

Sri Lanka Institute of Information Technology



Lab Submission Lab Sheet 07

IT24101387

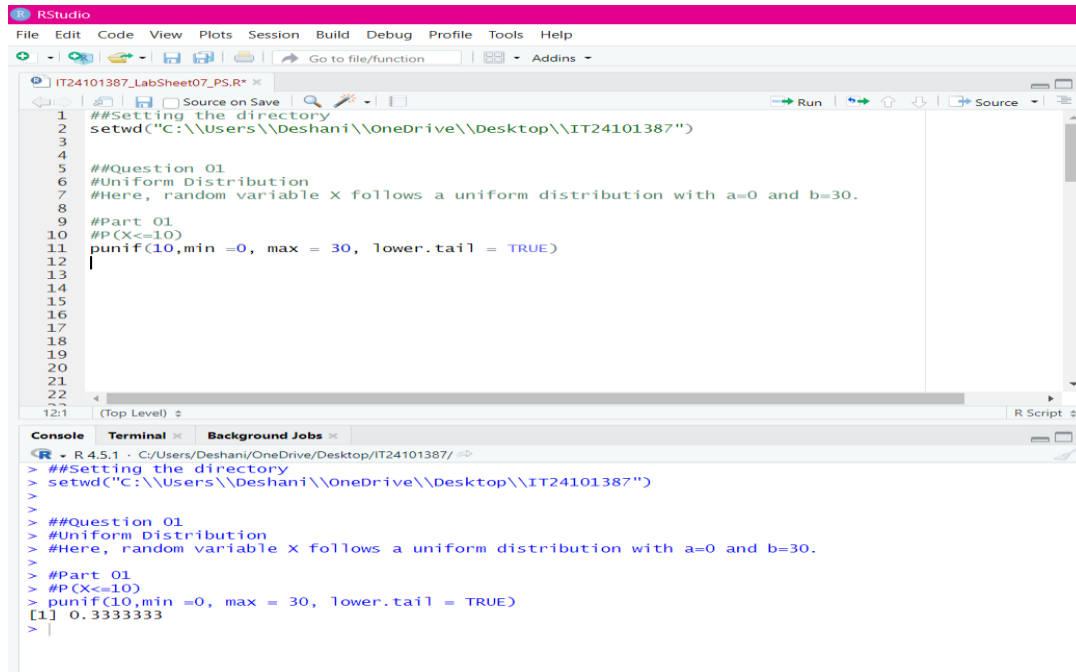
Deshani B.A.M

Probability and Statistics | IT2120

B.Sc. (Hons) in Information Technology

Question - 01

Part – 01



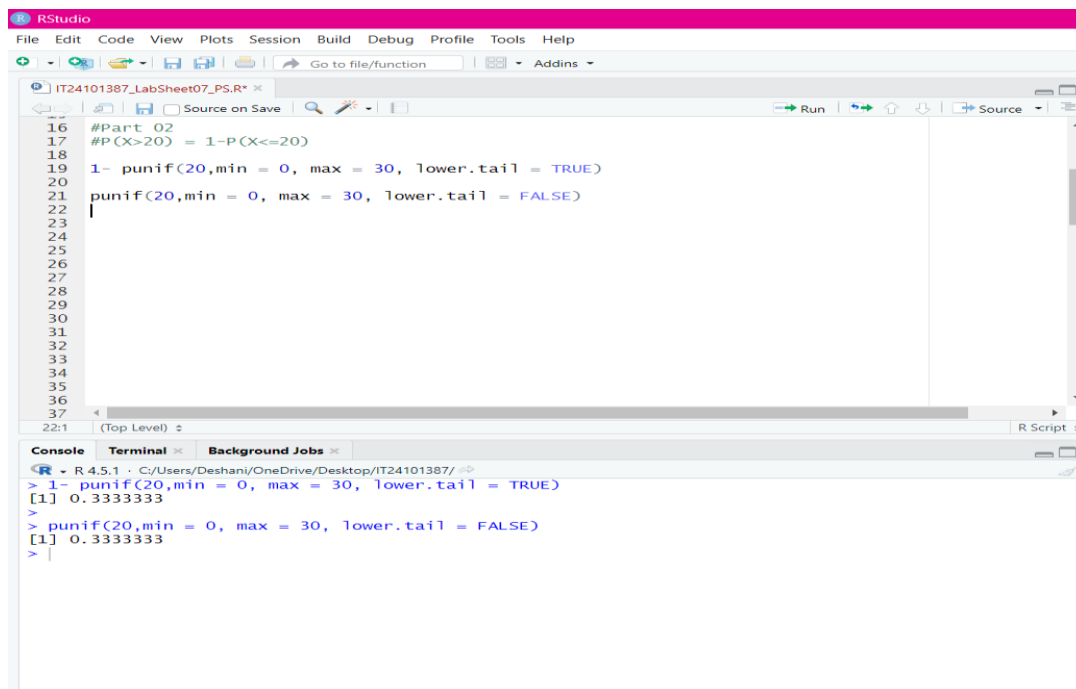
The screenshot shows the RStudio interface. The script editor contains the following R code:

```
1 ##Setting the directory
2 setwd("C:\\Users\\Deshani\\OneDrive\\Desktop\\IT24101387")
3
4
5 ##Question 01
6 ##Uniform Distribution
7 ##Here, random variable x follows a uniform distribution with a=0 and b=30.
8
9 #Part 01
10 #P(X<=10)
11 punif(10,min =0, max = 30, lower.tail = TRUE)
12
13
14
15
16
17
18
19
20
21
22
```

