Probability and Statistics - IT2120

LAB - 08

```
setwd('F:\\sliit\\2nd year\\1 sem\\Probability and Statistics - IT2120\\week 10\\Lab 08-20250925\\IT24100139')

# Read laptop bag weights data
laptop_data <- read.table("Exercise - LaptopsWeights.txt", header = TRUE)
attach(laptop_data)
```

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

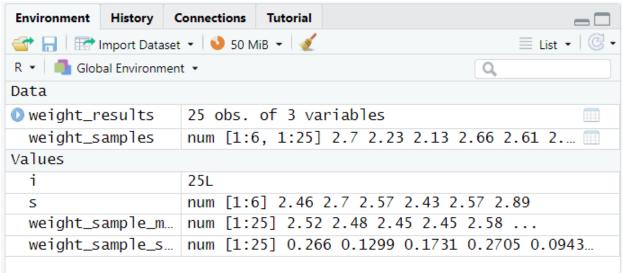
```
# (1.)
pop_mean_weight <- mean(Weight.kg.)
pop_sd_weight <- sd(Weight.kg.)
cat("Laptop Bag Weights - Population Mean:", pop_mean_weight, "\n")
cat("Laptop Bag Weights - Population Standard Deviation:", pop_sd_weight, "\n\n")

> # (1.)
> pop_mean_weight <- mean(Weight.kg.)
> pop_sd_weight <- sd(Weight.kg.)
> cat("Laptop Bag Weights - Population Mean:", pop_mean_weight, "\n")
Laptop Bag Weights - Population Mean: 2.468
> cat("Laptop Bag Weights - Population Standard Deviation:", pop_sd_weight, "\n\n")
Laptop Bag Weights - 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.

```
# (2.)
set.seed(456) # For reproducible results
weight_samples <- matrix(nrow = 6, ncol = 25)</pre>
weight_sample_means <- numeric(25)</pre>
weight_sample_sds <- numeric(25)</pre>
for(i in 1:25) {
  s <- sample(Weight.kg., 6, replace = TRUE)
  weight_samples[, i] <- s</pre>
  weight_sample_means[i] <- mean(s)</pre>
  weight_sample_sds[i] <- sd(s)</pre>
}
# Create results table for weights
weight_results <- data.frame(</pre>
  Sample = 1:25,
  Mean = round(weight_sample_means, 4),
  SD = round(weight_sample_sds, 4)
)
print("Laptop Bag Weights - Sample Results:")
print(weight_results)
cat("\n")
```

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> # (2.)
> set.seed(456) # For reproducible results
> weight_samples <- matrix(nrow = 6, ncol = 25)</pre>
> weight_sample_means <- numeric(25)</pre>
> weight_sample_sds <- numeric(25)</pre>
> set.seed(456) # For reproducible results
> weight_samples <- matrix(nrow = 6, ncol = 25)</pre>
> weight_sample_means <- numeric(25)</pre>
> weight_sample_sds <- numeric(25)</pre>
> for(i in 1:25) {
    s <- sample(Weight.kg., 6, replace = TRUE)</pre>
    weight_samples[, i] <- s</pre>
    weight_sample_means[i] <- mean(s)</pre>
    weight_sample_sds[i] <- sd(s)</pre>
+ }
> # Create results table for weights
> weight_results <- data.frame(
    Sample = 1:25,
    Mean = round(weight_sample_means, 4),
    SD = round(weight_sample_sds, 4)
+ )
> print("Laptop Bag Weights - Sample Results:")
[1] "Laptop Bag Weights - Sample Results:"
> print(weight_results)
   Sample
            Mean
1
         1 2.5150 0.2660
2
         2 2.4750 0.1299
3
         3 2.4483 0.1731
4
         4 2.4533 0.2705
5
         5 2.5783 0.0943
6
         6 2.4900 0.2175
7
        7 2.2050 0.3204
8
        8 2.4833 0.1895
9
        9 2.2800 0.1826
10
       10 2.5767 0.2266
11
       11 2.5900 0.1188
12
       12 2.4467 0.2314
```



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.

```
# (3.)
mean_weight_sample_means <- mean(weight_sample_means)
sd_weight_sample_means <- sd(weight_sample_means)

cat("Mean of Sample Means (Weights):", mean_weight_sample_means, "\n")
cat("Standard Deviation of Sample Means (Weights):", sd_weight_sample_means, "\n")

> # (3.)
> mean_weight_sample_means <- mean(weight_sample_means)
> sd_weight_sample_means <- sd(weight_sample_means)
> cat("Mean of Sample Means (Weights):", mean_weight_sample_means, "\n")
Mean of Sample Means (Weights): 2.475067
> cat("Standard Deviation of Sample Means (Weights):", sd_weight_sample_means, "\n")
Standard Deviation of Sample Means (Weights): 0.1057398
> |
```

