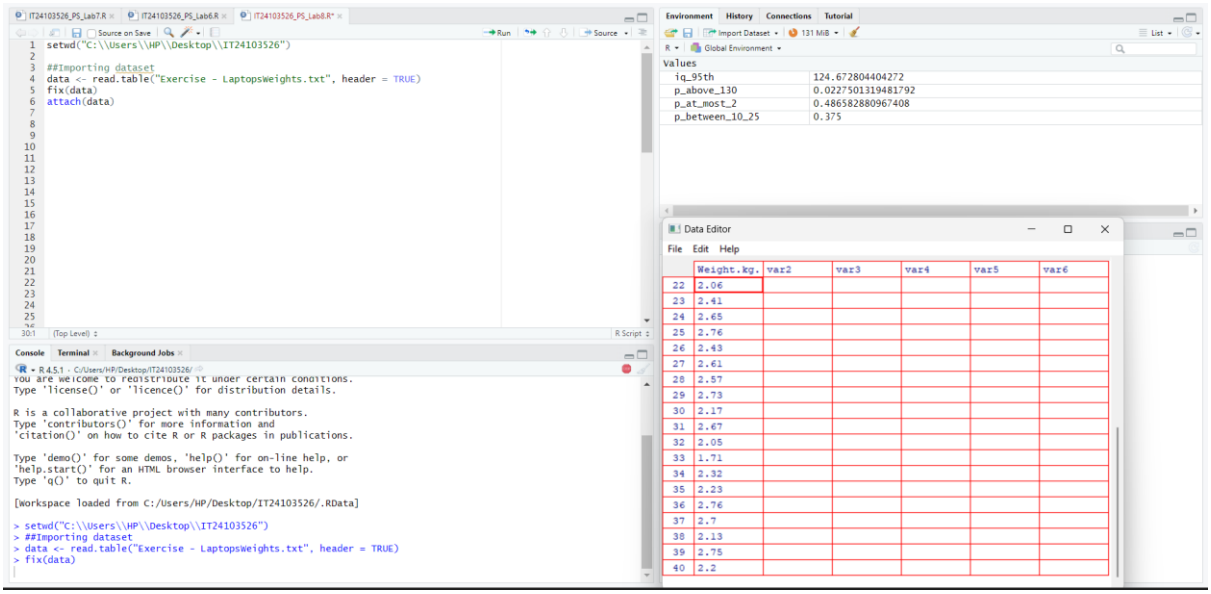
IT2120 - Probability and Statistics

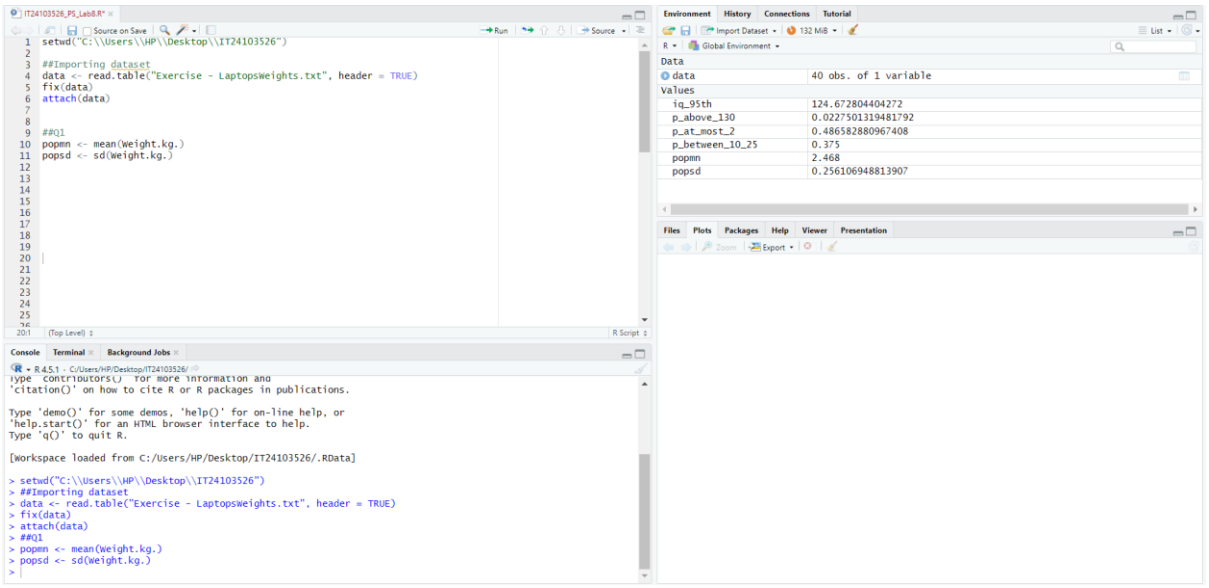
Lab Sheet 08

IT24103526 - Senaratne P.A.R.T.