The console shows the execution of the code:

```
> ##Setting the directory
> setwd("C:\\Users\\Deshani\\OneDrive\\Desktop\\IT24101387")
>
> ##Question 01
> ##Uniform Distribution
> ##Here, random variable x follows a uniform distribution with a=0 and b=30.
>
> #Part 01
> #P(X<=10)
> punif(10,min =0, max = 30, lower.tail = TRUE)
[1] 0.3333333
>
```

Part – 02



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

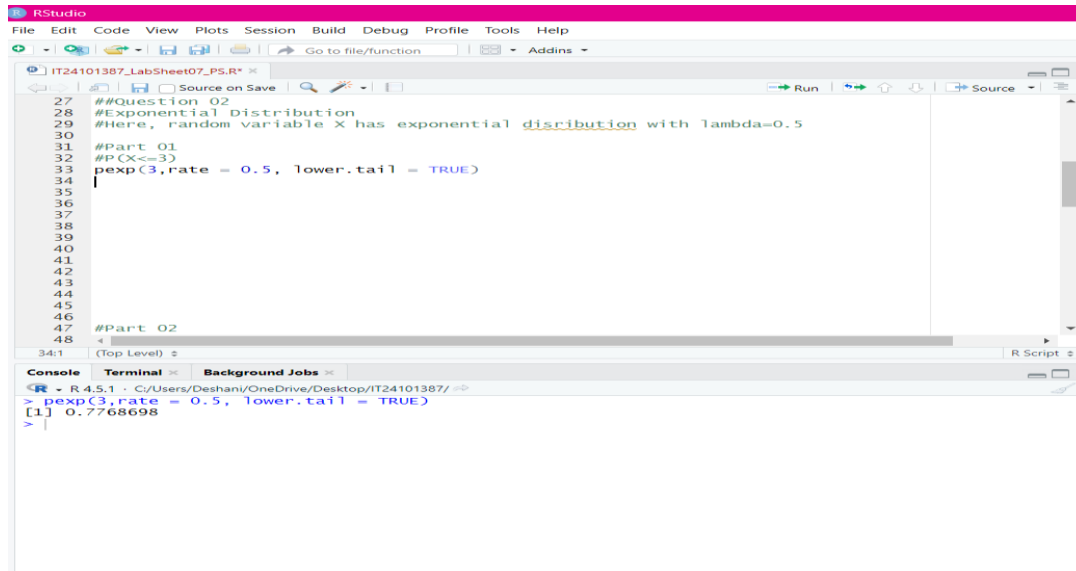
```
16 #Part 02
17 #P(X>20) = 1-P(X<=20)
18
19 1- punif(20,min = 0, max = 30, lower.tail = TRUE)
20
21 punif(20,min = 0, max = 30, lower.tail = FALSE)
22
23
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34
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36
37
```

