IT24101577

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Lab 8

1)

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> setwd("/Users/dede/Desktop/Lab8")
> getwd()
[1] "/Users/dede"
> weights <- read.table("Exercise - LaptopsWeights.txt", header = TRUE)
$Weight
> # Calculate population mean and population standard deviation
> pop_mean <- mean(weights)
> n <- length(weights)
> pop_sd <- sqrt(sum((weights - pop_mean)^2) / n)
> cat("1. Population mean:", pop_mean, "\n")
1. Population mean: 2.468
> cat("   Population standard deviation:", pop_sd, "\n\n")
   Population standard deviation: 0.2528853
```

2)

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> # 2. Draw 25 random samples of size 6 (with replacement) and calculate
sample mean and sd
> set.seed(123)  # For reproducibility
> sample_means <- numeric(25)
> sample_sds <- numeric(25)
> for(i in 1:25) {
+   samp <- sample(weights, 6, replace = TRUE)
+   sample_means[i] <- mean(samp)
+   sample_sds[i] <- sd(samp)
+ }
> cat("2. Sample means and standard deviations:\n")
2. Sample means and standard deviations:
> for(i in 1:25) {
+   cat("   Sample", i, ": mean =", sample_means[i], ", sd =", sample_sd
s[i], "\n")
```

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+ }
   Sample 1 : mean = 2.53 , sd = 0.1513935
   Sample 2 : mean = 2.573333 , sd = 0.1191078
   Sample 3 : mean = 2.473333 , sd = 0.1718914
   Sample 4 : mean = 2.591667 , sd = 0.1345239
   Sample 5 : mean = 2.456667 , sd = 0.2749303
   Sample 6 : mean = 2.401667 , sd = 0.254434
   Sample 7 : mean = 2.59 , sd = 0.2167026
   Sample 8 : mean = 2.466667 , sd = 0.4530195
   Sample 9 : mean = 2.401667 , sd = 0.2230172
   Sample 10 : mean = 2.335 , sd = 0.3237746
   Sample 11 : mean = 2.586667 , sd = 0.1706068
   Sample 12 : mean = 2.378333 , sd = 0.3235686
   Sample 13 : mean = 2.381667 , sd = 0.2993604
   Sample 14 : mean = 2.465 , sd = 0.2314951
   Sample 15 : mean = 2.485 , sd = 0.1745566
   Sample 16 : mean = 2.451667 , sd = 0.2762909
   Sample 17 : mean = 2.385 , sd = 0.2042303
   Sample 18 : mean = 2.338333 , sd = 0.2436733
   Sample 19 : mean = 2.428333 , sd = 0.2481465
   Sample 20 : mean = 2.551667 , sd = 0.2654367
   Sample 21 : mean = 2.538333 , sd = 0.1708118
```

3)

```
> # 3. Calculate mean and sd of the 25 sample means
> mean_sample_means <- mean(sample_means)
> sd_sample_means <- sd(sample_means)
> cat("3. Mean of sample means:", mean_sample_means, "\n")
3. Mean of sample means: 2.4668
> cat("   Standard deviation of sample means:", sd_sample_means, "\n\n")
   Standard deviation of sample means: 0.07624874
```

```
> # State the relationship
> cat("   Relationship:\n")
   Relationship:
> cat("   - The mean of the sample means (", mean_sample_means, ") is approximately equal to the population mean (", pop_mean, ").\n")
   - The mean of the sample means ( 2.4668 ) is approximately equal to the population mean ( 2.468 ).
> expected_se <- pop_sd / sqrt(6)
> cat("   - The standard deviation of the sample means (", sd_sample_means, ") is approximately equal to the population standard deviation divided by sqrt(sample size) (", pop_sd, " / sqrt(6) ≈ ", expected_se, ").\n")
   - The standard deviation of the sample means ( 0.07624874 ) is approximately equal to the population standard deviation divided by sqrt(sample size) ( 0.2528853  / sqrt(6) ≈  0.10324 ).
>
```