Sri Lanka Institute of Information Technology

Lab Submission
<Lab sheet 08>

<IT24104110>

<Thulmanthi W.A.S >

IT2120- Probability and Statistics

B.Sc. (Hons) in Information Technology

Exercise

1.

```r
getwd()

#01
weights_data <- read.table("Exercise - LaptopsWeights.txt", header=TRUE)
fix(weights_data)
attach(weights_data)

#Calculate the Population Mean
pop_mean <- mean(Weight.kg.)

#Calculate the Population Standard Deviation
n_pop <- length(Weight.kg.)
pop_variance <- var(Weight.kg.) * (n_pop - 1) / n_pop
pop_sd <- sqrt(pop_variance)

print(paste("Population Mean:", pop_mean))
print(paste("Population Standard Deviation:", pop_sd))

```

```
> print(paste("Population Mean:", pop_mean))
[1] "Population Mean: 2.468"
> print(paste("Population Standard Deviation:", pop_sd))
[1] "Population Standard Deviation: 0.252885349516337"
```

2.

```r
#02
population <- Weight.kg.

k <- 25 # Number of samples
n <- 6 # Sample size

samples_matrix <- c()
sample_means <- c()
sample_sds <- c()

for (i in 1:k) {
  # Draw a sample of size n=6 with replacement
  s <- sample(population, n, replace = TRUE)

  # Calculate sample mean and sample standard deviation
  s_mean <- mean(s)
  s_sd <- sd(s)

  # Store the mean and SD
  sample_means <- c(sample_means, s_mean)
  sample_sds <- c(sample_sds, s_sd)
}

# Combine results into a table for display
results_table <- data.frame(
  Sample = 1:k,
  Mean = sample_means,
  SD = sample_sds
)

print(results_table)
```

```
>
> print(results_table)
   Sample     Mean         SD
1       1 2.468333 0.19166812
2       2 2.473333 0.16132782
3       3 2.490000 0.10564090
4       4 2.625000 0.16932218
5       5 2.455000 0.17615334
6       6 2.488333 0.22364406
7       7 2.440000 0.21854061
8       8 2.383333 0.26964174
9       9 2.560000 0.24511222
10     10 2.410000 0.32112303
11     11 2.628333 0.22569153
12     12 2.251667 0.14048725
13     13 2.236667 0.35629576
14     14 2.643333 0.10191500
15     15 2.456667 0.26356530
16     16 2.341667 0.22355462
17     17 2.421667 0.18356652
18     18 2.418333 0.27125019
19     19 2.593333 0.24824719
20     20 2.560000 0.20909328
21     21 2.481667 0.25222345
22     22 2.696667 0.04179314
23     23 2.318333 0.17057745
24     24 2.491667 0.20014162
25     25 2.600000 0.11242775
```

3.

```
#03
#Calculate the Mean of the Sample Means
mean_of_sample_means <- mean(sample_means)

#Calculate the Standard Deviation of the Sample Means
sd_of_sample_means <- sd(sample_means)

print(paste("Mean of the Sample Means:", mean_of_sample_means))
print(paste("Standard Deviation of the Sample Means (SE):", sd_of_sample_means))
```

```
> print(paste("Mean of the Sample Means:", mean_of_sample_means))
[1] "Mean of the Sample Means: 2.47733333333333"
> print(paste("Standard Deviation of the Sample Means (SE):", sd_of_sample_means))
[1] "Standard Deviation of the Sample Means (SE): 0.118645909545386"
```

Relationship :-

(based on the Central Limit Theorem)

Mean of sample means ≈ Population means

SD of sample means < Population SD