

IT2120

## Probability and Statistics

### Lab Sheet 08

IT24103221

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#### Exercise

```
> # Set working directory
> setwd("C:\\Users\\De11\\OneDrive - Sri Lanka Institute of Information Technology\\Desktop\\IT24103221-Lab 08")
> # Read dataset
> data <- read.table("Exercise - LaptopsWeights.txt", header = TRUE)
>
> weights <- data$Weight.kg.

> # 1. Population mean and variance
> pop_mean <- mean(weights)
> pop_var <- var(weights)
>
> print(paste("Population Mean =", round(pop_mean, 3)))
[1] "Population Mean = 2.468"
> print(paste("Population Variance =", round(pop_var, 3)))
[1] "Population Variance = 0.066"

> # 2. 30 random samples of size 5 (with replacement)
> num_samples <- 30
> sample_size <- 5
>
> sample_means <- numeric(num_samples)
> sample_vars <- numeric(num_samples)
>
> set.seed(123)
>
> for(i in 1:num_samples){
+   samp <- sample(weights, size = sample_size, replace = TRUE)
+   sample_means[i] <- mean(samp)
+   sample_vars[i] <- var(samp)
+ }
>
> results <- data.frame(
+   Sample = 1:num_samples,
+   Mean = round(sample_means, 3),
+   Variance = round(sample_vars, 3)
+ )
```

```
> print(results)
```

	Sample	Mean	Variance
1	1	2.530	0.029
2	2	2.558	0.018
3	3	2.514	0.037
4	4	2.478	0.006
5	5	2.692	0.019
6	6	2.378	0.048
7	7	2.456	0.059
8	8	2.480	0.072
9	9	2.514	0.236
10	10	2.488	0.072
11	11	2.304	0.061
12	12	2.392	0.107
13	13	2.552	0.027
14	14	2.478	0.149
15	15	2.372	0.080
16	16	2.466	0.065
17	17	2.362	0.044
18	18	2.526	0.025
19	19	2.496	0.081
20	20	2.306	0.039
21	21	2.486	0.032
22	22	2.364	0.068
23	23	2.282	0.070
24	24	2.652	0.013
25	25	2.506	0.029
26	26	2.626	0.017
27	27	2.300	0.066
28	28	2.472	0.029
29	29	2.518	0.080
30	30	2.456	0.067

```
> # 3. Mean and variance of sample means
```

```
> mean_of_means <- mean(sample_means)
```

```
> var_of_means <- var(sample_means)
```

```
>
```

```
> print(paste("Mean of the Sample Means =", round(mean_of_means, 3)))
```

```
[1] "Mean of the Sample Means = 2.467"
```

```
> print(paste("Variance of Sample Means =", round(var_of_means, 3)))
```

```
[1] "Variance of Sample Means = 0.01"
```