```r
setwd("C:\\Users\\it24101035\\Documents\\IT24101035")
getwd()

nicotine <- scan("Data - Lab 8.txt", what = numeric(), skip = 1)
weights <- scan("Exercise - LaptopsWeights.txt", what = numeric(), skip = 1)

pop_mean_nic <- mean(nicotine)
pop_var_nic <- sum((nicotine - pop_mean_nic)^2) / length(nicotine)
pop_sd_nic <- sqrt(pop_var_nic)

pop_mean_nic
pop_var_nic
pop_sd_nic
var(nicotine)
sd(nicotine)

set.seed(123)
nic_sample_means <- replicate(30, mean(sample(nicotine, size = 5, replace = TRUE)))
nic_sample_sds <- replicate(30, sd(sample(nicotine, size = 5, replace = TRUE)))
```

```
> setwd("C:\\Users\\it24101035\\Documents\\IT24101035")
> getwd()
[1] "C:/Users/it24101035/Documents/IT24101035"
> nicotine <- scan("Data - Lab 8.txt", what = numeric(), skip = 1)
Read 40 items
> weights <- scan("Exercise - LaptopsWeights.txt", what = numeric(), skip = 1)
Read 40 items
> pop_mean_nic <- mean(nicotine)
> pop_var_nic <- sum((nicotine - pop_mean_nic)^2) / length(nicotine)
> pop_sd_nic <- sqrt(pop_var_nic)
> pop_mean_nic
[1] 1.77425
> pop_var_nic
[1] 0.1486444
> pop_sd_nic
[1] 0.3855443
> var(nicotine)
[1] 0.1524558
> sd(nicotine)
[1] 0.3904559
> set.seed(123)
> nic_sample_means <- replicate(30, mean(sample(nicotine, size = 5, replace = TRUE)))
> nic_sample_sds <- replicate(30, sd(sample(nicotine, size = 5, replace = TRUE)))
```

```r
set.seed(123)
nic_sample_means <- replicate(30, mean(sample(nicotine, size = 5, replace = TRUE)))
nic_sample_sds <- replicate(30, sd(sample(nicotine, size = 5, replace = TRUE)))

nic_sample_means
mean(nic_sample_means)
sd(nic_sample_means)

pop_sd_nic / sqrt(5)

pop_mean_w <- mean(weights)
pop_var_w <- sum((weights - pop_mean_w)^2) / length(weights)
pop_sd_w <- sqrt(pop_var_w)

pop_mean_w
pop_var_w
pop_sd_w
var(weights)
sd(weights)
```

```
> set.seed(123)
> nic_sample_means <- replicate(30, mean(sample(nicotine, size = 5, replace = TRUE)))
> nic_sample_sds <- replicate(30, sd(sample(nicotine, size = 5, replace = TRUE)))
> nic_sample_means
 [1] 1.886 1.782 2.034 1.518 2.046 1.688 1.772 1.638 1.716
[10] 1.850 1.598 1.848 1.604 1.800 1.916 2.116 1.606 1.594
[19] 1.884 2.124 1.590 1.562 1.836 1.744 1.494 1.542 1.854
[28] 1.914 1.834 1.538
> mean(nic_sample_means)
[1] 1.764267
> sd(nic_sample_means)
[1] 0.1811235
> pop_sd_nic / sqrt(5)
[1] 0.1724207
> pop_mean_w <- mean(weights)
> pop_var_w <- sum((weights - pop_mean_w)^2) / length(weights)
> pop_sd_w <- sqrt(pop_var_w)
> pop_mean_w
[1] 2.468
> pop_var_w
[1] 0.063951
> pop_sd_w
[1] 0.2528853
> var(weights)
[1] 0.06559077
> sd(weights)
[1] 0.2561069
>
```

```r
set.seed(123)
w_sample_means <- replicate(25, mean(sample(weights, size = 6, replace = TRUE)))
w_sample_sds <- replicate(25, sd(sample(weights, size = 6, replace = TRUE)))

w_sample_means
mean(w_sample_means)
sd(w_sample_means)

pop_sd_w / sqrt(6)

write.csv(data.frame(nicotine = nicotine), "nicotine_data.csv", row.names = FALSE)
write.csv(data.frame(weights = weights), "weights_data.csv", row.names = FALSE)
```

```
> set.seed(123)
> w_sample_means <- replicate(25, mean(sample(weights, size = 6, replace = TRUE)))
> w_sample_sds <- replicate(25, sd(sample(weights, size = 6, replace = TRUE)))
> w_sample_means
 [1] 2.530000 2.573333 2.473333 2.591667 2.456667 2.401667
 [7] 2.590000 2.466667 2.401667 2.335000 2.586667 2.378333
[13] 2.381667 2.465000 2.485000 2.451667 2.385000 2.338333
[19] 2.428333 2.551667 2.538333 2.466667 2.470000 2.448333
[25] 2.475000
> mean(w_sample_means)
[1] 2.4668
> sd(w_sample_means)
[1] 0.07624874
> pop_sd_w / sqrt(6)
[1] 0.10324
> write.csv(data.frame(nicotine = nicotine), "nicotine_data.csv", row.names = FALSE)
> write.csv(data.frame(weights = weights), "weights_data.csv", row.names = FALSE)
>
>
```

