Sri Lanka Institute of Information Technology

Lab Submission
<Lab sheet No-08>

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Probability and Statistics| IT2120

B.Sc. (Hons) in Information Technology

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

```
> print(paste("Population Mean:", pop_mean))
[1] "Population Mean: 2.468"
> print(paste("Population Standard Deviation:", pop_sd))
[1] "Population Standard Deviation: 0.256106948813907"
```

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

```
> print(sample_means)
 Sample_1  Sample_2  Sample_3  Sample_4  Sample_5  Sample_6  Sample_7
 2.511667  2.316667  2.533333  2.491667  2.390000  2.426667  2.468333
 Sample_8  Sample_9 Sample_10 Sample_11 Sample_12 Sample_13 Sample_14
 2.471667  2.448333  2.285000  2.593333  2.566667  2.320000  2.530000
Sample_15 Sample_16 Sample_17 Sample_18 Sample_19 Sample_20 Sample_21
 2.470000  2.576667  2.380000  2.418333  2.458333  2.391667  2.545000
Sample_22 Sample_23 Sample_24 Sample_25
 2.560000  2.358333  2.635000  2.430000
```

```
> print("Sample Standard Deviations:")
[1] "Sample Standard Deviations:"
> print(sample_sds)
  Sample_1   Sample_2   Sample_3   Sample_4   Sample_5   Sample_6
0.20536959 0.20392809 0.29574764 0.07808115 0.13251415 0.14962175
  Sample_7   Sample_8   Sample_9  Sample_10  Sample_11  Sample_12
0.17803558 0.23077406 0.16702295 0.25343638 0.18206226 0.14250146
 Sample_13  Sample_14  Sample_15  Sample_16  Sample_17  Sample_18
0.40398020 0.24355697 0.17308957 0.16753109 0.20899761 0.32529474
 Sample_19  Sample_20  Sample_21  Sample_22  Sample_23  Sample_24
0.22728103 0.20546695 0.22572107 0.14587666 0.23301645 0.15319922
 Sample_25
0.22208107
```

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.

```
> print(paste("Mean of Sample Means:", mean_of_sample_means))
[1] "Mean of Sample Means: 2.46306666666667"
> print(paste("Standard Deviation of Sample Means (Standard Error):", sd_of_sample_means))
[1] "Standard Deviation of Sample Means (Standard Error): 0.0925558890216748"
> theoretical_sd_of_means <- pop_sd / sqrt(sample_size)
>
> print("--- Relationships ---")
[1] "--- Relationships ---"
> print("Relationship between Population Mean and Mean of Sample Means:")
[1] "Relationship between Population Mean and Mean of Sample Means:"
> print(paste("Population Mean (", pop_mean, ") is approximately equal to the Mean of Sample Means (", mean_of_sample_means, ")"))
[1] "Population Mean ( 2.468 ) is approximately equal to the Mean of Sample Means ( 2.46306666666667 )"
>
> print("Relationship between Population Standard Deviation and Standard Deviation of Sample Means:")
[1] "Relationship between Population Standard Deviation and Standard Deviation of Sample Means:"
> print(paste("The Standard Deviation of Sample Means (", sd_of_sample_means, ") is approximately equal to the Population Standard Deviation divided by the squa
oot of the sample size (", theoretical_sd_of_means, ")"))
[1] "The Standard Deviation of Sample Means ( 0.0925558890216748 ) is approximately equal to the Population Standard Deviation divided by the square root of the
```