IT24100227

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Lab-08

01.

```
setwd("C:\\Users\\BINARA\\Desktop\\PS_Lab_08")

weights <- 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)

#01
pop_mean <- mean(weights)
pop_sd <- sd(weights) * sqrt((length(weights)-1)/length(weights))

pop_mean
pop_sd

#02

set.seed(123)
```

```
> setwd("C:\\Users\\BINARA\\Desktop\\PS_Lab_08")
> weights <- 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)
> #01
> pop_mean <- mean(weights)
> pop_sd <- sd(weights) * sqrt((length(weights)-1)/length(weights))
>
> pop_mean
[1] 2.468
> pop_sd
[1] 0.2528853
```

02.

```
#02

set.seed(123)
sample_means <- numeric(25)
sample_sds <- numeric(25)

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

sample_means
sample_sds

#03
```

```
> #02
>
> set.seed(123)
> sample_means <- numeric(25)
> sample_sds <- numeric(25)
>
> for(i in 1:25) {
+   sample_data <- sample(weights, 6, replace = TRUE)
+   sample_means[i] <- mean(sample_data)
+   sample_sds[i] <- sd(sample_data)
+ }
>
> sample_means
 [1] 2.530000 2.573333 2.473333 2.591667 2.456667 2.401667 2.590000 2.466667 2.401667 2.335000
[11] 2.586667 2.378333 2.381667 2.465000 2.485000 2.451667 2.385000 2.338333 2.428333 2.551667
[21] 2.538333 2.466667 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
[10] 0.3237746 0.1706068 0.3235686 0.2993604 0.2314951 0.1745566 0.2762909 0.2042303 0.2436733
[19] 0.2481465 0.2654367 0.1708118 0.2451666 0.2405826 0.2792430 0.2358601
>
```

03.

```r

mean_of_sample_means <- mean(sample_means)
sd_of_sample_means <- sd(sample_means)

mean_of_sample_means
sd_of_sample_means

# Relationships:

theoretical_sd <- pop_sd / sqrt(6)

cat("Population mean:", pop_mean, "\n")
cat("Mean of sample means:", mean_of_sample_means, "\n")
cat("Population standard deviation:", pop_sd, "\n")
cat("Standard deviation of sample means:", sd_of_sample_means, "\n")
cat("Theoretical standard error:", theoretical_sd, "\n")

```

46:57 (Top Level)

Console | Terminal | Background Jobs

R 4.5.1 · C:/Users/BINARA/Desktop/PS_Lab_08/

```
> sd_of_sample_means <- sd(sample_means)
>
> mean_of_sample_means
[1] 2.4668
> sd_of_sample_means
[1] 0.07624874
>
> # Relationships:
>
> theoretical_sd <- pop_sd / sqrt(6)
>
> cat("Population mean:", pop_mean, "\n")
Population mean: 2.468
> cat("Mean of sample means:", mean_of_sample_means, "\n")
Mean of sample means: 2.4668
> cat("Population standard deviation:", pop_sd, "\n")
Population standard deviation: 0.2528853
> cat("Standard deviation of sample means:", sd_of_sample_means, "\n")
Standard deviation of sample means: 0.07624874
> cat("Theoretical standard error:", theoretical_sd, "\n")
Theoretical standard error: 0.10324
```