Lab Sheet 08

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

```
> # The population mean and population standard deviation of the laptop bag
weights.
> pop_mean <- mean(weight.kg.)
> pop_sd <- sd(weight.kg.)
> pop_mean
[1] 2.468
> pop_sd
[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.

```
> # The sample mean and sample standard deviation of 25 random samples of s
ize 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
>
> s.means <- apply(samples, 2, mean)
> s.sds <- apply(samples, 2, sd)
>
```

```
> s.means
     S 1      S 2      S 3      S 4      S 5      S 6      S 7      S 8
2.538333 2.368333 2.391667 2.606667 2.350000 2.573333 2.556667 2.470000
     S 9     S 10     S 11     S 12     S 13     S 14     S 15     S 16
2.616667 2.575000 2.258333 2.578333 2.435000 2.320000 2.305000 2.445000
    S 17     S 18     S 19     S 20     S 21     S 22     S 23     S 24
2.533333 2.533333 2.458333 2.606667 2.566667 2.328333 2.423333 2.445000
    S 25
2.576667
> s.sds
       S 1        S 2        S 3        S 4        S 5        S 6
0.21885307 0.13644291 0.22736901 0.10230673 0.23426481 0.10385888
       S 7        S 8        S 9       S 10       S 11       S 12
0.12754084 0.20668817 0.15870308 0.29426179 0.35924458 0.27418364
      S 13       S 14       S 15       S 16       S 17       S 18
0.19511535 0.35933271 0.33530583 0.25750728 0.23947164 0.22312926
      S 19       S 20       S 21       S 22       S 23       S 24
0.20400163 0.13721030 0.07554248 0.28519584 0.29391609 0.27038861
      S 25
0.15200877
```

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.

```
> # The mean and standard deviation of the 25 sample means
> samplemean <- mean(s.means)
> samplesd <- sd(s.means)
>
> samplemean
[1] 2.4744
> samplesd
[1] 0.1085904
> # The relationship of mean of sample means with true mean
> pop_mean
[1] 2.468
> samplemean
[1] 2.4744
>
>
> # The relationship of standard deviation of sample means with true standa
rd deviation
> pop_sd/sqrt(6)
[1] 0.1045552
> samplesd
[1] 0.1085904
```

The mean of sample means and standard deviation of sample means values are very close to the true mean and true standard deviation values.