

Sri Lanka Institute of Information Technology



Lab Submission Lab Sheet 09

IT24101387

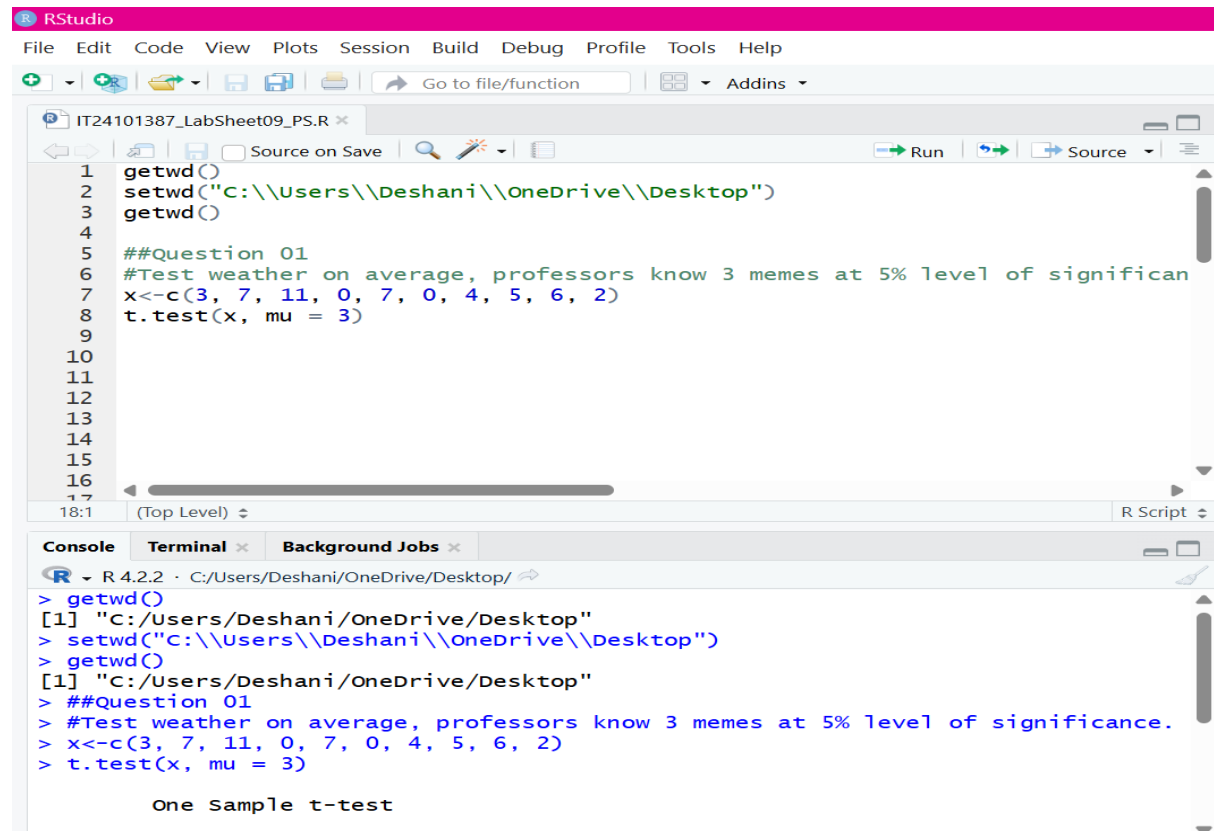
Deshani B.A.M

Probability and Statistics | IT2120

B.Sc. (Hons) in Information Technology

Question – 01

Test weather on average, professors know 3 memes at 5% level of significance.



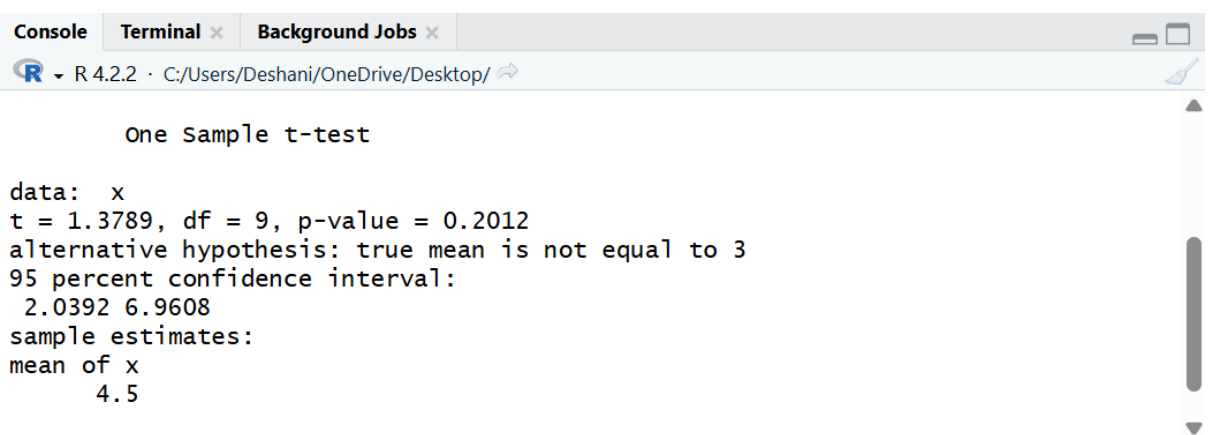
The screenshot shows the RStudio interface. The script editor contains the following code:

```
1 getwd()
2 setwd("C:\\Users\\Deshani\\OneDrive\\Desktop")
3 getwd()
4
5 ##Question 01
6 #Test weather on average, professors know 3 memes at 5% level of significance
7 x<-c(3, 7, 11, 0, 7, 0, 4, 5, 6, 2)
8 t.test(x, mu = 3)
9
10
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12
13
14
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16
17
```

