

# Sri Lanka Institute of Information Technology



Lab Submission  
Lab sheet No.08

**IT24102009**

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**Probability and Statistics | IT2120**

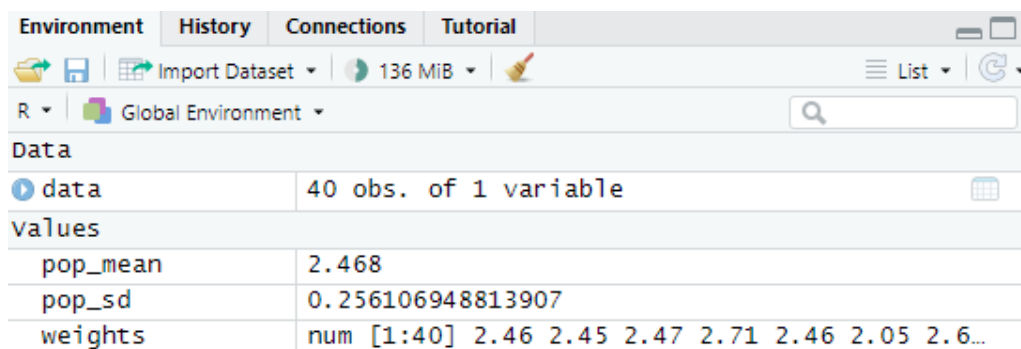
B.Sc. (Hons) in Information Technology

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

```
> # ----- Queastion 01 ----- #
> pop_mean <- mean(weights)
> pop_sd <- sd(weights)
> cat("Population mean =", pop_mean)
Population mean = 2.468
> cat("Population standard deviation =", pop_sd)
Population standard deviation = 0.2561069
```



Environment	History	Connections	Tutorial
R   Global Environment			
Data			
data	40 obs. of 1 variable		
values			
pop_mean	2.468		
pop_sd	0.256106948813907		
weights	num [1:40] 2.46 2.45 2.47 2.71 2.46 2.05 2.6...		

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






```
> # ----- Queastion 02 ----- #
> num_samples <- 25
> sample_size <- 6
> # Matrix to store samples
> samples <- matrix(nrow = sample_size, ncol = num_samples)
> # Generate samples
> for (i in 1:num_samples) {
+   samples[, i] <- sample(weights, size = sample_size, replace = TRUE)
+ }
> # Name samples
> colnames(samples) <- paste("sample", 1:num_samples, sep = "_")
> # Calculate sample means and sample standard deviations
> sample_means <- apply(samples, 2, mean)
> sample_sds <- apply(samples, 2, sd)
> # Display first few sample means and SDs
> head(sample_means)
sample_1 sample_2 sample_3 sample_4 sample_5 sample_6
2.641667 2.368333 2.505000 2.566667 2.281667 2.420000
> head(sample_sds)
sample_1 sample_2 sample_3 sample_4 sample_5 sample_6
0.2263110 0.2747666 0.1389604 0.1036661 0.3458564 0.2504396
```


Environment


History

Connections


Tutorial


   Import Dataset ▾  136 MiB ▾ 

List ▾ 


R ▾  Global Environment ▾

Data

 data

40 obs. of 1 variable 

samples

num [1:6, 1:25] 2.71 2.7 2.57 2.23 2.89 2... 

Values

i

25L

num\_samples

25

pop\_mean

2.468

pop\_sd

0.256106948813907

sample\_means

Named num [1:25] 2.64 2.37 2.5 2.57 2.28 ...

sample\_sds

Named num [1:25] 0.226 0.275 0.139 0.104 0.3...

sample\_size

6

weights

num [1:40] 2.46 2.45 2.47 2.71 2.46 2.05 2.6...

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 03 ----- #
> mean_of_sample_means <- mean(sample_means)
> sd_of_sample_means <- sd(sample_means)
> cat("Mean of sample means =", mean_of_sample_means)
Mean of sample means = 2.4808
> cat("Standard deviation of sample means =", sd_of_sample_means)
Standard deviation of sample means = 0.1080243

```

Environment

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Import Dataset

136 MiB

List

R

Global Environment

Data

data

40 obs. of 1 variable

samples

num [1:6, 1:25] 2.71 2.7 2.57 2.23 2.89 2...

values

i

25L

mean\_of\_sample\_...

2.4808

num\_samples

25

pop\_mean

2.468

pop\_sd

0.256106948813907

sample\_means

Named num [1:25] 2.64 2.37 2.5 2.57 2.28 ...

sample\_sds

Named num [1:25] 0.226 0.275 0.139 0.104 0.3...

sample\_size

6

sd\_of\_sample\_me...

0.108024259963865

weights

num [1:40] 2.46 2.45 2.47 2.71 2.46 2.05 2.6...