Values

nic_sample_means	num [1:30] 1.89 1.78 2.03 1.52 2.05 ...
nic_sample_sds	num [1:30] 0.371 0.346 0.236 0.549 0.608 ...
nicotine	num [1:40] 1.09 1.74 1.58 2.11 1.64 1.79 1.37 1.75 1.92 1.47 ...
pop_mean_nic	1.77425
pop_mean_w	2.468
pop_sd_nic	0.385544339214052
pop_sd_w	0.252885349516337
pop_var_nic	0.1486444375
pop_var_w	0.063951
w_sample_means	num [1:25] 2.53 2.57 2.47 2.59 2.46 ...
w_sample_sds	num [1:25] 0.249 0.36 0.154 0.372 0.153 ...
weights	num [1:40] 2.46 2.45 2.47 2.71 2.46 2.05 2.6 2.42 2.43 2.53 ...

```
> popmn <- mean(data$Weight.kg)
> popsd <- sd(data$Weight.kg)
> print(popmn)
[1] 2.468
> print(popsd)
[1] 0.2561069
```

	Sample	Mean	SD
1	1	2.476667	0.1471960
2	2	2.360000	0.2271563
3	3	2.411667	0.2326729
4	4	2.296667	0.2013620
5	5	2.360000	0.3574353
6	6	2.520000	0.2287357
7	7	2.350000	0.3996498
8	8	2.450000	0.1778764
9	9	2.570000	0.1915202
10	10	2.488333	0.2753483
11	11	2.396667	0.1787363
12	12	2.540000	0.1848242
13	13	2.405000	0.2494594
14	14	2.408333	0.1451092
15	15	2.425000	0.3095642
16	16	2.431667	0.1669032
17	17	2.385000	0.2284513
18	18	2.545000	0.2342435
19	19	2.456667	0.2958153
20	20	2.536667	0.1094836
21	21	2.548333	0.1330288
22	22	2.523333	0.1258041
23	23	2.608333	0.3483341
24	24	2.436667	0.1903330
25	25	2.556667	0.1134313

```
> print(paste("Mean of Sample Means:", mean_of_sample_means))
[1] "Mean of Sample Means: 2.4748"
> print(paste("Standard Deviation of Sample Means:", sd_of_sample_means))
[1] "Standard Deviation of Sample Means: 0.103361689657672"
```

Data	
data	40 obs. of 1 variable
sample_table	25 obs. of 3 variables
values	
i	25L
mean_of_sample_means	2.46046666666667
popmn	2.468
popsd	0.256106948813907
s_means	num [1:25] 2.6 2.56 2.43 2.48 2.45 ...
s_sds	num [1:25] 0.2 0.163 0.276 0.247 0.208 ...
samp	num [1:6] 2.6 2.73 2.06 2.57 2.2 2.57
sd_of_sample_means	0.118064561747972