IT2120 - Probability and Statistics - Lab Sheet 08

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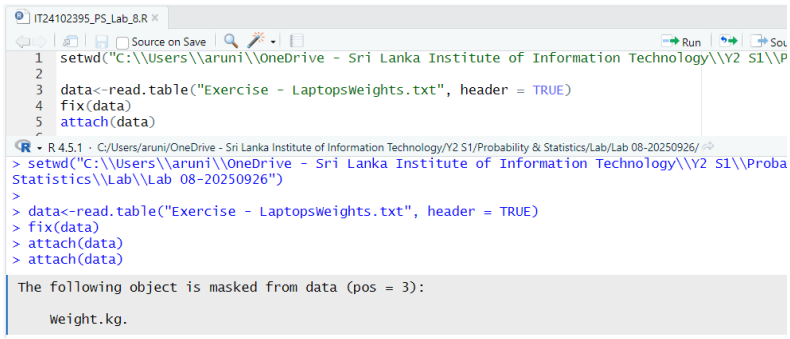


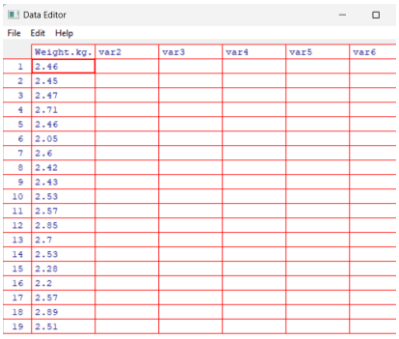
```
setwd("C:\\Users\\aruni\\OneDrive - Sri Lanka Institute of Information Technology\\Y2 S1\\P

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

```
R 4.5.1 · C:/Users/aruni/OneDrive - Sri Lanka Institute of Information Technology/Y2 S1/Probability & Statistics/Lab/Lab 08-20250926/
> setwd("C:\\Users\\aruni\\OneDrive - Sri Lanka Institute of Information Technology\\Y2 S1\\Proba
Statistics\\Lab\\Lab 08-20250926")
>
> data<-read.table("Exercise - LaptopsWeights.txt", header = TRUE)
> fix(data)
> attach(data)
> attach(data)

The following object is masked from data (pos = 3):

    Weight.kg.
```



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					

1.

```
#Question 01

popmn <- mean(Weight.kg.)
print(popmn)

popvar <- var(Weight.kg.)
print(popvar)

popsd <- sqrt(popvar)
print(popsd)
```

```
> #Question 01
>
> popmn <- mean(Weight.kg.)
> print(popmn)
[1] 2.468
>
> popvar <- var(Weight.kg.)
> print(popvar)
[1] 0.06559077
>
> popsd <- sqrt(popvar)
> print(popsd)
[1] 0.2561069
```

2.

```
#Question 02 - Draw 25 random samples of size 6 (with replacement)

samples <- c()
n <- c()
for(i in 1:25) {
  s <- sample(Weight.kg., 6, replace = TRUE)
  samples <- cbind(samples,s)
  n <- c(n, paste('s',i))
}
colnames(samples) = n
samples