The console shows the execution of the code:

```
> 1- punif(20,min = 0, max = 30, lower.tail = TRUE)
[1] 0.3333333
>
> punif(20,min = 0, max = 30, lower.tail = FALSE)
[1] 0.3333333
>
```

Question – 02

Part – 01



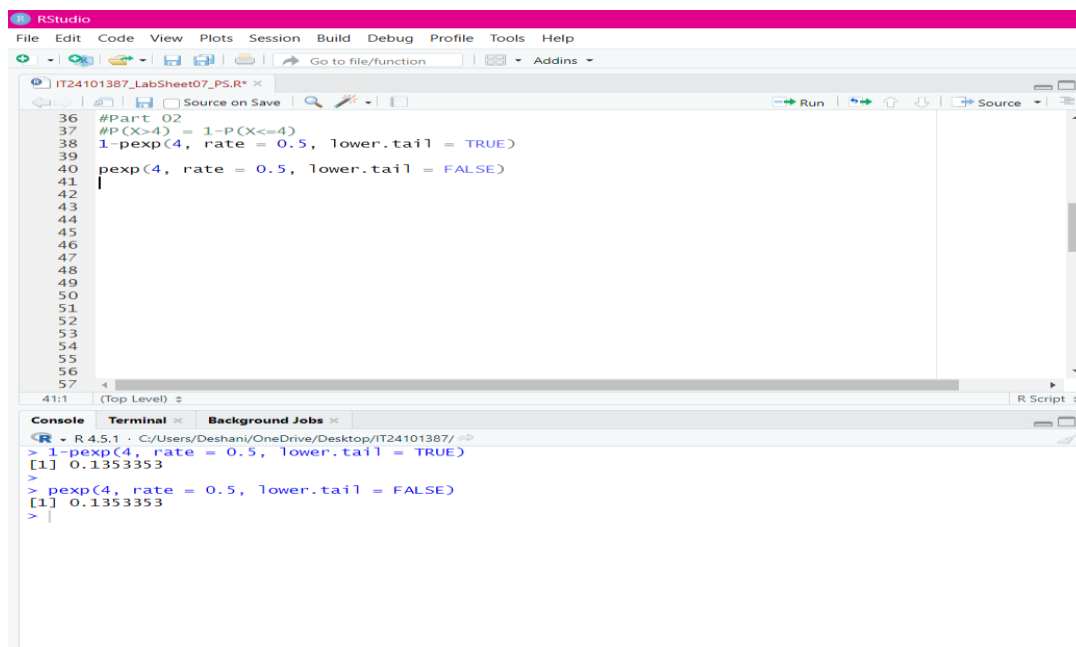
The screenshot shows the RStudio interface. The script editor contains the following code:

```
27 ##Question 02
28 #Exponential Distribution
29 #Here, random variable X has exponential distribution with lambda=0.5
30
31 #Part 01
32 #P(X<=3)
33 pexp(3,rate = 0.5, lower.tail = TRUE)
34
35
36
37
38
39
40
41
42
43
44
45
46
47 #Part 02
48
```

The console shows the output of the command:

```
> pexp(3,rate = 0.5, lower.tail = TRUE)
[1] 0.7768698
>
```

