

Sri Lanka Institute of Information Technology



Lab Submission
Lab sheet No - 08

IT24100577

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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.

```
> #Q-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.

```
> #Q-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
2.485000 2.400000 2.528333 2.345000 2.486667 2.526667
> head(sample_sds)
sample_1 sample_2 sample_3 sample_4 sample_5 sample_6
0.2417230 0.1783255 0.2013372 0.1356097 0.2133229 0.1222566
```

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.

```
> #Q-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 = 2.467267> cat("Standard deviation of sample means =", sd_of_samp
le_means)
Standard deviation of sample means = 0.09778789
```