Sri Lanka Institute of Information Technology

Lab Submission
<Worksheet No 08>

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Probability and Statistics| IT2120

B.Sc. (Hons) in Information Technology

Exercise

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

```
> setwd("C:\\Users\\IT24101474\\Desktop\\IT24101474")
```

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

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					

```
> ## Question 01
> popmn <- mean(weight.kg.)
> popvar <- var(weight.kg.) * (length(weight.kg.)-1)/length(weight.kg.)
> popSD <- sqrt(popvar)
>
> popmn
[1] 2.468
> popvar
[1] 0.063951
> popSD
[1] 0.2528853
>
```

Data	
data	40 obs. of 1 variable
$ weight.kg. : num	2.46 2.45 2.47 2.71 2.46 2.05 2.6 2.42 2.4…
samples	num [1:6, 1:25] 2.06 2.28 2.46 2.75 2.57 2.…
Values	
i	25L
mean_smeans	2.42266666666667
n	chr [1:25] "s 1" "s 2" "s 3" "s 4" "s 5" "s 6…
popmn	2.468
popSD	0.252885349516337
popvar	0.063951
s	num [1:6] 2.75 2.73 2.67 2.75 2.46 2.23
s.means	Named num [1:25] 2.39 2.36 2.39 2.38 2.44 ...
s.SD	Named num [1:25] 0.25 0.28 0.255 0.185 0.406 …
s.var	Named num [1:25] 0.0627 0.0783 0.065 0.0343 0…
sd_smeans	0.0998042064726214

2. Draw 25 random samples of size 6 (with replacement) and calculate the sample mean and sample standard deviation for each sample.

```
> ## Question 02
> 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
>
> s.means <- apply(samples, 2, mean)
> s.var   <- apply(samples, 2, var)
> s.SD    <- sqrt(s.var)
```

```
> s.means
     S 1      S 2      S 3      S 4      S 5      S 6      S 7      S 8
2.475000 2.553333 2.671667 2.531667 2.451667 2.580000 2.515000 2.653333
     S 9     S 10     S 11     S 12     S 13     S 14     S 15     S 16
2.528333 2.316667 2.615000 2.265000 2.590000 2.250000 2.260000 2.505000
    S 17     S 18     S 19     S 20     S 21     S 22     S 23     S 24
2.351667 2.481667 2.473333 2.353333 2.593333 2.385000 2.306667 2.566667
    S 25
2.538333
```

```
> s.SD
       S 1        S 2        S 3        S 4        S 5        S 6
0.28967223 0.12192894 0.14190372 0.21037269 0.26678956 0.07771744
       S 7        S 8        S 9       S 10       S 11       S 12
0.25041965 0.11707547 0.28152561 0.36406959 0.20364184 0.35764508
      S 13       S 14       S 15       S 16       S 17       S 18
0.16480291 0.33917547 0.34193567 0.07204165 0.11889772 0.18978058
      S 19       S 20       S 21       S 22       S 23       S 24
0.23131508 0.35981477 0.10073066 0.21603240 0.24038857 0.18704723
      S 25
0.36135394
```

Data	
data	40 obs. of 1 variable
$ weight.kg. : num	2.46 2.45 2.47 2.71 2.46 2.05 2.6 2.42 2.4…
samples	num [1:6, 1:25] 2.05 2.57 2.75 2.2 2.53 2.7…
Values	
i	25L
mean_smeans	2.42266666666667
n	chr [1:25] "S 1" "S 2" "S 3" "S 4" "S 5" "S 6…
popmn	2.468
popSD	0.252885349516337
popvar	0.063951
s	num [1:6] 2.45 2.05 2.89 2.2 2.89 2.75
s.means	Named num [1:25] 2.48 2.55 2.67 2.53 2.45 ...
s.SD	Named num [1:25] 0.29 0.122 0.142 0.21 0.267 …
s.var	Named num [1:25] 0.0839 0.0149 0.0201 0.0443 …
sd_smeans	0.0998042064726214

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.

```
> ## Question 03
> mean_smeans <- mean(s.means)
> sd_smeans   <- sd(s.means)
>
> mean_smeans
[1] 2.472467
> sd_smeans
[1] 0.1272038
>
```

Data	
data	40 obs. of 1 variable
$ weight.kg.: num	2.46 2.45 2.47 2.71 2.46 2.05 2.6 2.42 2.4…
samples	num [1:6, 1:25] 2.05 2.57 2.75 2.2 2.53 2.7…
Values	
i	25L
mean_smeans	2.47246666666667
n	chr [1:25] "S 1" "S 2" "S 3" "S 4" "S 5" "S 6…
popmn	2.468
popSD	0.252885349516337
popvar	0.063951
s	num [1:6] 2.45 2.05 2.89 2.2 2.89 2.75
s.means	Named num [1:25] 2.48 2.55 2.67 2.53 2.45 ...
s.SD	Named num [1:25] 0.29 0.122 0.142 0.21 0.267 …
s.var	Named num [1:25] 0.0839 0.0149 0.0201 0.0443 …
sd_smeans	0.127203831761527