IT24102357

Jayasinghe J.A.K.N

Lab sheet -08

1. Calculate population mean and variance of the dataset.

```
setwd("C:\\Users\\Kavindu\\Desktop\\IT24102357")
getwd()
```

```
data <- read.table("Data - Lab 8.txt", header = TRUE)
fix(data)
attach(data)
```

```
pop_mean <- mean(Nicotine)
popvar<-var(Nicotine)
```

```
> pop_mean <- mean(Nicotine)
> popvar<-var(Nicotine)
```

2. Get 30 random samples of size 5, with replacement and calculate sample mean and sample variance for each sample.

```
samples<-c()
n<-c()

for(i in 1:30){
  s<-sample(Nicotine,5 ,replace=TRUE)
  samples<-cbind(samples,s)
  n<-c(n,paste('s', i))
}
```

```
colnames(samples)=n

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

```
> n<-c()
> samples<-c()
> n<-c()
> for(i in 1:30){
+   s<-sample(Nicotine,5 ,replace=TRUE)
+   samples<-cbind(samples,s)
+   n<-c(n,paste('s', i))
+ }
> colnames(samples)=n
> s.means<-apply(samples,2,mean)
> s.vars<-apply(samples,2,var)
```

3. Calculate mean and variance of the Sample Means.

```
samplemean <- mean(s.means)
samplevar <- var(s.means)
```

```
> samplemean <- mean(s.means)
> samplevar <- var(s.means)
```

4. Compare and state relationship (if any) Population Mean and the Mean of Sample Means.

```
popmn
samplemean
```

```
> popmn
```

5. Compare and state relationship (if any) Population Variance and the Variance of Sample Means.

```
truevar = popvar / 5
samplevars
```

Exercise

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

```
weights<-read.table("Exercise - LaptopsWeights.txt",header = TRUE, sep = ",")

#Q01
weights<-weights$Weight.kg.

pop_mean <- mean(weights)

pop_sd <- sd(weights) * sqrt((length(weights)-1)/length(weights))

pop_mean
pop_sd
```

```
> weights<-read.table("Exercise - LaptopsWeights.txt",header = TRUE, sep = ",")
>
> #Q01
> weights<-weights$Weight.kg.
>
> pop_mean <- mean(weights)
>
> pop_sd <- sd(weights) * sqrt((length(weights)-1)/length(weights))
>
> pop_mean
[1] 2.468
> pop_sd
[1] 0.2528853
>
```

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

```r
#Q02
set.seed(123)

sample_means <- numeric(25)
sample_sds <- numeric(25)

for (i in 1:25) {
  samp_data <- sample(weights, size = 6, replace = TRUE)
  sample_means[i] <- mean(samp_data)
  sample_sds[i] <- sd(samp_data)
}

sample_means
sample_sds
```

```
> #Q02
> set.seed(123)
>
> sample_means <- numeric(25)
> sample_sds <- numeric(25)
>
> for (i in 1:25) {
+   samp_data <- sample(weights, size = 6, replace = TRUE)
+   sample_means[i] <- mean(samp_data)
+   sample_sds[i] <- sd(samp_data)
+ }
>
> 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
[12] 2.378333 2.381667 2.465000 2.485000 2.451667 2.385000 2.338333 2.428333 2.551667 2.538333 2.466667
[23] 2.470000 2.448333 2.475000
> sample_sds
 [1] 0.1513935 0.1191078 0.1718914 0.1345239 0.2749303 0.2544340 0.2167026 0.4530195 0.2230172 0.3237746
[11] 0.1706068 0.3235686 0.2993604 0.2314951 0.1745566 0.2762909 0.2042303 0.2436733 0.2481465 0.2654367
[21] 0.1708118 0.2451666 0.2405826 0.2792430 0.2358601
```

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.

```r
#Q03
mean_of_means <- mean(sample_means)

sd_of_means <- sd(sample_means)

mean_of_means
sd_of_means
```

```
> #Q03
> mean_of_means <- mean(sample_means)
>
> sd_of_means <- sd(sample_means)
>
> mean_of_means
[1] 2.4668
> sd_of_means
[1] 0.07624874
>
```