Sri Lanka Institute of Information Technology

Lab Submission 08

IT24103021

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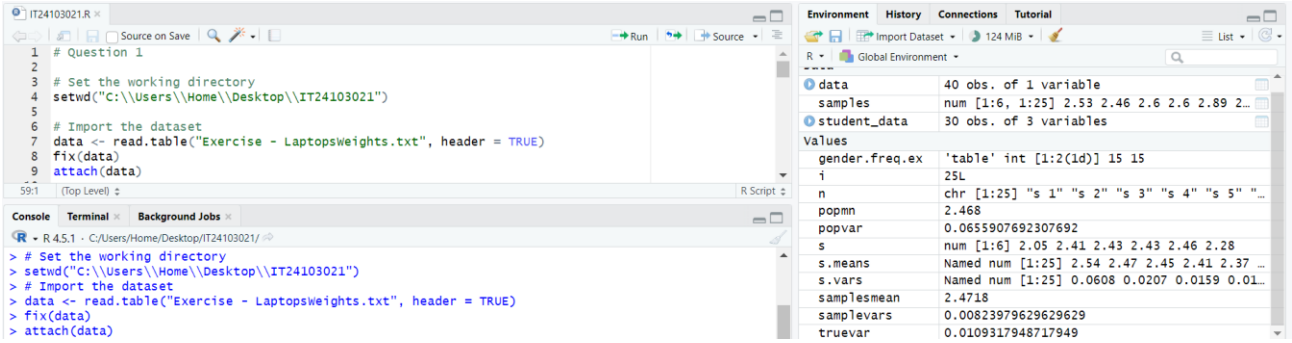
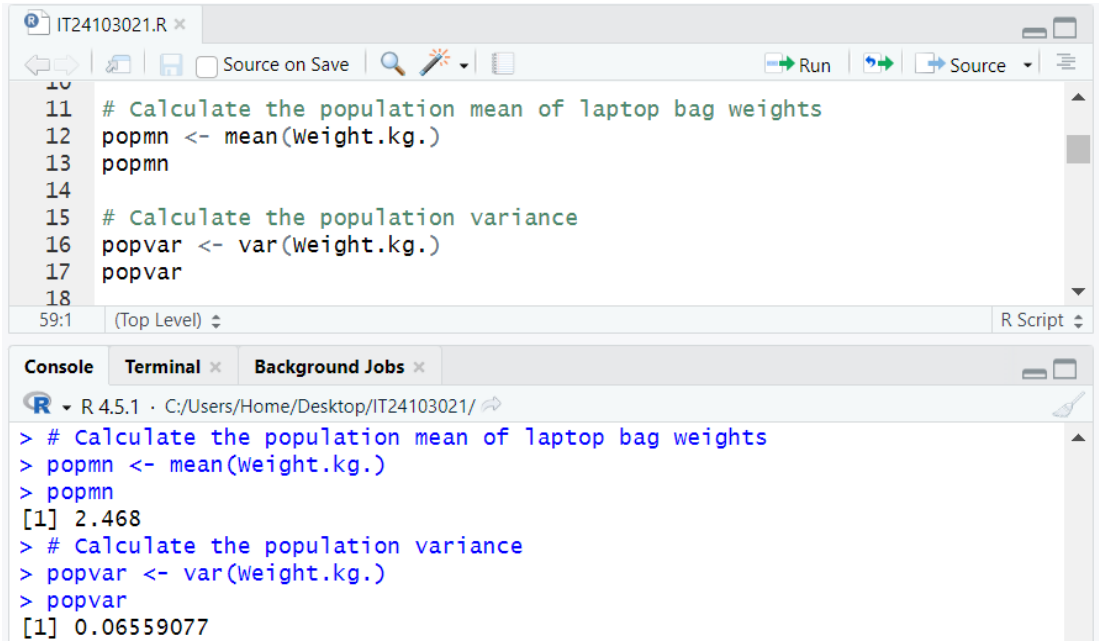
Probability and Statistics - IT2120