The console output shows the execution of the script:

```
> getwd()
[1] "C:/Users/Deshani/OneDrive/Desktop"
> setwd("C:\\Users\\Deshani\\OneDrive\\Desktop")
> getwd()
[1] "C:/Users/Deshani/OneDrive/Desktop"
> ##Question 01
> #Test weather on average, professors know 3 memes at 5% level of significance.
> x<-c(3, 7, 11, 0, 7, 0, 4, 5, 6, 2)
> t.test(x, mu = 3)

One sample t-test
```



The console output continues with the results of the t-test:

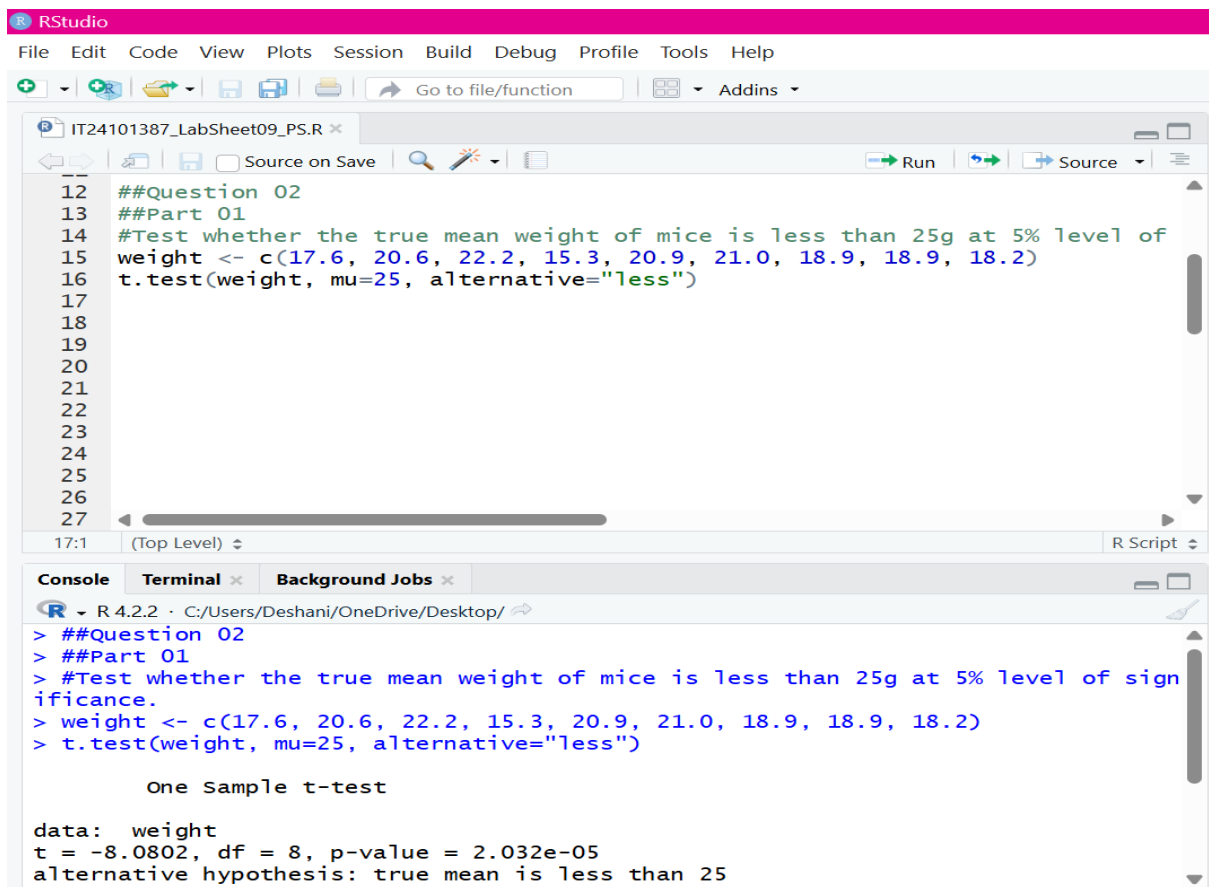
```
One sample t-test

data: x
t = 1.3789, df = 9, p-value = 0.2012
alternative hypothesis: true mean is not equal to 3
95 percent confidence interval:
 2.0392 6.9608
sample estimates:
mean of x
 4.5
```