Part – 02



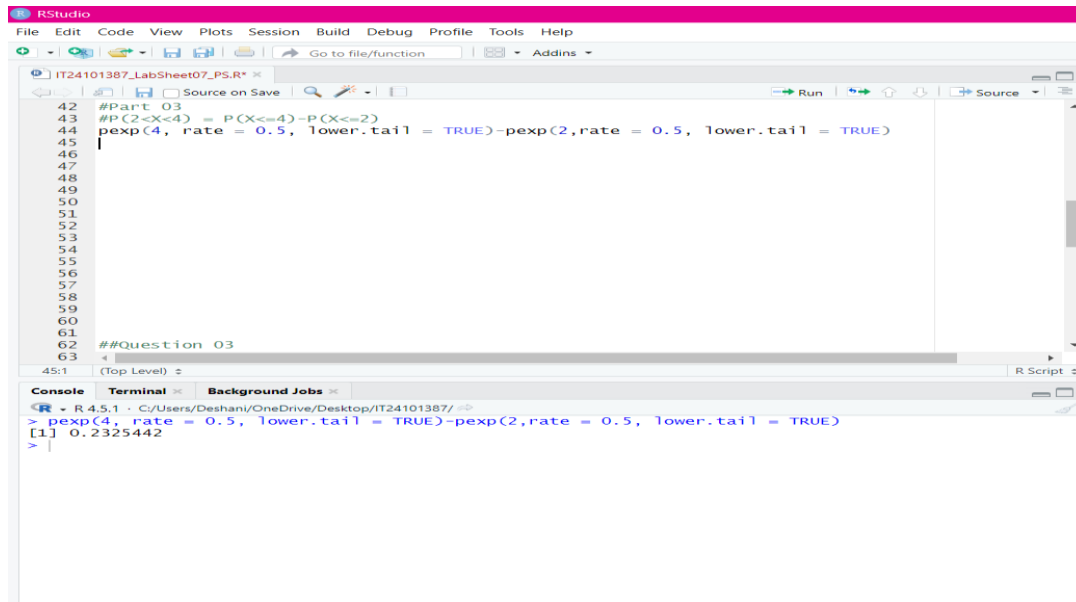
The screenshot shows the RStudio interface. The script editor contains the following code:

```
36 #Part 02
37 #P(X>4) = 1-P(X<=4)
38 1-pexp(4, rate = 0.5, lower.tail = TRUE)
39
40 pexp(4, rate = 0.5, lower.tail = FALSE)
41
42
43
44
45
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56
57
```

The console shows the output of the commands:

```
> 1-pexp(4, rate = 0.5, lower.tail = TRUE)
[1] 0.1353353
> pexp(4, rate = 0.5, lower.tail = FALSE)
[1] 0.1353353
>
```

