IT2120 - Probability and Statistics

Lab Sheet 08

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Exercise

```
data<-read.table("Exercise - LaptopsWeights.txt",header = TRUE)
fix(data)
attach(data)
```

```
> data<-read.table("Exercise - LaptopsWeights.txt",header = TRUE)
> fix(data)
data<-read.table("Exercise - LaptopsWeights.txt",header = TRUE)
```

Data Editor — □ ×

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	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					

```
# Question 01
colnames(data)[1] <- "Weights"
weights <- data$Weights

# Population mean
popmn <- mean(weights)
popmn

# Population variance
popvar <- sum((weights - mean(weights))^2) / length(weights)
popvar

# Population standard deviation
pop_sd <- sqrt(popvar)
pop_sd
```

```
> # Rename column for easier access
> colnames(data)[1] <- "Weights"
> weights <- data$Weights
> # Population mean
> popmn <- mean(weights)
> popmn
[1] 2.468
> # Population variance (divide by N, not N-1)
> popvar <- sum((weights - mean(weights))^2) / length(weights)
> popvar
[1] 0.063951
> # Population standard deviation
> pop_sd <- sqrt(popvar)
> pop_sd
[1] 0.2528853
```

```r
#Question 02
set.seed(123)
samples <- 25
n <- 6

sample_means <- numeric(samples)
sample_sds   <- numeric(samples)

for (i in 1:samples) {
  s <- sample(weights, n, replace = TRUE)
  sample_means[i] <- mean(s)
  sample_sds[i]   <- sd(s)
}
print(sample_means)
print(sample_sds)
```

```r
> set.seed(123)
> samples <- 25
> n <- 6
>
> sample_means <- numeric(samples)
> sample_sds   <- numeric(samples)
>
> for (i in 1:samples) {
+   s <- sample(weights, n, replace = TRUE)
+   sample_means[i] <- mean(s)
+   sample_sds[i]   <- sd(s)
+ }
> print(sample_means)
 [1] 2.530000 2.573333 2.473333 2.591667 2.456667 2.401667 2.590000 2.466667 2.401667 2.335000 2.586667 2.378333 2.381667
[14] 2.465000 2.485000 2.451667 2.385000 2.338333 2.428333 2.551667 2.538333 2.466667 2.470000 2.448333 2.475000
> print(sample_sds)
 [1] 0.1513935 0.1191078 0.1718914 0.1345239 0.2749303 0.2544340 0.2167026 0.4530195 0.2230172 0.3237746 0.1706068 0.3235686
[13] 0.2993604 0.2314951 0.1745566 0.2762909 0.2042303 0.2436733 0.2481465 0.2654367 0.1708118 0.2451666 0.2405826 0.2792430
[25] 0.2358601
>
```

```r
#Question 03
mean_of_sample_means <- mean(sample_means)
sd_of_sample_means   <- sd(sample_means)

print(mean_of_sample_means)
print(sd_of_sample_means)
```

```r
> print(mean_of_sample_means)
[1] 2.4668
> print(sd_of_sample_means)
[1] 0.07624874
>
```