Question - 02

Part – 01

Test whether the true mean weight of mice is less than 25g at 5% level of significance.



The screenshot shows the RStudio interface. The script editor contains the following code:

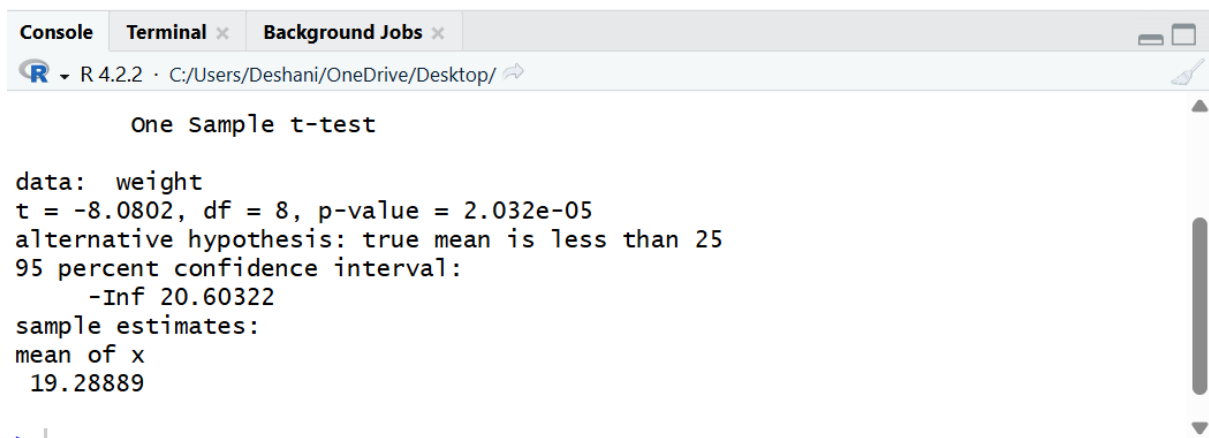
```
12 ##Question 02
13 ##Part 01
14 #Test whether the true mean weight of mice is less than 25g at 5% level of
15 weight <- c(17.6, 20.6, 22.2, 15.3, 20.9, 21.0, 18.9, 18.9, 18.2)
16 t.test(weight, mu=25, alternative="less")
17
18
19
20
21
22
23
24
25
26
27
```

The console output shows the results of the t-test:

```
> ##Question 02
> ##Part 01
> #Test whether the true mean weight of mice is less than 25g at 5% level of sign
ificance.
> weight <- c(17.6, 20.6, 22.2, 15.3, 20.9, 21.0, 18.9, 18.9, 18.2)
> t.test(weight, mu=25, alternative="less")

One Sample t-test

data: weight
t = -8.0802, df = 8, p-value = 2.032e-05
alternative hypothesis: true mean is less than 25
```

