SLIIT UNI
THE KNOWLEDGE UNIVERSITY

Faculty of Computing

Year 2 Semester 1 (2025)

IT2120 - Probability and Statistics — Lab Sheet 08

IT24104154_Lab_08.R

```r
setwd("C://Users//it24104154//Desktop//PS_LAB_08")
weights <- read.table("Exercise - LaptopsWeights.txt", header = TRUE)

fix(weights)
attach(weights)
# Extract the Weight column
w <- weights$weight.kg.


pop_mean <- mean(w)
pop_sd   <- sd(w)

print("Q1: Population Mean and SD")
print(pop_mean)
print(pop_sd)


set.seed(42)   # for reproducibility

sample_means <- c()
sample_sds   <- c()

for(i in 1:25){
  samp <- sample(w, size = 6, replace = TRUE)
  sample_means[i] <- mean(samp)
  sample_sds[i]   <- sd(samp)
}

print("Q2: Sample Means (25 samples)")
print(sample_means)

print("Q2: Sample SDs (25 samples)")
print(sample_sds)
```

```r
# --------------------------------
# Question 3:
# Mean & SD of the 25 sample means
# and compare with true mean & SD
# --------------------------------
mean_of_sample_means <- mean(sample_means)
sd_of_sample_means   <- sd(sample_means)

print("Q3: Mean of Sample Means")
print(mean_of_sample_means)

print("Q3: SD of Sample Means")
print(sd_of_sample_means)

# --------------------------------
# Relationships
# --------------------------------
print("Relationship:")
print(" - Mean of sample means ≈ Population mean")
print(" - SD of sample means < Population SD")
```

```
R 4.2.2 · C:/Users/it24104154/Desktop/PS_LAB_08/
> weights <- read.table("Exercise - LaptopsWeights.txt", header = TRUE)
> fix(weights)
> attach(weights)
> # Extract the Weight column
> w <- weights$Weight.kg.
> pop_mean <- mean(w)
> pop_sd   <- sd(w)
> print("Q1: Population Mean and SD")
[1] "Q1: Population Mean and SD"
> print(pop_mean)
[1] 2.468
> print(pop_sd)
[1] 0.2561069
> set.seed(42)   # for reproducibility
> sample_means <- c()
> sample_sds   <- c()
> for(i in 1:25){
+   samp <- sample(w, size = 6, replace = TRUE)
+   sample_means[i] <- mean(samp)
+   sample_sds[i]   <- sd(samp)
+ }
> print("Q2: Sample Means (25 samples)")
[1] "Q2: Sample Means (25 samples)"
> print(sample_means)
 [1] 2.683333 2.656667 2.621667 2.448333 2.223333 2.568333 2.463333 2.351667 2.246667 2.665000 2.476667 2.651667 2.506667
[14] 2.585000 2.501667 2.501667 2.376667 2.350000 2.220000 2.320000 2.541667 2.491667 2.521667 2.475000 2.298333
> print("Q2: Sample SDs (25 samples)")
[1] "Q2: Sample SDs (25 samples)"
> print(sample_sds)
 [1] 0.1600833 0.1107550 0.1444184 0.1689280 0.3283697 0.2968782 0.1862973 0.2477431 0.3068985 0.1720174 0.2290560
[12] 0.1988383 0.2615849 0.2918733 0.1921891 0.2162791 0.3881065 0.2848859 0.2442949 0.2260973 0.1741742 0.1675012
[23] 0.2393672 0.1251799 0.3819119
> # Question 3:
> # Mean & SD of the 25 sample means
> # and compare with true mean & SD
> # --------------------------------
> mean_of_sample_means <- mean(sample_means)
> sd_of_sample_means   <- sd(sample_means)
> print("Q3: Mean of Sample Means")
[1] "Q3: Mean of Sample Means"
> print(mean_of_sample_means)
[1] 2.469867
> print("Q3: SD of Sample Means")
[1] "Q3: SD of Sample Means"
> print(sd_of_sample_means)
[1] 0.1402073
> # Relationships
> # --------------------------------
> print("Relationship:")
[1] "Relationship:"
> print(" - Mean of sample means ≈ Population mean")
[1] " - Mean of sample means ≈ Population mean"
> print(" - SD of sample means < Population SD")
[1] " - SD of sample means < Population SD"
```

Data Editor

File Edit Help

	Weight.kg.	var2	var3	var4	var5	var6
1	2.46					
2	2.45					
3	2.47					
4	2.71					
5	2.46					
6	2.05					
7	2.6					
8	2.42					
9	2.43					
10	2.53					
11	2.57					
12	2.85					
13	2.7					
14	2.53					
15	2.28					
16	2.2					
17	2.57					
18	2.89					
19	2.51					

Data	
weights	40 obs. of 1 variable
Values	
i	25L
mean_of_sample_means	2.46986666666667
pop_mean	2.468
pop_sd	0.256106948813907
samp	num [1:6] 1.71 2.7 2.23 2.43 2.67 2.05
sample_means	num [1:25] 2.68 2.66 2.62 2.45 2.22 ...
sample_sds	num [1:25] 0.16 0.111 0.144 0.169 0.328 ...
sd_of_sample_means	0.140207287019375
w	num [1:40] 2.46 2.45 2.47 2.71 2.46 2.05 2.6 2.42 2.43 2.53 ...