s.means <- apply(samples,2,mean)
s.means

s.vars <- apply(samples,2,var)
s.vars
```

```
> #Question 02 - Draw 25 random samples of size 6 (with replacement)
>
> samples <- c()
> n <- c()
> for(i in 1:25) {
+   s <- sample(Weight.kg., 6, replace = TRUE)
+   samples <- cbind(samples,s)
+   n <- c(n, paste('s',i))
+ }
> colnames(samples) = n
> samples
      s 1  s 2  s 3  s 4  s 5  s 6  s 7  s 8  s 9 s 10 s 11 s 12 s 13 s 14 s 15 s 16 s 17 s 18
[1,] 2.71 2.42 2.73 2.06 2.66 2.51 2.46 2.85 2.57 2.65 2.70 2.47 2.89 2.46 2.57 2.23 2.32 2.57
[2,] 2.61 2.61 2.41 2.73 2.57 2.46 2.46 2.57 2.70 2.66 2.57 2.06 2.66 2.60 1.71 2.41 2.76 2.46
[3,] 2.89 2.76 1.71 2.53 2.46 2.43 2.47 2.89 2.57 2.70 2.43 2.76 2.76 2.46 2.89 2.47 2.46 2.20
[4,] 2.61 2.89 2.89 2.06 2.67 2.60 2.53 1.71 2.76 2.47 2.28 1.71 2.57 2.13 2.06 2.47 2.60 2.23
[5,] 2.70 2.46 2.75 2.41 2.67 2.43 2.57 2.41 2.43 2.60 2.75 2.05 2.46 2.46 1.71 2.46 2.57 2.28
[6,] 2.13 2.20 2.76 2.05 2.60 2.17 2.76 2.06 2.46 2.42 2.60 2.67 2.85 2.41 2.71 2.05 2.47 2.65
     s 19 s 20 s 21 s 22 s 23 s 24 s 25
[1,] 2.46 2.28 2.46 2.05 2.43 2.43 2.53
[2,] 2.05 2.75 2.70 2.53 2.66 2.28 2.57
[3,] 2.06 2.71 2.70 2.60 2.45 1.71 2.60
[4,] 2.05 2.43 2.47 2.42 2.42 2.43 2.61
[5,] 2.85 2.13 2.57 2.70 2.46 2.67 2.89
[6,] 2.41 2.45 2.67 2.43 2.53 2.43 2.23
>
```

```
> s.means <- apply(samples,2,mean)
> s.means
     s 1      s 2      s 3      s 4      s 5      s 6      s 7      s 8      s 9     s 10     s 11
2.608333 2.556667 2.541667 2.306667 2.605000 2.433333 2.541667 2.415000 2.581667 2.583333 2.555000
    s 12     s 13     s 14     s 15     s 16     s 17     s 18     s 19     s 20     s 21     s 22
2.286667 2.698333 2.420000 2.275000 2.348333 2.530000 2.398333 2.313333 2.458333 2.595000 2.455000
    s 23     s 24     s 25
2.491667 2.325000 2.571667
>
> s.vars <- apply(samples,2,var)
> s.vars
        s 1         s 2         s 3         s 4         s 5         s 6         s 7         s 8
0.065376667 0.062106667 0.191376667 0.085466667 0.006750000 0.020746667 0.013416667 0.212390000
        s 9        s 10        s 11        s 12        s 13        s 14        s 15        s 16
0.016776667 0.012746667 0.030510000 0.168906667 0.027656667 0.024280000 0.267830000 0.029776667
       s 17        s 18        s 19        s 20        s 21        s 22        s 23        s 24
0.022400000 0.035656667 0.104346667 0.057776667 0.012430000 0.050510000 0.008296667 0.106470000
       s 25
0.044416667
>
```

3.

```
#Question 03 - Calculate the mean and standard deviation of the 25 sample means

samplemean <- mean(s.means)
samplemean

samplevar <- var(s.means)
samplesd <- sqrt(samplevar)
samplesd

# Comparison

#Population Mean
popmn

#Population SD
popsd

#Mean of Sample Means
samplemean

#SD of Sample Means
samplesd

#Mean of sample means is close to population mean.
#SD of sample means is smaller than population SD.
```

```
> #Question 03 - Calculate the mean and standard deviation of the 25 sample means
>
> samplemean <- mean(s.means)
> samplemean
[1] 2.4758
>
> samplevar <- var(s.means)
> samplesd <- sqrt(samplevar)
> samplesd
[1] 0.1190346
> # Comparison
>
> #Population Mean
> popmn
[1] 2.468
>
> #Population SD
> popsd
[1] 0.2561069
>
> #Mean of Sample Means
> samplemean
[1] 2.4758
>
> #SD of Sample Means
> samplesd
[1] 0.1190346
> #Mean of sample means is close to population mean.
> #SD of sample means is smaller than population SD.
```