Part – 03



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

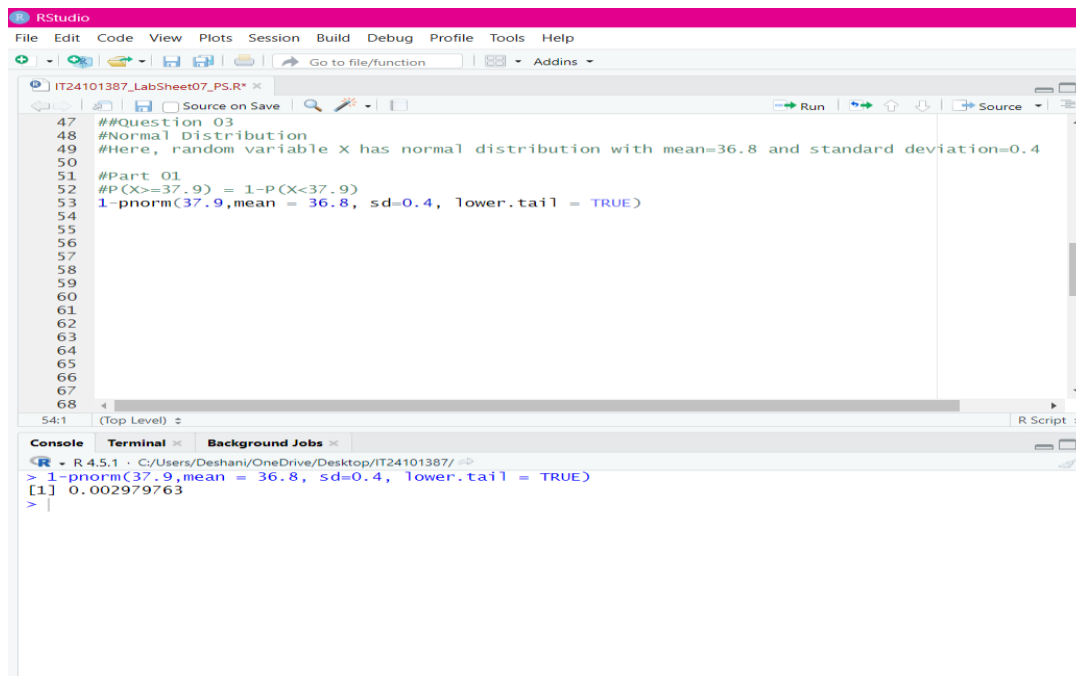
```
42 #Part 03
43 #P(2<X<4) = P(X<=4)-P(X<=2)
44 pexp(4, rate = 0.5, lower.tail = TRUE)-pexp(2,rate = 0.5, lower.tail = TRUE)
45
46
47
48
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53
54
55
56
57
58
59
60
61
62 ##Question 03
63
```

The console shows the execution of the code:

```
> pexp(4, rate = 0.5, lower.tail = TRUE)-pexp(2,rate = 0.5, lower.tail = TRUE)
[1] 0.2325442
>
```

Question – 03

Part – 01



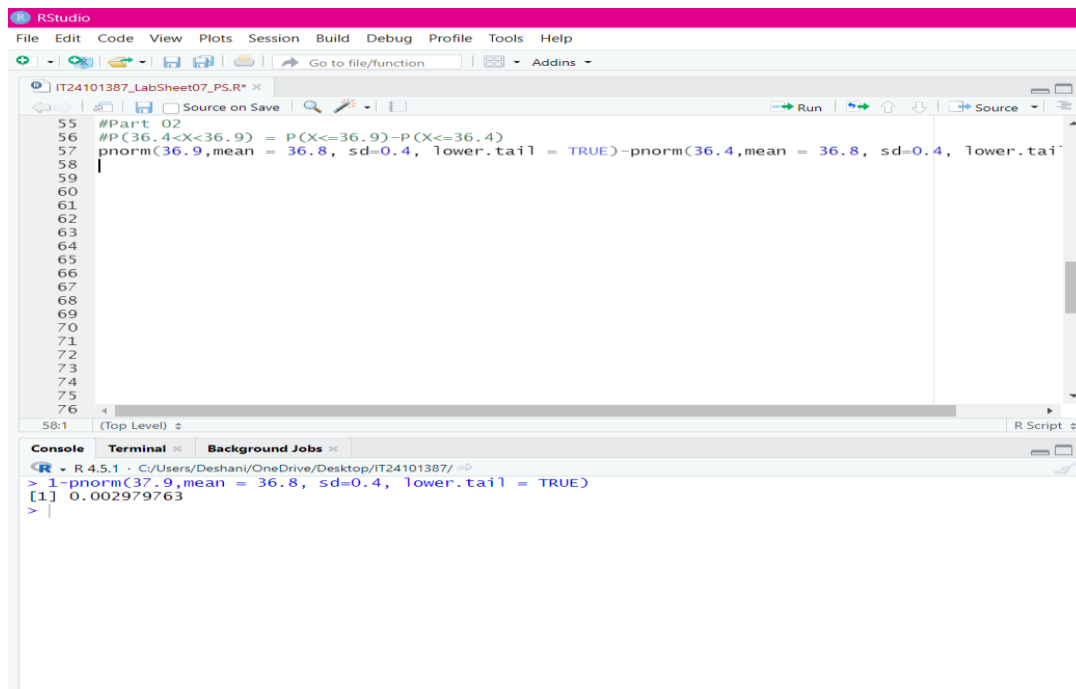
The screenshot shows the RStudio interface with a script editor and a console. The script editor contains the following R code:

```
47 ##Question 03
48 #Normal Distribution
49 #Here, random variable X has normal distribution with mean=36.8 and standard deviation=0.4
50
51 #Part 01
52 #P(X>=37.9) = 1-P(X<37.9)
53 1-pnorm(37.9,mean = 36.8, sd=0.4, lower.tail = TRUE)
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
```