B.Sc. (Hons) in Information Technology

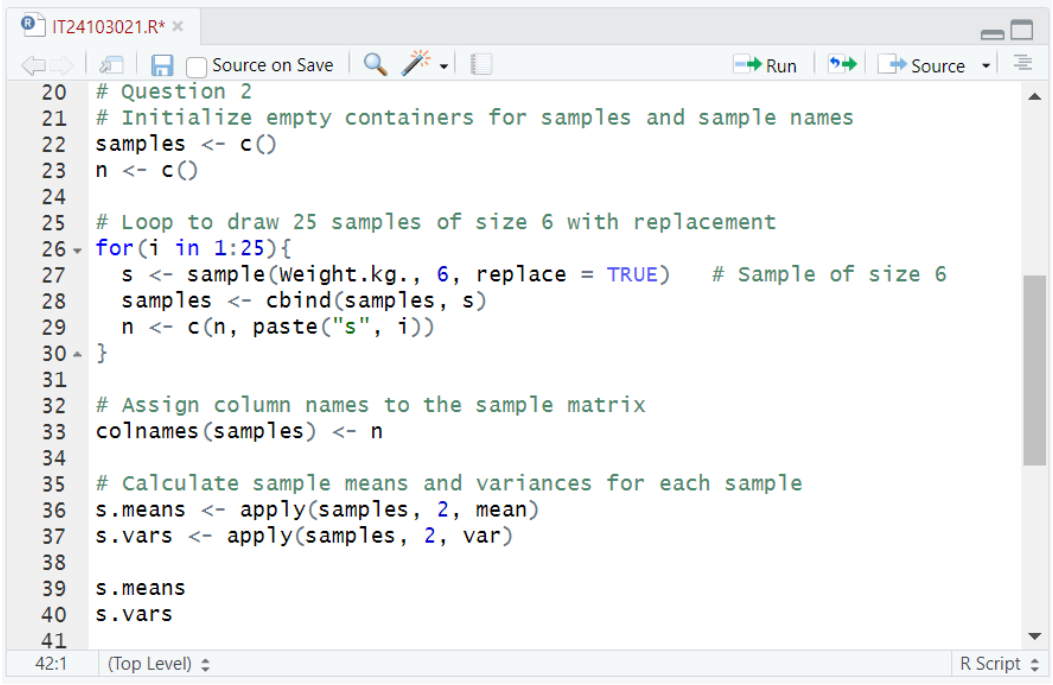
Exercise



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.