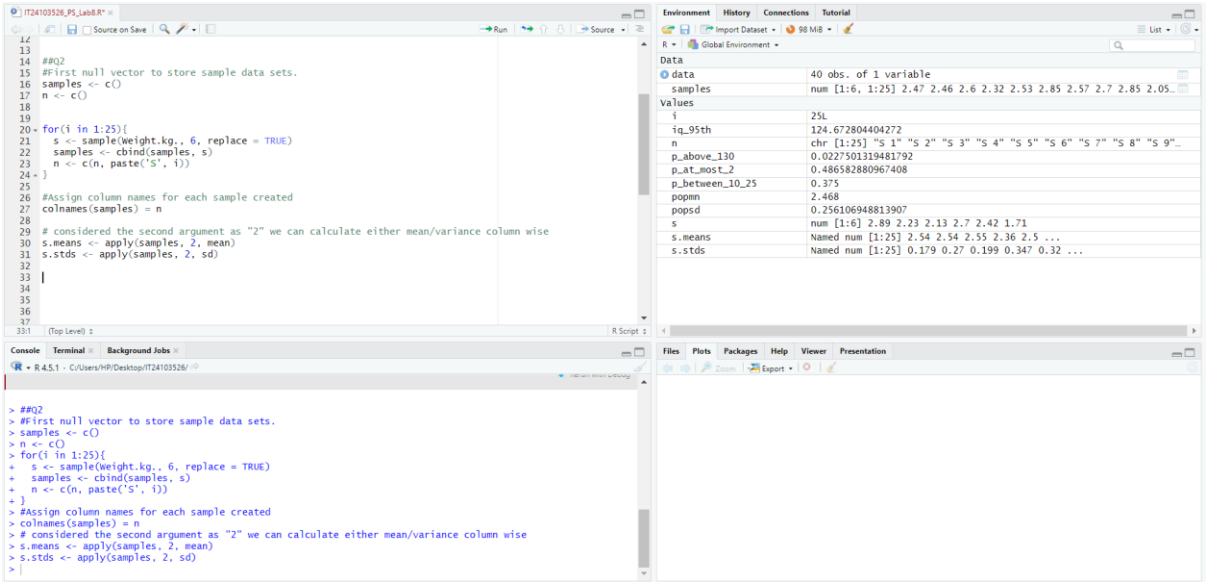
Exercise

1. Calculate the population mean and population standard deviation of the laptop bag weights.





2. Draw 25 random samples of size 6 (with replacement) and calculate the sample mean and sample standard deviation for each sample.

