Probability and Statistics - IT2120

LAB - 08

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```
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)
weight_sample_means <- numeric(25)
weight_sample_sds <- numeric(25)

for(i in 1:25) {
  s <- sample(Weight.kg., 6, replace = TRUE)
  weight_samples[, i] <- s
  weight_sample_means[i] <- mean(s)
  weight_sample_sds[i] <- sd(s)
}

# 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:")
print(weight_results)
cat("\n")
```

Console | Terminal | Background Jobs

R 4.5.1 · F:/sliit/2nd year/1 sem/Probability and Statistics - IT2120/week 10/Lab 08-20250925/IT24100139/

```
> # (2.)
> set.seed(456) # For reproducible results
> weight_samples <- matrix(nrow = 6, ncol = 25)
> weight_sample_means <- numeric(25)
> weight_sample_sds <- numeric(25)
> set.seed(456) # For reproducible results
> weight_samples <- matrix(nrow = 6, ncol = 25)
> weight_sample_means <- numeric(25)
> weight_sample_sds <- numeric(25)
>
> for(i in 1:25) {
+   s <- sample(Weight.kg., 6, replace = TRUE)
+   weight_samples[, i] <- s
+   weight_sample_means[i] <- mean(s)
+   weight_sample_sds[i] <- sd(s)
+ }
>
> # 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     SD
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
```

Environment | History | Connections | Tutorial

Import Dataset · 50 MiB · List

R · Global Environment

Data	
weight_results	25 obs. of 3 variables
weight_samples	num [1:6, 1:25] 2.7 2.23 2.13 2.66 2.61 2.…
Values	
i	25L
s	num [1:6] 2.46 2.7 2.57 2.43 2.57 2.89
weight_sample_m…	num [1:25] 2.52 2.48 2.45 2.45 2.58 ...
weight_sample_s…	num [1:25] 0.266 0.1299 0.1731 0.2705 0.0943…

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
>
```