis. There is not enough statistical evidence to reject the owner's claim that customers choose the four snack types with equal probability.