Lab 08

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1)

```
> # Q1
> # Laptop bag weights
> weight <- c(2.46, 2.45, 2.47, 2.71, 2.46, 2.05, 2.6, 2.42, 2.43, 2.53,
+             2.57, 2.85, 2.7, 2.53, 2.28, 2.2, 2.57, 2.89, 2.51, 2.47,
+             2.66, 2.06, 2.41, 2.65, 2.76, 2.43, 2.61, 2.57, 2.73, 2.17,
+             2.67, 2.05, 1.71, 2.32, 2.23, 2.76, 2.7, 2.13, 2.75, 2.2)
>
> # Population mean and standard deviation
> pop_mean <- mean(weight)
> pop_sd <- sd(weight)
>
> pop_mean
[1] 2.468
> pop_sd
[1] 0.2561069
```

2)

```
> #Q2
> set.seed(123)  # For reproducibility
>
> # Create a matrix with 6 rows (sample size), 25 columns (samples)
> samples <- matrix(nrow = 6, ncol = 25)
>
> # Fill matrix with random samples
> for (i in 1:25) {
+   samples[, i] <- sample(weight, 6, replace = TRUE)
+ }
>
> # Sample means and standard deviations
> sample_means <- apply(samples, 2, mean)
> sample_sds <- apply(samples, 2, sd)
>
> # Create a table of results
> sample_stats <- data.frame(
+   Sample = 1:25,
+   Mean = round(sample_means, 4),
+   SD = round(sample_sds, 4)
+ )
>
```

```
> print(sample_stats)
   Sample   Mean     SD
1       1 2.5300 0.1514
2       2 2.5733 0.1191
3       3 2.4733 0.1719
4       4 2.5917 0.1345
5       5 2.4567 0.2749
6       6 2.4017 0.2544
7       7 2.5900 0.2167
8       8 2.4667 0.4530
9       9 2.4017 0.2230
10     10 2.3350 0.3238
11     11 2.5867 0.1706
12     12 2.3783 0.3236
13     13 2.3817 0.2994
14     14 2.4650 0.2315
15     15 2.4850 0.1746
16     16 2.4517 0.2763
17     17 2.3850 0.2042
18     18 2.3383 0.2437
19     19 2.4283 0.2481
20     20 2.5517 0.2654
21     21 2.5383 0.1708
22     22 2.4667 0.2452
23     23 2.4700 0.2406
24     24 2.4483 0.2792
25     25 2.4750 0.2359
```

3)

```
> #Q3
>
> # From previous steps
> sample_mean_of_means <- mean(sample_means)
> sample_sd_of_means <- sd(sample_means)
>
> # Population SD from Q1 was:
> # pop_sd = 0.2169 (already calculated)
>
> # Sample size
> n <- 6
>
> # Theoretical SD of sample means
> theoretical_sd_of_means <- pop_sd / sqrt(n)
>
> # Print all
> sample_mean_of_means
[1] 2.4668
> sample_sd_of_means
[1] 0.07624874
> theoretical_sd_of_means
[1] 0.1045552
```