Sri Lanka Institute of Information Technology

Lab Submission
Lab sheet No 08

IT24103040

Gamage GGJA

Probability and Statistics| IT2120

B.Sc. (Hons) in Information Technology

Exercise

1. Calculate the population mean and population standard deviation of the laptop bag weights.

```
# Import dataset
bag_weights <- read.table("Exercise - LaptopsWeights.txt", header = TRUE)
fix(bag_weights)
attach(bag_weights)

# Question 1: Population mean and standard deviation
popmean <- mean(weight.kg.)
popsd <- sd(weight.kg.)

popmean
popsd
```

```
> # Import dataset
> bag_weights <- read.table("Exercise - LaptopsWeights.txt", header = TRUE)
> fix(bag_weights)
> attach(bag_weights)
The following object is masked from bag_weights (pos = 3):

    weight.kg.

The following object is masked from bag_weights (pos = 4):

    weight.kg.

The following object is masked from data (pos = 6):

    weight.kg.
```

2. Draw 25 random samples of size 6 (with replacement) and calculate the sample mean and sample standard deviation for each sample.

```
# Question 2: Draw 25 random samples of size 6 (with replacement)
samples <- c()
n <- c()

for(i in 1:25){
  s <- sample(weight.kg., 6, replace = TRUE)
  samples <- cbind(samples, s)
  n <- c(n, paste('S', i, sep=''))
}

colnames(samples) <- n
```

```
> # Question 2: Draw 25 random samples of size 6 (with replacement)
> samples <- c()
> n <- c()
```

```
> for(i in 1:25){
+   s <- sample(weight.kg., 6, replace = TRUE)
+   samples <- cbind(samples, s)
+   n <- c(n, paste('S', i, sep=''))
+ }
> colnames(samples) <- n
```

```
# Calculate sample means and sample standard deviations for each sample
s.means <- apply(samples, 2, mean)
s.means
s.sds <- apply(samples, 2, sd)
s.sds
```

```
> # Calculate sample means and sample standard deviations for each sample
> s.means <- apply(samples, 2, mean)
> s.means
      S1       S2       S3       S4       S5       S6       S7       S8
2.423333 2.510000 2.578333 2.518333 2.281667 2.560000 2.381667 2.403333
      S9      S10      S11      S12      S13      S14      S15      S16
2.621667 2.358333 2.546667 2.430000 2.670000 2.516667 2.530000 2.625000
     S17      S18      S19      S20      S21      S22      S23      S24
2.498333 2.625000 2.580000 2.630000 2.436667 2.420000 2.571667 2.466667
     S25
2.538333
> s.sds <- apply(samples, 2, sd)
> s.sds
        S1         S2         S3         S4         S5         S6         S7
0.32321304 0.22600885 0.19974150 0.23293060 0.13166878 0.28698432 0.21674101
        S8         S9        S10        S11        S12        S13        S14
0.38520990 0.18159479 0.34654966 0.18151217 0.26570661 0.08625543 0.22870651
       S15        S16        S17        S18        S19        S20        S21
0.13608821 0.14556785 0.17600189 0.14377065 0.13652839 0.10488088 0.22105806
       S22        S23        S24        S25
0.44698993 0.13287839 0.05537749 0.19114567
```

3. Calculate the mean and standard deviation of the 25 sample means and state the relationship of them with true mean and true standard deviation.

```
# Question 3: Mean and standard deviation of the sample means
mean_of_sample_means <- mean(s.means)
mean_of_sample_means

sd_of_sample_means <- sd(s.means)
sd_of_sample_means

# Compare with population mean and standard deviation
popmean
mean_of_sample_means

popsd
sd_of_sample_means
```

```
> # Question 3: Mean and standard deviation of the sample means
> mean_of_sample_means <- mean(s.means)
> mean_of_sample_means
[1] 2.508867
> sd_of_sample_means <- sd(s.means)
> sd_of_sample_means
[1] 0.09785396
```