

# 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.)
popstd <- sd(weight.kg.)

popmean
popstd
```

```
> # 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

popstd
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
```

Environment

History

Connections

Tutorial

Import Dataset

194 MiB

List

R

Global Environment

Data

bag\_weights

40 obs. of 1 variable

data

40 obs. of 1 variable

samples

num [1:6, 1:25] 2.06 2.71 2.75 2.32 2.65 2.05 2.51 ...

values

i

25L

mean\_of\_sample\_mea...

2.50886666666667

n

chr [1:25] "s1" "s2" "s3" "s4" "s5" "s6" "s7" "s8" "s...

popmean

2.468

popsd

0.256106948813907

popvar

0.152455833333333

s

num [1:6] 2.65 2.7 2.46 2.46 2.73 2.23

s.means

Named num [1:25] 2.42 2.51 2.58 2.52 2.28 ...

s.sds

Named num [1:25] 0.323 0.226 0.2 0.233 0.132 ...

s.vars

Named num [1:30] 0.2208 0.0696 0.4503 0.0138 0.2575 ...

samplemean

1.78933333333333

samplevars

0.0362445057471264

sd\_of\_sample\_means

0.0978539633747563

truevar

0.0304911666666667