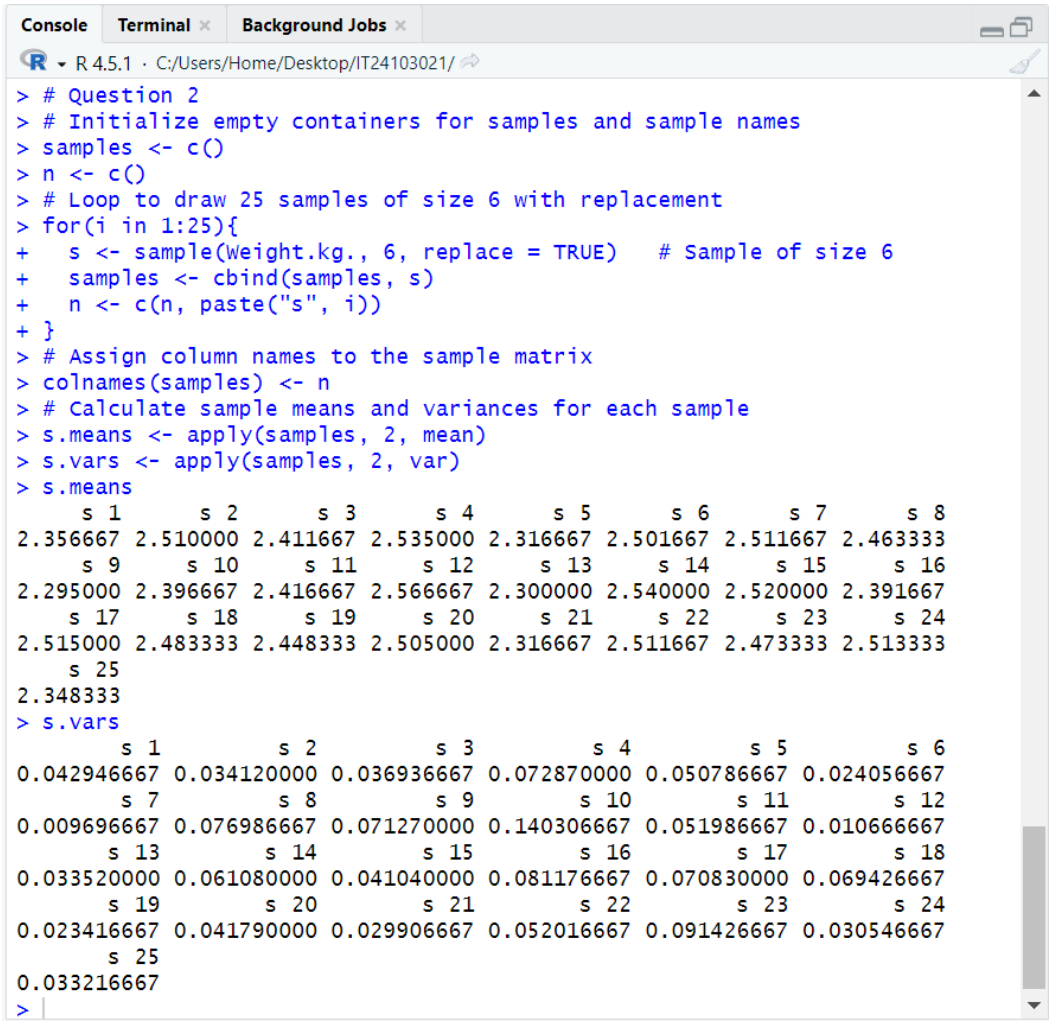
```r
# Question 2
# Initialize empty containers for samples and sample names
samples <- c()
n <- c()

# Loop to draw 25 samples of size 6 with replacement
for(i in 1:25){
  s <- sample(Weight.kg., 6, replace = TRUE)   # Sample of size 6
  samples <- cbind(samples, s)
  n <- c(n, paste("s", i))
}

# Assign column names to the sample matrix
colnames(samples) <- n

# Calculate sample means and variances for each sample
s.means <- apply(samples, 2, mean)
s.vars <- apply(samples, 2, var)

s.means
s.vars
```



```
> # Question 2
> # Initialize empty containers for samples and sample names
> samples <- c()
> n <- c()
> # Loop to draw 25 samples of size 6 with replacement
> for(i in 1:25){
+   s <- sample(Weight.kg., 6, replace = TRUE)   # Sample of size 6
+   samples <- cbind(samples, s)
+   n <- c(n, paste("s", i))
+ }
> # Assign column names to the sample matrix
> colnames(samples) <- n
> # Calculate sample means and variances for each sample
> s.means <- apply(samples, 2, mean)
> s.vars <- apply(samples, 2, var)
> s.means
     s 1      s 2      s 3      s 4      s 5      s 6      s 7      s 8
2.356667 2.510000 2.411667 2.535000 2.316667 2.501667 2.511667 2.463333
     s 9     s 10     s 11     s 12     s 13     s 14     s 15     s 16
2.295000 2.396667 2.416667 2.566667 2.300000 2.540000 2.520000 2.391667
    s 17     s 18     s 19     s 20     s 21     s 22     s 23     s 24
2.515000 2.483333 2.448333 2.505000 2.316667 2.511667 2.473333 2.513333
    s 25
2.348333
> s.vars
        s 1         s 2         s 3         s 4         s 5         s 6
0.042946667 0.034120000 0.036936667 0.072870000 0.050786667 0.024056667
        s 7         s 8         s 9        s 10        s 11        s 12
0.009696667 0.076986667 0.071270000 0.140306667 0.051986667 0.010666667
       s 13        s 14        s 15        s 16        s 17        s 18
0.033520000 0.061080000 0.041040000 0.081176667 0.070830000 0.069426667
       s 19        s 20        s 21        s 22        s 23        s 24
0.023416667 0.041790000 0.029906667 0.052016667 0.091426667 0.030546667
       s 25
0.033216667
>
```

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.