Sri Lanka Institute of Information Technology

Lab Submission
Lab sheet No.08

IT24102009

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Probability and Statistics | IT2120

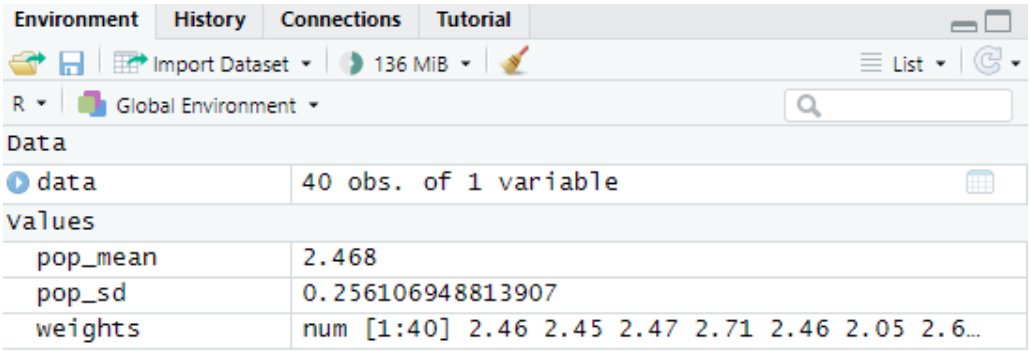
B.Sc. (Hons) in Information Technology

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.

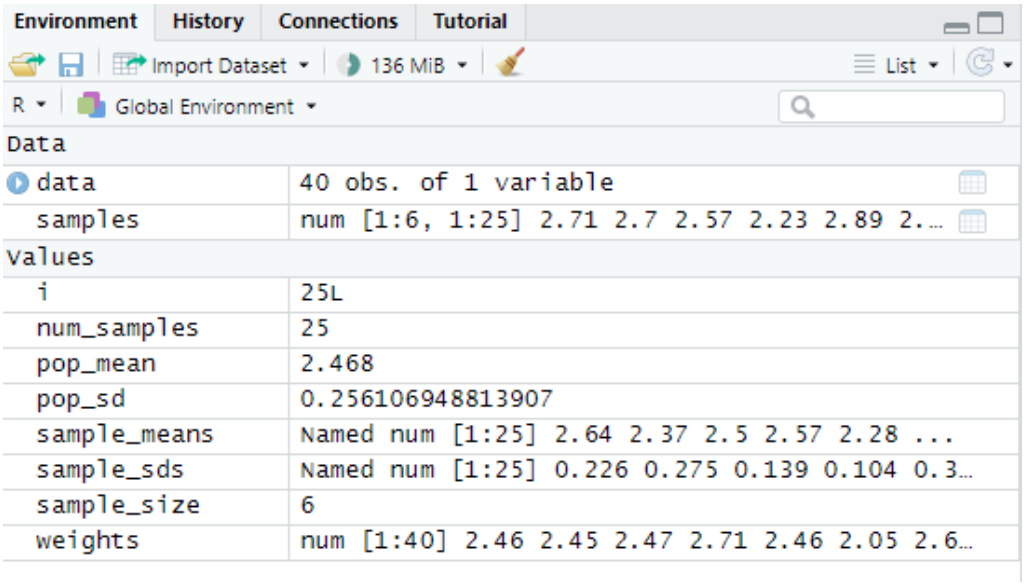
1. Calculate the population mean and population standard deviation of the laptop bag weights.

```
> # ------------- 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
```



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
```



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
```