Sri Lanka Institute of Information Technology



Lab Submission Lab sheet 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.

```
#set warking path
setwd("C:\\Users\\it24100652\\Desktop\\IT24100652_PS LAB 08")
getwd()

#Import dataset
bag_weights <- read.table("Exercise - Laptopsweights.txt",header= TRUE)
fix(bag_weights)
attach(bag_weights)

# Question 1: Population mean and standard deviation
popmean <- mean(weight.kg.)
popsd <- sd(weight.kg.)

popmean
popsd</pre>
```

```
> #set warking path
> setwd("C:\\Users\\it24100652\\Desktop\\IT24100652_PS LAB 08")
> getwd()
[1] "C:/Users/it24100652/Desktop/IT24100652_PS LAB 08"
> #Import dataset
> bag_weights <- read.table("Exercise - Laptopsweights.txt",header= TRUE)
> fix(bag_weights)
> attach(bag_weights)
> # Question 1: Population mean and standard deviation
> popmean <- mean(weight.kg.)
> popsd <- sd(weight.kg.)
> popmean
[1] 2.468
> popsd
[1] 0.2561069
```

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

```
# Question 2: Draw 25 random samples of size 6 (with replacement)
samples <- c()
n \leftarrow c()
for(i in 1:25){
  s <- sample(Weight.kg., 6, replace = TRUE)</pre>
  samples <- cbind(samples, s)</pre>
  n <- c(n, paste('S', i, sep=''))
}
colnames(samples) <- n
> # Question 2: 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)</pre>
  n <- c(n, paste('S', i, sep=''))
+ }
> colnames(samples) <- n
# Calculate sample means and sample standard deviations for each sample
s.means <- apply(samples, 2, mean)
s.means
s.sds <- apply(samples, 2, sd)</pre>
s.sds
> # Calculate sample means and sample standard deviations for each sample
> s.means <- apply(samples, 2, mean)</pre>
            52
                    53
                           54
                                    55
                                            56
                                                    57
                                                            58
     51
2.423333 2.510000 2.578333 2.518333 2.281667 2.560000 2.381667 2.403333
    s9 s10 s11 s12 s13 s14 s15 s16
2.621667 2.358333 2.546667 2.430000 2.670000 2.516667 2.530000 2.625000
    517
         518 519 520 521
                                          522
                                                   523
2.498333 2.625000 2.580000 2.630000 2.436667 2.420000 2.571667 2.466667
    525
2.538333
> s.sds <- apply(samples, 2, sd)
                                   54
                52
                          53
                                             55
0.32321304 0.22600885 0.19974150 0.23293060 0.13166878 0.28698432 0.21674101
      58
                59
                        510
                                  511 512 513
                                                                514
0.38520990 0.18159479 0.34654966 0.18151217 0.26570661 0.08625543 0.22870651
     515
               516
                        517
                                  518
                                           519
                                                     520
0.13608821 0.14556785 0.17600189 0.14377065 0.13652839 0.10488088 0.22105806
      522
               523
                         524
                                   525
0.44698993 0.13287839 0.05537749 0.19114567
```

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 3: Mean and standard deviation of the sample means
mean_of_sample_means <- mean(s.means)</pre>
mean_of_sample_means
sd_of_sample_means <- sd(s.means)</pre>
sd_of_sample_means
# Compare with population mean and standard deviation
popmean
mean_of_sample_means
popsd
sd_of_sample_means
> # Question 3: Mean and standard deviation of the sample means
> mean_of_sample_means <- mean(s.means)</pre>
> mean_of_sample_means
[1] 2.508867
> sd_of_sample_means <- sd(s.means)</pre>
> sd_of_sample_means
```

[1] 0.09785396

Environment History Conn	ections Tutorial
Import Dataset ▼	(1) 194 MiB ▼ <u>《</u>
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Data	
D bag_weights	40 obs. of 1 variable
O data	40 obs. of 1 variable
samples	num [1:6, 1:25] 2.06 2.71 2.75 2.32 2.65 2.05 2.51
values	
i	25L
mean_of_sample_mea	2.5088666666667
n	chr [1:25] "S1" "S2" "S3" "S4" "S5" "S6" "S7" "S8" "S
popmean	2.468
popsd	0.256106948813907
popvar	0.152455833333333
S	num [1:6] 2.65 2.7 2.46 2.46 2.73 2.23
s.means	Named num [1:25] 2.42 2.51 2.58 2.52 2.28
s.sds	Named num [1:25] 0.323 0.226 0.2 0.233 0.132
s.vars	Named num [1:30] 0.2208 0.0696 0.4503 0.0138 0.2575
samplemean	1.7893333333333
samplevars	0.0362445057471264
sd_of_sample_means	0.0978539633747563
truevar	0.0304911666666667