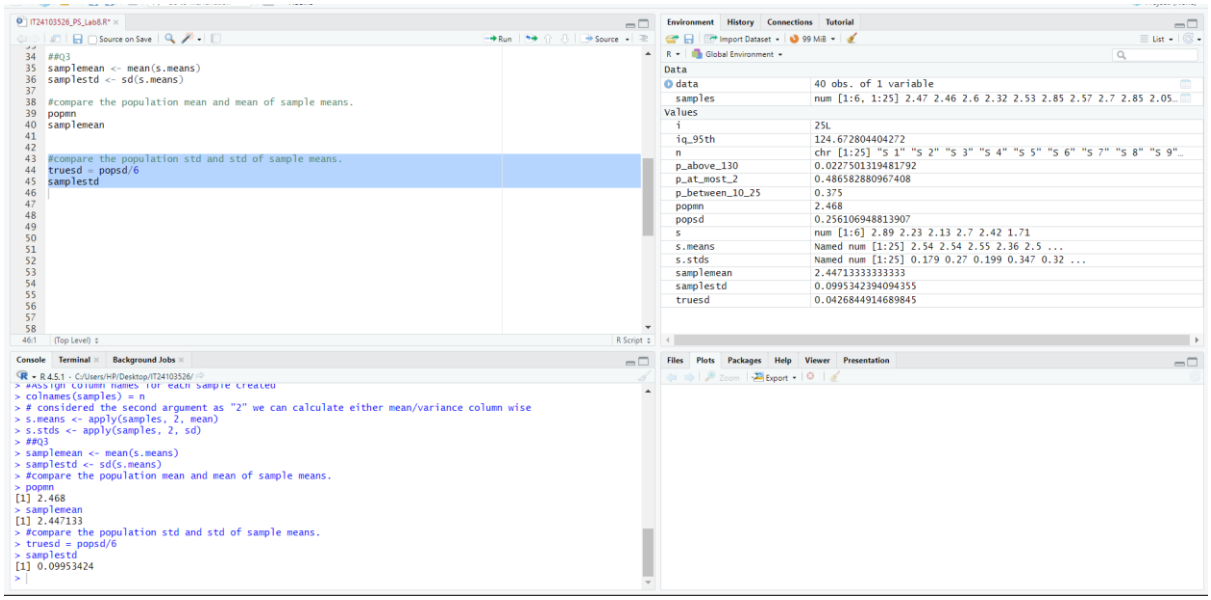


```
##Q2
#First null vector to store sample data sets.
samples <- c()
n <- c()

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

#Assign column names for each sample created
colnames(samples) = n

# considered the second argument as "2" we can calculate either mean/variance column wise
s.means <- apply(samples, 2, mean)
s.stds <- apply(samples, 2, sd)
```

```
> ##Q2
> #First null vector to store sample data sets.
> samples <- c()
> n <- c()
> for(i in 1:25){
+   s <- sample(Weight.kg., 6, replace = TRUE)
+   samples <- cbind(samples, s)
+   n <- c(n, paste('S', i))
+ }
> #Assign column names for each sample created
> colnames(samples) = n
> # considered the second argument as "2" we can calculate either mean/variance column wise
> s.means <- apply(samples, 2, mean)
> s.stds <- apply(samples, 2, sd)
```

Data	
data	40 obs. of 1 variable
samples	num [1:6, 1:25] 2.47 2.46 2.6 2.32 2.53 2.85 2.57 2.7 2.85 2.05…
Values	
i	25L
iq_95th	124.672804404272
n	chr [1:25] "S 1" "S 2" "S 3" "S 4" "S 5" "S 6" "S 7" "S 8" "S 9"…
p_above_130	0.0227501319481792
p_at_most_2	0.486582880967408
p_between_10_25	0.375
popmn	2.468
popsd	0.256106948813907
s	num [1:6] 2.89 2.23 2.13 2.7 2.42 1.71
s.means	Named num [1:25] 2.54 2.54 2.55 2.36 2.5 ...
s.stds	Named num [1:25] 0.179 0.27 0.199 0.347 0.32 ...

3. Calculate the mean and standard deviation of the 25 sample means and state the relationship of them with true mean and true standard deviation.



```
##Q3
samplemean <- mean(s.means)
samplestd <- sd(s.means)

#compare the population mean and mean of sample means.
popmn
samplemean


#compare the population std and std of sample means.
truesd = popsd/6
samplestd
```

```
> #Assign column names for each sample created
> colnames(samples) = n
> # considered the second argument as "2" we can calculate either mean/variance column wise
> s.means <- apply(samples, 2, mean)
> s.stds <- apply(samples, 2, sd)
> ##Q3
> samplemean <- mean(s.means)
> samplestd <- sd(s.means)
> #compare the population mean and mean of sample means.
> popmn
[1] 2.468
> samplemean
[1] 2.447133
> #compare the population std and std of sample means.
> truesd = popsd/6
> samplestd
[1] 0.09953424
```

Data	
data	40 obs. of 1 variable
samples	num [1:6, 1:25] 2.47 2.46 2.6 2.32 2.53 2.85 2.57 2.7 2.85 2.05…
Values	
i	25L
iq_95th	124.672804404272
n	chr [1:25] "S 1" "S 2" "S 3" "S 4" "S 5" "S 6" "S 7" "S 8" "S 9"…
p_above_130	0.0227501319481792
p_at_most_2	0.486582880967408
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popmn	2.468
popsd	0.256106948813907
s	num [1:6] 2.89 2.23 2.13 2.7 2.42 1.71
s.means	Named num [1:25] 2.54 2.54 2.55 2.36 2.5 ...
s.stds	Named num [1:25] 0.179 0.27 0.199 0.347 0.32 ...
samplemean	2.44713333333333
samplestd	0.0995342394094355
truesd	0.0426844914689845