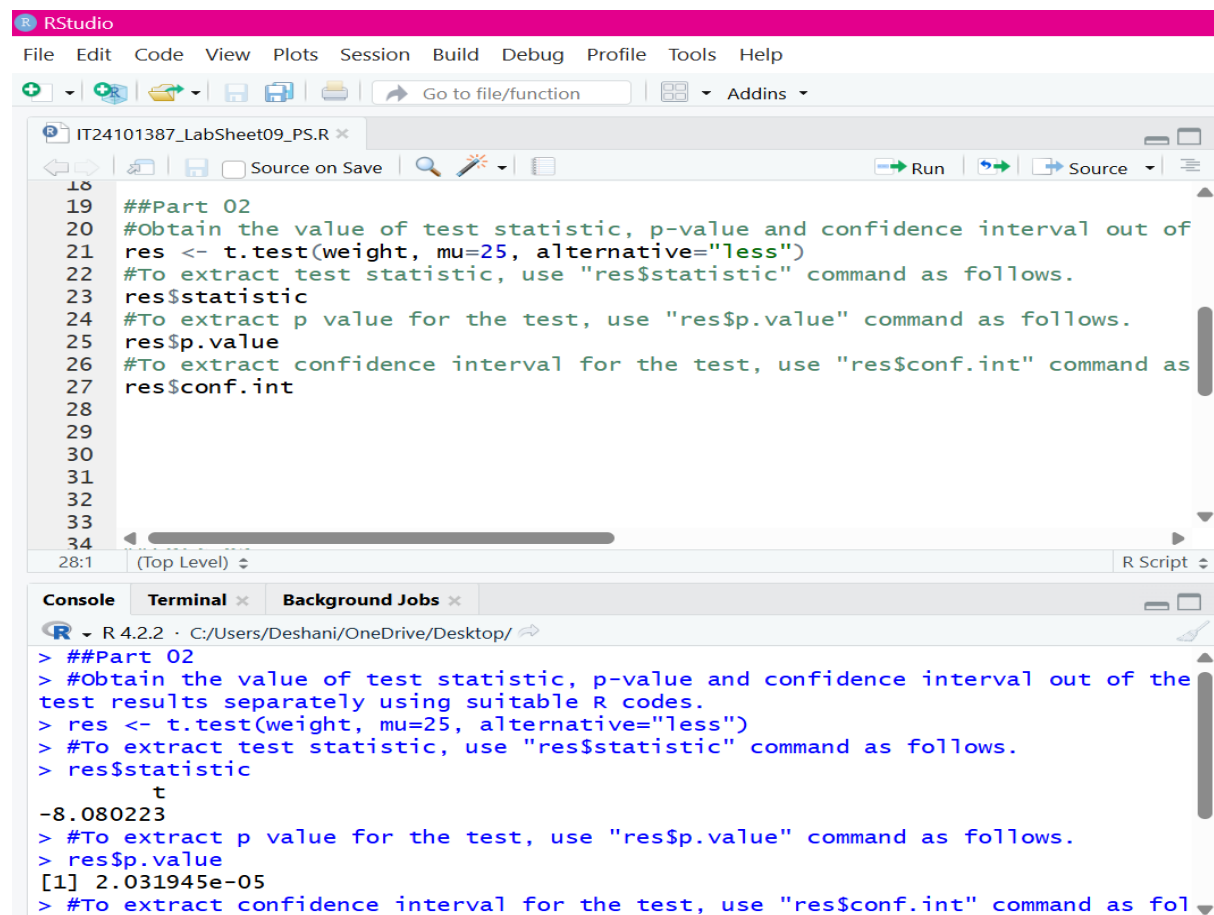


The console output continues with the 95% percent confidence interval and sample estimates:

```
95 percent confidence interval:
 -Inf 20.60322
sample estimates:
mean of x
19.28889
```

Part - 02

Obtain the value of test statistic, p-value and confidence interval out of the test results separately using suitable R codes.

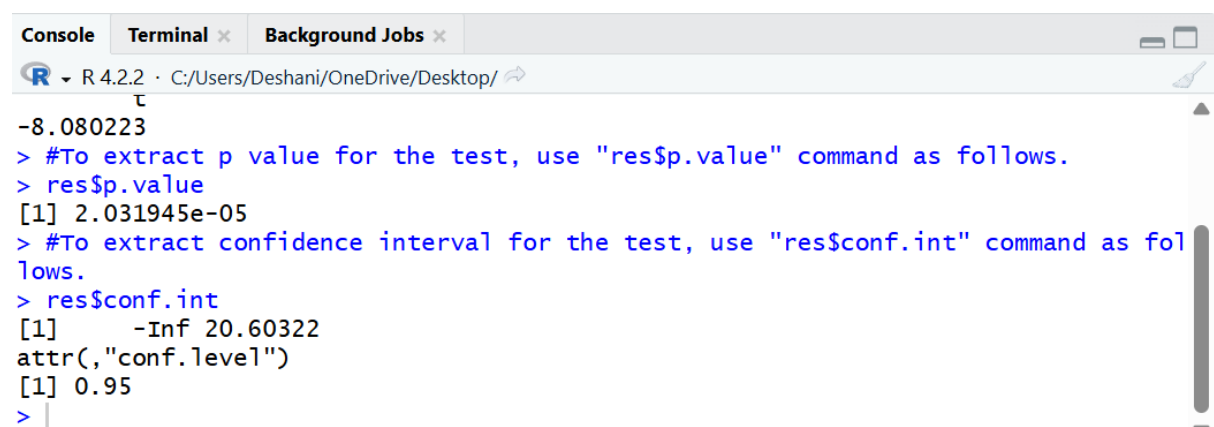


The screenshot shows the RStudio interface. The script editor contains the following R code:

```
18
19 ##Part 02
20 #Obtain the value of test statistic, p-value and confidence interval out of
21 res <- t.test(weight, mu=25, alternative="less")
22 #To extract test statistic, use "res$statistic" command as follows.
23 res$statistic
24 #To extract p value for the test, use "res$p.value" command as follows.
25 res$p.value
26 #To extract confidence interval for the test, use "res$conf.int" command as
27 res$conf.int
28
29
30
31
32
33
34
```

