Probability and Statistics - IT2120

Lab sheet 08

IT NO: IT24102364

Name: Sanjana K.D.A

Question 1

```r
setwd("C:\\Users\\asind\\Desktop\\IT24102364")


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

#Question 1
#Population mean and Population standard deviation for laptop bag weights

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

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

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

```
> setwd("C:\\Users\\asind\\Desktop\\IT24102364")
>
>
> data <- read.table("Exercise - LaptopsWeights.txt",header = TRUE)
> fix(data)
> attach(data)
The following object is masked from data (pos = 3):

    Weight.kg.
```

```
> #Question 1
> #Population mean and Population standard deviation for laptop bag weights
>
> 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
```

Question 2

```r
#Question 2
#The 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

#Means and standard deviation for each sample
s.means <- apply(samples,2,mean)
s.means

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

```

```
> #Question 2
> #The 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,] 2.06 2.23 2.85 2.42 2.06 2.76 2.67 2.46 2.05 2.23 2.42 2.23 2.51 2.57 2.45 2.06 2.47 2.71
[2,] 2.76 2.43 2.57 2.45 2.43 2.60 2.71 2.46 2.45 2.05 2.57 2.53 2.46 2.20 2.43 2.47 2.05 2.60
[3,] 2.53 2.28 1.71 2.75 2.17 2.89 2.66 2.57 2.73 2.47 2.60 2.20 2.51 2.85 2.43 2.89 2.57 2.75
[4,] 2.23 2.71 2.20 2.05 2.43 2.53 2.70 2.43 2.13 2.66 2.32 2.43 2.70 2.17 2.43 2.47 2.43 2.20
[5,] 2.43 2.70 2.57 2.71 2.67 2.41 2.66 2.60 2.47 2.42 2.28 2.17 2.13 2.89 2.41 2.75 2.46 2.06
[6,] 2.76 1.71 2.47 2.57 2.06 2.76 2.70 2.70 2.46 2.51 2.61 2.23 2.17 2.53 2.76 2.66 2.65 2.71
     S 19 S 20 S 21 S 22 S 23 S 24 S 25
[1,] 2.05 2.53 2.45 2.13 2.20 2.67 2.61
[2,] 2.76 2.43 2.41 2.20 2.42 2.51 2.73
[3,] 2.13 1.71 2.05 2.71 2.05 2.76 2.85
[4,] 2.43 2.43 2.76 2.45 2.45 2.66 2.45
[5,] 2.46 2.61 2.17 2.17 1.71 2.17 2.32
[6,] 2.71 2.85 2.85 2.43 2.71 2.20 2.75
```

```
> #Means and standard deviation for each sample
> 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
2.461667 2.343333 2.395000 2.491667 2.303333 2.658333 2.683333 2.536667 2.381667 2.390000 2.466667
    S 12     S 13     S 14     S 15     S 16     S 17     S 18     S 19     S 20     S 21     S 22
2.298333 2.413333 2.535000 2.485000 2.550000 2.438333 2.505000 2.423333 2.426667 2.448333 2.348333
    S 23     S 24     S 25
2.256667 2.495000 2.618333
>
> s.vars <- apply(samples,2,var)
> print(sqrt(s.vars))
       S 1        S 2        S 3        S 4        S 5        S 6        S 7        S 8        S 9
0.28237682 0.37071103 0.39525941 0.25396194 0.24606232 0.17656916 0.02250926 0.10481730 0.25031314
      S 10       S 11       S 12       S 13       S 14       S 15       S 16       S 17       S 18
0.21716353 0.14665151 0.14593377 0.22024229 0.30722956 0.13531445 0.29003448 0.20711510 0.29804362
      S 19       S 20       S 21       S 22       S 23       S 24       S 25
0.29063150 0.38396180 0.31498677 0.22328606 0.35052342 0.25335745 0.20044118
```

Question 3

```r
#Question 3
#The mean and standard deviation of the 25 sample means
samplemean <- mean(s.means)
samplemean

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

#Compare and state the difference between true mean and true standard deviation

print(popmn)
popsd
samplemean
samplesd
#From the above observation it is clear that population mean is different from sample mean.
#Also the population standard diviation is different from the sample standard deviation.

```

```
> #Question 3
> #The mean and standard deviation of the 25 sample means
> samplemean <- mean(s.means)
> samplemean
[1] 2.454133
>
> samplevar <- var(s.means)
> samplesd <- sqrt(samplevar)
> samplesd
[1] 0.1073461
>
> #Compare and state the difference between true mean and true standard deviation
>
> print(popmn)
[1] 2.468
> popsd
[1] 0.2561069
> samplemean
[1] 2.454133
> samplesd
[1] 0.1073461
> #From the above observation it is clear that population mean is different from sample mean.
> #Also the population standard diviation is different from the sample standard deviation.
>
```