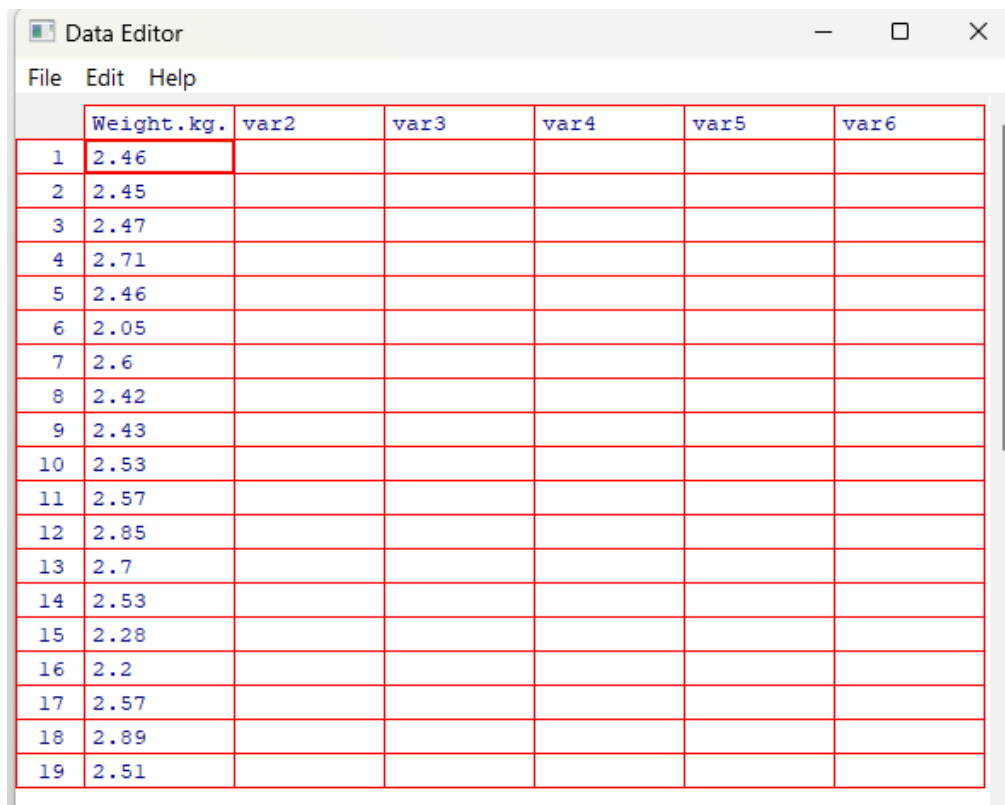**EXERCISE:**

```
setwd('C:\\Users\\vinod\\Desktop\\LABS\\PS\\Lab 8\\IT24104383')
getwd()

> setwd('C:\\Users\\vinod\\Desktop\\LABS\\PS\\Lab 8\\IT24104383')
> getwd()
[1] "C:/Users/vinod/Desktop/LABS/PS/Lab 8/IT24104383"
```

1)

```
#Q1)
#Load the data set
data<-read.table('Exercise - LaptopsWeights.txt', header=TRUE)
fix(data)
```

Data Editor — □ ×

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	Weight.kg.	var2	var3	var4	var5	var6
1	2.46					
2	2.45					
3	2.47					
4	2.71					
5	2.46					
6	2.05					
7	2.6					
8	2.42					
9	2.43					
10	2.53					
11	2.57					
12	2.85					
13	2.7					
14	2.53					
15	2.28					
16	2.2					
17	2.57					
18	2.89					
19	2.51					

```r
# Check the column name
names(data)

#Rename the column name to avoid parentheses
names(data) <- "Weight"
attach(data)
# Check the column name
#Rename the column name to avoid parentheses
attach(data)
```

2)

```r
#Q2)
samples<- c()
n<-c()
for (i in 1:25){
  s<-sample(Weight, 6, replace = TRUE)
  samples<-cbind(samples, s)
  n<-c(n,paste('s',i))
}

#Q2)
n<-c()
for (i in 1:25){
  s<-sample(Weight, 6, replace = TRUE)
  samples<-cbind(samples, s)
  n<-c(n,paste('s',i))

s.mean<-apply(samples,2,mean)
s.sd<-apply(samples,2,sd)

s.mean<-apply(samples,2,mean)
s.sd<-apply(samples,2,sd)
```

3)

```r
#Q3)
#mean and standard deviation of the 25 sample means
samplemean<-mean(s.mean)
samplesd<-sd(s.sd)
#Q3)
samplemean<-mean(s.mean)
samplesd<-sd(s.sd)
```

```r
#population mean & sample mean
popmn
samplemean


#population sd & sample sd
popsd
samplesd

popsd
samplesd


# Theoretical standard error (what we expect)
theoretical_se <- popsd / sqrt(6)

cat("Theoretical Standard Error (pop_sd / sqrt(6)):", theoretical_se, "\n\n")


theoretical_se <- popsd / sqrt(6)
cat("Theoretical Standard Error (pop_sd / sqrt(6)):", theoretical_se, "\n\n")

# Compare and state relationships
cat("Relationship 1: Mean of Sample Means vs Population Mean\n")
cat("  Mean of Sample Means =", samplemean, "\n")
cat("  Population Mean =", popmn, "\n")
cat("  They are approximately equal (unbiased estimator)\n\n")




cat("Relationship 2: SD of Sample Means vs Population SD\n")
cat("  SD of Sample Means =", samplesd, "\n")
cat("  Theoretical Standard Error =", popsd, "\n")
cat("  They are approximately equal (Central Limit Theorem)\n")


cat("Relationship 2: SD of Sample Means vs Population SD\n")
cat("  SD of Sample Means =", samplesd, "\n")
cat("  Theoretical Standard Error =", popsd, "\n")
cat("  They are approximately equal (Central Limit Theorem)\n")
```