The console shows the execution of the code:

```
> ##Part 02
> #Obtain the value of test statistic, p-value and confidence interval out of the
test results separately using suitable R codes.
> res <- t.test(weight, mu=25, alternative="less")
> #To extract test statistic, use "res$statistic" command as follows.
> res$statistic
      t
-8.080223
> #To extract p value for the test, use "res$p.value" command as follows.
> res$p.value
[1] 2.031945e-05
> #To extract confidence interval for the test, use "res$conf.int" command as fol
```

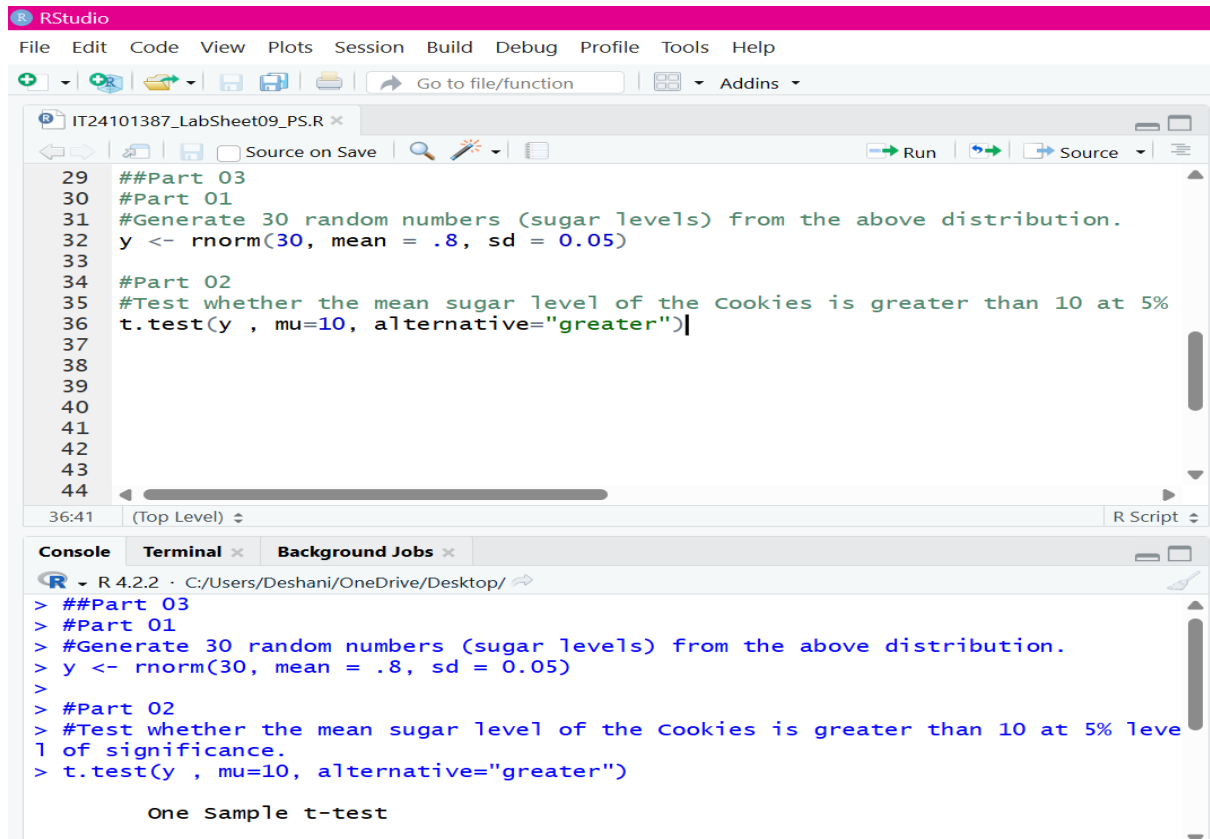


The console continues with the following output:

```
>
-8.080223
> #To extract p value for the test, use "res$p.value" command as follows.
> res$p.value
[1] 2.031945e-05
> #To extract confidence interval for the test, use "res$conf.int" command as fol
lows.
> res$conf.int
[1] -Inf 20.60322
attr(,"conf.level")
[1] 0.95
>
```

