Sri Lanka Institute of Information Technology
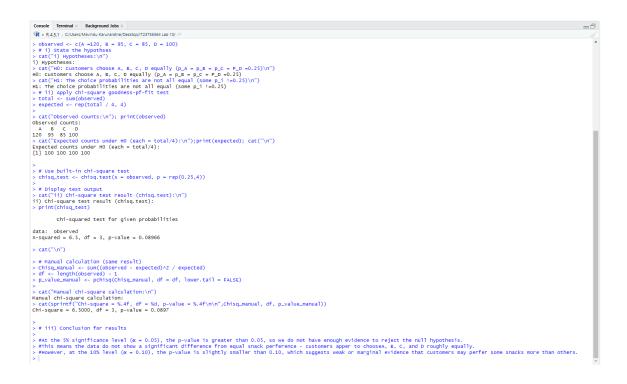

Lab Submission
Lab sheet No 10

IT24100036

Surenthiran K

Probability and Statistics | IT2120

B.Sc. (Hons) in Information Technology

```r
1   setwd("C:\\IT24100036 Lab 10")
2   getwd()
3   observed <- c(A =120, B = 95, C = 85, D = 100)
4   # i) State the hypothses
5   cat("i) Hypotheses:\n")
6   cat("H0: Customers choose A, B, C, D equally (p_A = p_B = p_C = P_D =0.25)\n")
7   cat("H1: The choice probabilities are not all equal (some p_i !=0.25)\n")
8
9   # ii) Apply chi-square goodness-pf-fit test
10  total <- sum(observed)
11  expected <- rep(total / 4, 4)
12
13  cat("Observed counts:\n"); print(observed)
14  cat("Expected counts under H0 (each = total/4):\n");print(expected); cat("\n")
15
16  # Use built-in chi-square test
17  chisq_test <- chisq.test(x = observed, p = rep(0.25,4))
18
19  # Display test output
20  cat("ii) Chi-square test result (chisq.test):\n")
21  print(chisq_test)
22  cat("\n")
23
24  # Manual calculation (same result)
25  Chisq_manual <- sum((observed - expected)^2 / expected)
26  df <- length(observed) - 1
27  p_value_manual <- pchisq(Chisq_manual, df = df, lower.tail = FALSE)
28
29  cat("Manual chi-square calculation:\n")
30  cat(sprintf("Chi-square = %.4f, df = %d, p-value = %.4f\n\n",Chisq_manual, df, p_value_manual))
31
32  # iii) Conclusion for results
33
34  #At the 5% significance level (α = 0.05), the p-value is greater than 0.05, so we do not have enough evidence to reject the null hypothesis.
35  #This means the data do not show a significant difference from equal snack perference – customers apper to chooseA, B, C, and D roughly equally.
36  #However, at the 10% level (α = 0.10), the p-value is slightly smaller than 0.10, which suggests weak or marginal evidence that customers may perfer some snacks more than others.
```

Console Terminal Background Jobs

R 4.5.1 · C:/Users/Mavindu Karunaratne/Desktop/IT23756564 Lab 10/

```
> observed <- c(A =120, B = 95, C = 85, D = 100)
> # i) State the hypothesis
> cat("i) Hypotheses:\n")
i) Hypotheses:
> cat("H0: Customers choose A, B, C, D equally (p_A = p_B = p_C = P_D =0.25)\n")
H0: Customers choose A, B, C, D equally (p_A = p_B = p_C = P_D =0.25)
> cat("H1: The choice probabilities are not all equal (some p_i !=0.25)\n")
H1: The choice probabilities are not all equal (some p_i !=0.25)
> # ii) Apply chi-square goodness-pf-fit test
> total <- sum(observed)
> expected <- rep(total / 4, 4)
>
> cat("Observed counts:\n"); print(observed)
Observed counts:
  A   B   C   D
120  95  85 100
> cat("Expected counts under H0 (each = total/4):\n");print(expected); cat("\n")
Expected counts under H0 (each = total/4):
[1] 100 100 100 100

>
> # Use built-in chi-square test
> chisq_test <- chisq.test(x = observed, p = rep(0.25,4))
>
> # Display test output
> cat("ii) Chi-square test result (chisq.test):\n")
ii) Chi-square test result (chisq.test):
> print(chisq_test)

        Chi-squared test for given probabilities

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

> cat("\n")

> # Manual calculation (same result)
> Chisq_manual <- sum((observed - expected)^2 / expected)
> df <- length(observed) - 1
> p_value_manual <- pchisq(Chisq_manual, df = df, lower.tail = FALSE)
>
> cat("Manual chi-square calculation:\n")
Manual chi-square calculation:
> cat(sprintf("Chi-square = %.4f, df = %d, p-value = %.4f\n\n",Chisq_manual, df, p_value_manual))
Chi-square = 6.5000, df = 3, p-value = 0.0897

>
> # iii) Conclusion for results
>
> #At the 5% significance level (α = 0.05), the p-value is greater than 0.05, so we do not have enough evidence to reject the null hypothesis.
> #This means the data do not show a significant difference from equal snack perference – customers apper to chooseA, B, C, and D roughly equally.
> #However, at the 10% level (α = 0.10), the p-value is slightly smaller than 0.10, which suggests weak or marginal evidence that customers may perfer some snacks more than others.
> |
```

Environment History Connections Tutorial

Import Dataset ▾   217 MiB ▾

R ▾   Global Environment ▾

Data

Data	
● chisq_test	List of 9

Values

Values	
Chisq_manual	6.5
df	3
expected	num [1:4] 100 100 100 100
observed	Named num [1:4] 120 95 85 100
p_value_manual	0.0896625039881679
total	400