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PS Lab Sheet 08

Exercise

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

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


## Question 01
popmn <- mean(Weight)
popvar <- var(Weight) * (length(Weight)-1)/length(Weight)
popSD <- sqrt(popvar)

popmn
popvar
popSD
```

```
>
> ## Question 01
> popmn <- mean(Weight)
> popvar <- var(Weight) * (length(Weight)-1)/length(Weight)
> popSD <- sqrt(popvar)
>
> popmn
[1] 2.468
> popvar
[1] 0.063951
> popSD
[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
## Question 02
samples <- c()
n <- c()
for (i in 1:25){
  s <- sample(Weight, 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.SD
```

```
> ## Question 02
> samples <- c()
> n <- c()
> for (i in 1:25){
+   s <- sample(Weight, 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      S 9     S 10     S 11     S 12
2.485000 2.390000 2.466667 2.523333 2.653333 2.413333 2.546667 2.483333 2.506667 2.533333 2.541667 2.471667
    S 13     S 14     S 15     S 16     S 17     S 18     S 19     S 20     S 21     S 22     S 23     S 24
2.656667 2.393333 2.533333 2.298333 2.550000 2.548333 2.566667 2.391667 2.541667 2.380000 2.396667 2.468333
    S 25
2.395000
> s.SD
       S 1        S 2        S 3        S 4        S 5        S 6        S 7        S 8        S 9       S 10
0.25618353 0.21484878 0.18359375 0.22888134 0.15187714 0.17258814 0.16741167 0.20636537 0.21172309 0.20490648
      S 11       S 12       S 13       S 14       S 15       S 16       S 17       S 18       S 19       S 20
0.24943269 0.43406989 0.15121728 0.29857439 0.25889509 0.37037369 0.15899686 0.08109665 0.15526322 0.39458417
      S 21       S 22       S 23       S 24       S 25
0.27614610 0.26168684 0.22482586 0.31789411 0.34616470
```

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
sd_smeans
```

```
> ## Question 03
> mean_smeans <- mean(s.means)
> sd_smeans   <- sd(s.means)
>
> mean_smeans
[1] 2.4854
> sd_smeans
[1] 0.08741303
```