Question – 03

Part – 01 And Part - 02



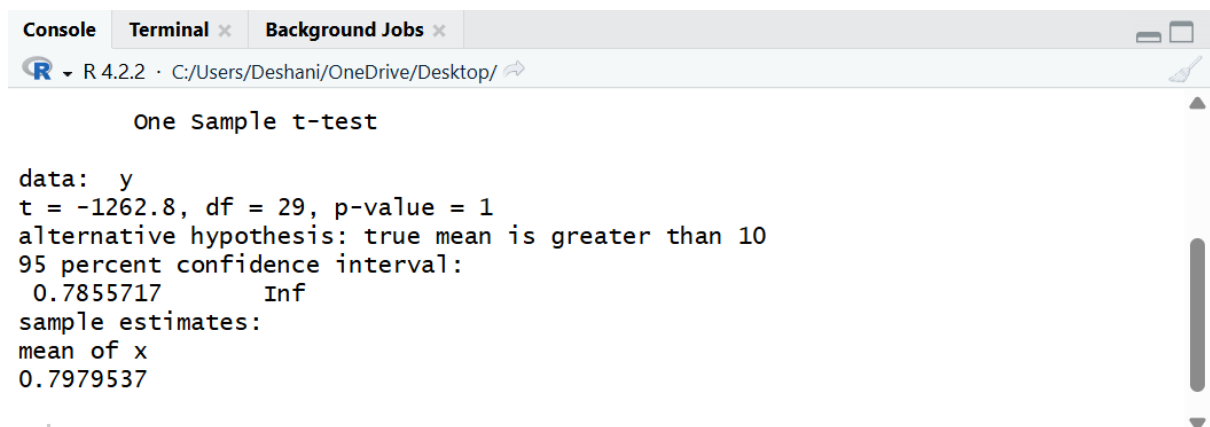
The screenshot shows the RStudio interface with a script editor and a console. The script editor contains the following R code:

```
29 ##Part 03
30 #Part 01
31 #Generate 30 random numbers (sugar levels) from the above distribution.
32 y <- rnorm(30, mean = .8, sd = 0.05)
33
34 #Part 02
35 #Test whether the mean sugar level of the Cookies is greater than 10 at 5%
36 t.test(y , mu=10, alternative="greater")
37
38
39
40
41
42
43
44
```

The console shows the execution of the code:

```
> ##Part 03
> #Part 01
> #Generate 30 random numbers (sugar levels) from the above distribution.
> y <- rnorm(30, mean = .8, sd = 0.05)
>
> #Part 02
> #Test whether the mean sugar level of the Cookies is greater than 10 at 5% level of significance.
> t.test(y , mu=10, alternative="greater")

One sample t-test
```



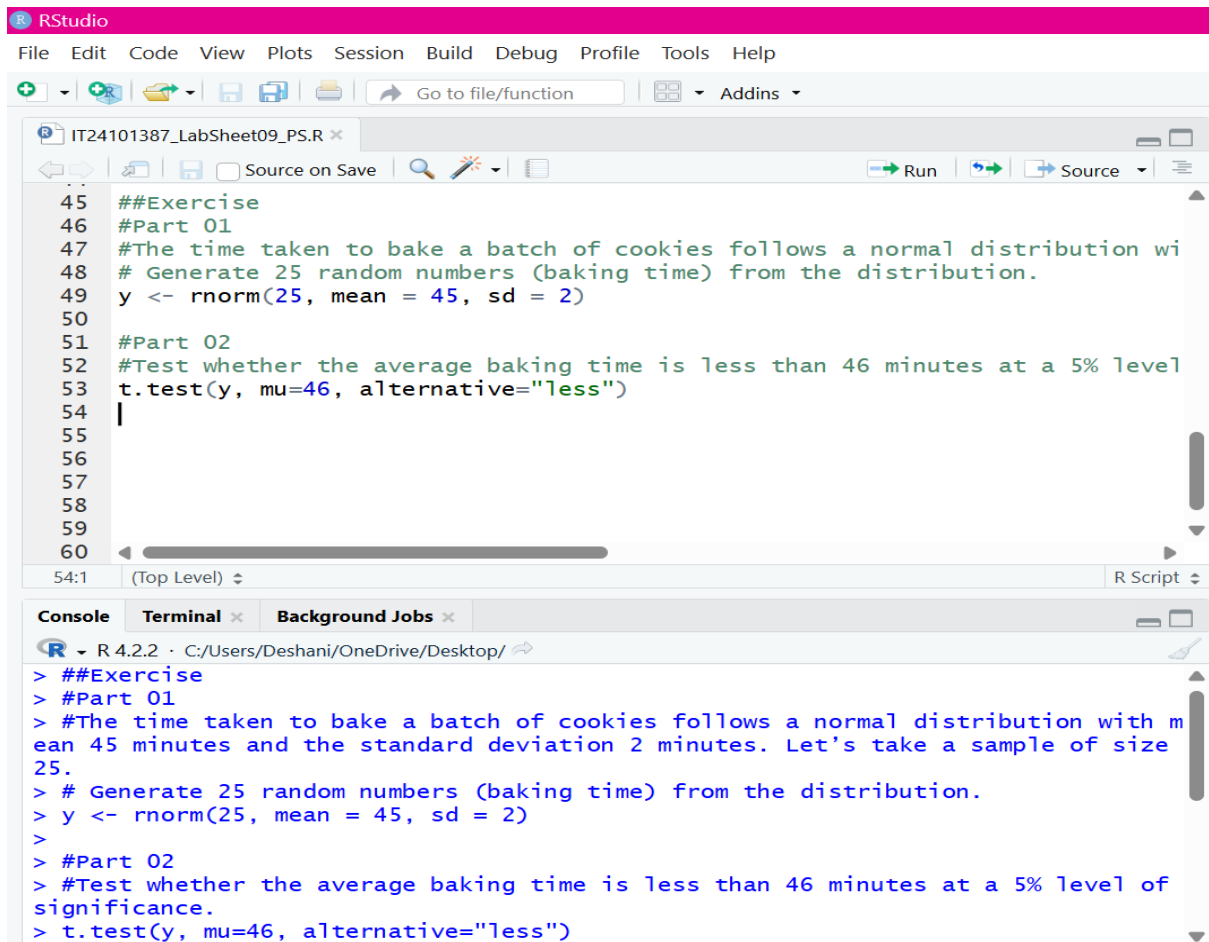
The console continues with the output of the t-test:

```
One sample t-test

data: y
t = -1262.8, df = 29, p-value = 1
alternative hypothesis: true mean is greater than 10
95 percent confidence interval:
 0.7855717      Inf
sample estimates:
mean of x
0.7979537
```

Exercise

Part – 01 And Part – 02

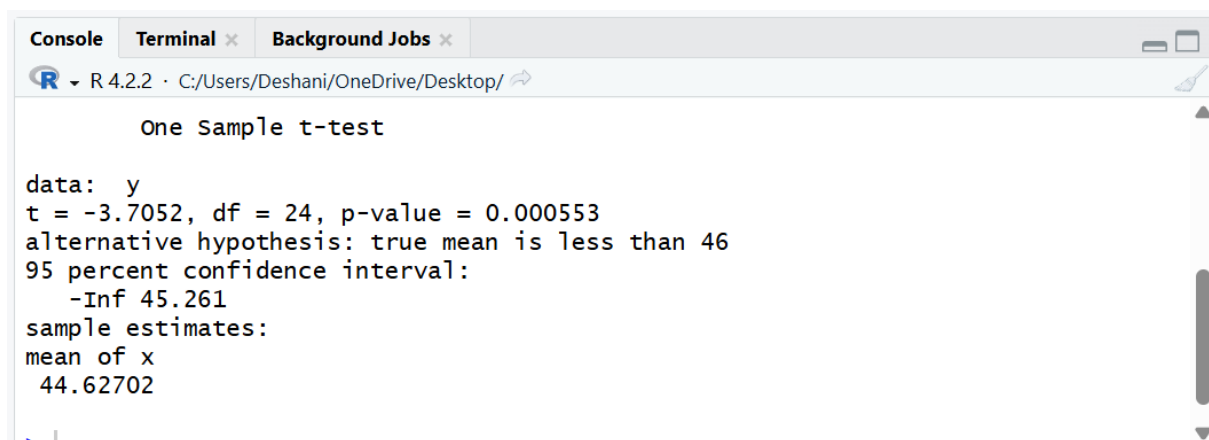


The screenshot shows the RStudio interface with a script editor containing R code. The code defines two parts: Part 01, which generates 25 random numbers from a normal distribution with a mean of 45 and a standard deviation of 2, and Part 02, which performs a one-sample t-test to check if the average baking time is less than 46 minutes at a 5% significance level.

```
45 ##Exercise
46 #Part 01
47 #The time taken to bake a batch of cookies follows a normal distribution wi
48 # Generate 25 random numbers (baking time) from the distribution.
49 y <- rnorm(25, mean = 45, sd = 2)
50
51 #Part 02
52 #Test whether the average baking time is less than 46 minutes at a 5% level
53 t.test(y, mu=46, alternative="less")
54
55
56
57
58
59
60
```

The console output shows the execution of the code, confirming the generation of 25 random numbers and the results of the t-test.

```
> ##Exercise
> #Part 01
> #The time taken to bake a batch of cookies follows a normal distribution with m
ean 45 minutes and the standard deviation 2 minutes. Let's take a sample of size
25.
> # Generate 25 random numbers (baking time) from the distribution.
> y <- rnorm(25, mean = 45, sd = 2)
>
> #Part 02
> #Test whether the average baking time is less than 46 minutes at a 5% level of
significance.
> t.test(y, mu=46, alternative="less")
```



The screenshot shows the RStudio console output for the t-test. It displays the test statistics, p-value, confidence interval, and sample estimates.

```
One Sample t-test

data:  y
t = -3.7052, df = 24, p-value = 0.000553
alternative hypothesis: true mean is less than 46
95 percent confidence interval:
 -Inf 45.261
sample estimates:
mean of x
 44.62702
```

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Addins

Project: (None)

IT24101387_LabSheet09_P5.R

```

1 getwd()
2 setwd("C:\\Users\\Deshani\\OneDrive\\Desktop")
3 getwd()
4
5 ##Question 01
6 #Test whether on average, professors know 3 memes at 5% level of significance
7 x<-c(3, 7, 11, 0, 7, 0, 4, 5, 6, 2)
8 t.test(x, mu = 3)
9
10
11
12 ##Question 02
13 ##Part 01
14 #Test whether the true mean weight of mice is less than 25g at 5% level of
15 weight <- c(17.6, 20.6, 22.2, 15.3, 20.9, 21.0, 18.9, 18.9, 18.2)
16
17
18
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100

```

Console

```

R - R 4.2.2 - C:/Users/Deshani/OneDrive/Desktop/
> getwd()
[1] "C:/Users/Deshani/OneDrive/Desktop"
> setwd("C:\\Users\\Deshani\\OneDrive\\Desktop")
> getwd()
[1] "C:/Users/Deshani/OneDrive/Desktop"
>
> ##Question 01
> #Test whether on average, professors know 3 memes at 5% level of significance.
> x<-c(3, 7, 11, 0, 7, 0, 4, 5, 6, 2)
> t.test(x, mu = 3)

One Sample t-test

```

Environment

Global Environment

Data

res List of 10

weight num [1:9] 17.6 20.6 22.2 15.3 20.9 21 18.9 ...

x num [1:10] 3 7 11 0 7 0 4 5 6 2

y num [1:25] 46.5 42.2 45.4 39.1 46.7 ...

Files Plots Packages Help Viewer Presentation

Home

Name	Size	Modified
.Rhistory	1.4 KB	Sep 27, 2025, 11:08 AM
123		
Adobe		
bin		
conf		
Custom Office Templates		
desktop.ini	402 B	Sep 13, 2025, 9:19 AM
Downloads - ShortcutLink	755 B	Aug 25, 2024, 3:53 PM

Environment History Connections Tutorial

Import Dataset 151 MiB

R Global Environment

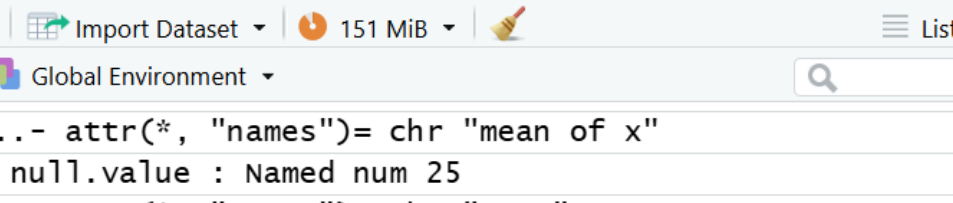
Data

res List of 10

```

$ statistic : Named num -8.08
..- attr(*, "names")= chr "t"
$ parameter : Named num 8
..- attr(*, "names")= chr "df"
$ p.value : num 2.03e-05
$ conf.int : num [1:2] -Inf 20.6
..- attr(*, "conf.level")= num 0.95
$ estimate : Named num 19.3
..- attr(*, "names")= chr "mean of x"
$ null.value : Named num 25

```



The screenshot shows the RStudio interface. The top menu bar includes 'Environment', 'History', 'Connections', and 'Tutorial'. Below the menu bar, there are icons for file operations and a status bar showing '151 MiB'. The 'Environment' pane on the left shows the 'Global Environment' with a search bar. The main console area displays the output of a t-test:

```
..- attr(*, "names")= chr "mean of x"
$ null.value : Named num 25
..- attr(*, "names")= chr "mean"
$ stderr      : num 0.707
$ alternative: chr "less"
$ method      : chr "One Sample t-test"
$ data.name   : chr "weight"
- attr(*, "class")= chr "htest"
```

Below the console output, the 'values' section shows a table with three rows: 'weight', 'x', and 'y'. Each row has a 'num' column and a range of values in brackets.

	num	Range
weight	num	[1:9] 17.6 20.6 22.2 15.3 20.9 21 18.9...
x	num	[1:10] 3 7 11 0 7 0 4 5 6 2
y	num	[1:25] 46.5 42.2 45.4 39.1 46.7 ...