The console shows the execution of the code:

```
> 1-pnorm(37.9,mean = 36.8, sd=0.4, lower.tail = TRUE)
[1] 0.002979763
>
```

Part – 02



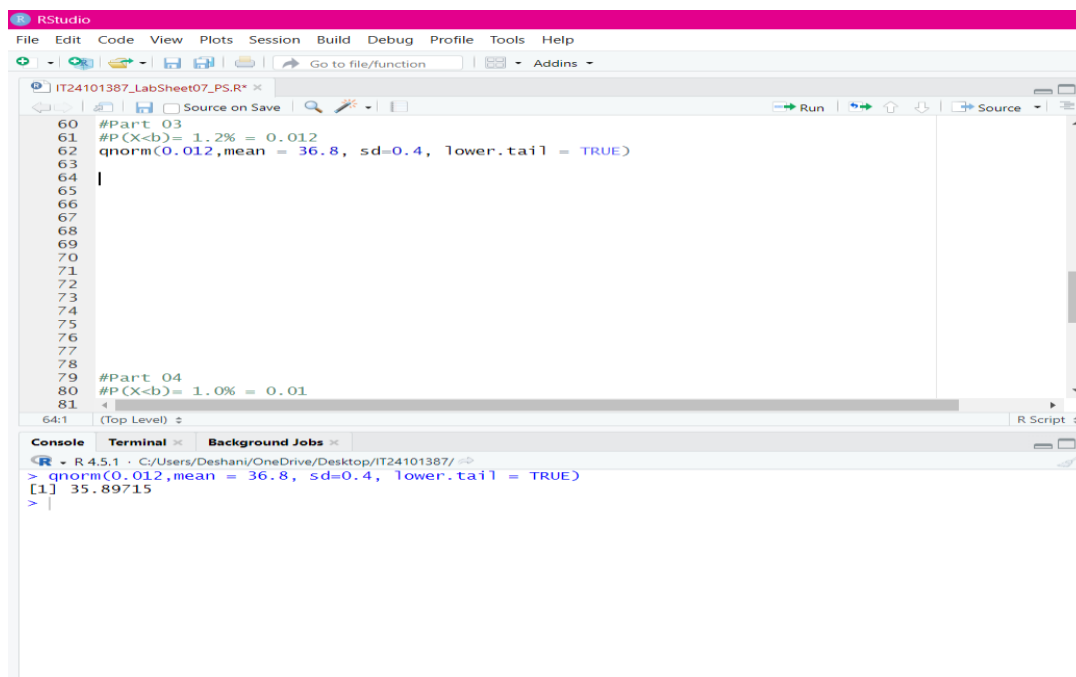
The screenshot shows the RStudio interface. The script editor displays the following R code:

```
55 #Part 02
56 #P(36.4<X<36.9) = P(X<=36.9)-P(X<=36.4)
57 pnorm(36.9,mean = 36.8, sd=0.4, lower.tail = TRUE)-pnorm(36.4,mean = 36.8, sd=0.4, lower.tail = TRUE)
58
59
60
61
62
63
64
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66
67
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70
71
72
73
74
75
76
```

The console shows the execution of the code on line 57:

```
> 1-pnorm(37.9,mean = 36.8, sd=0.4, lower.tail = TRUE)
[1] 0.002979763
>
```

Part – 03



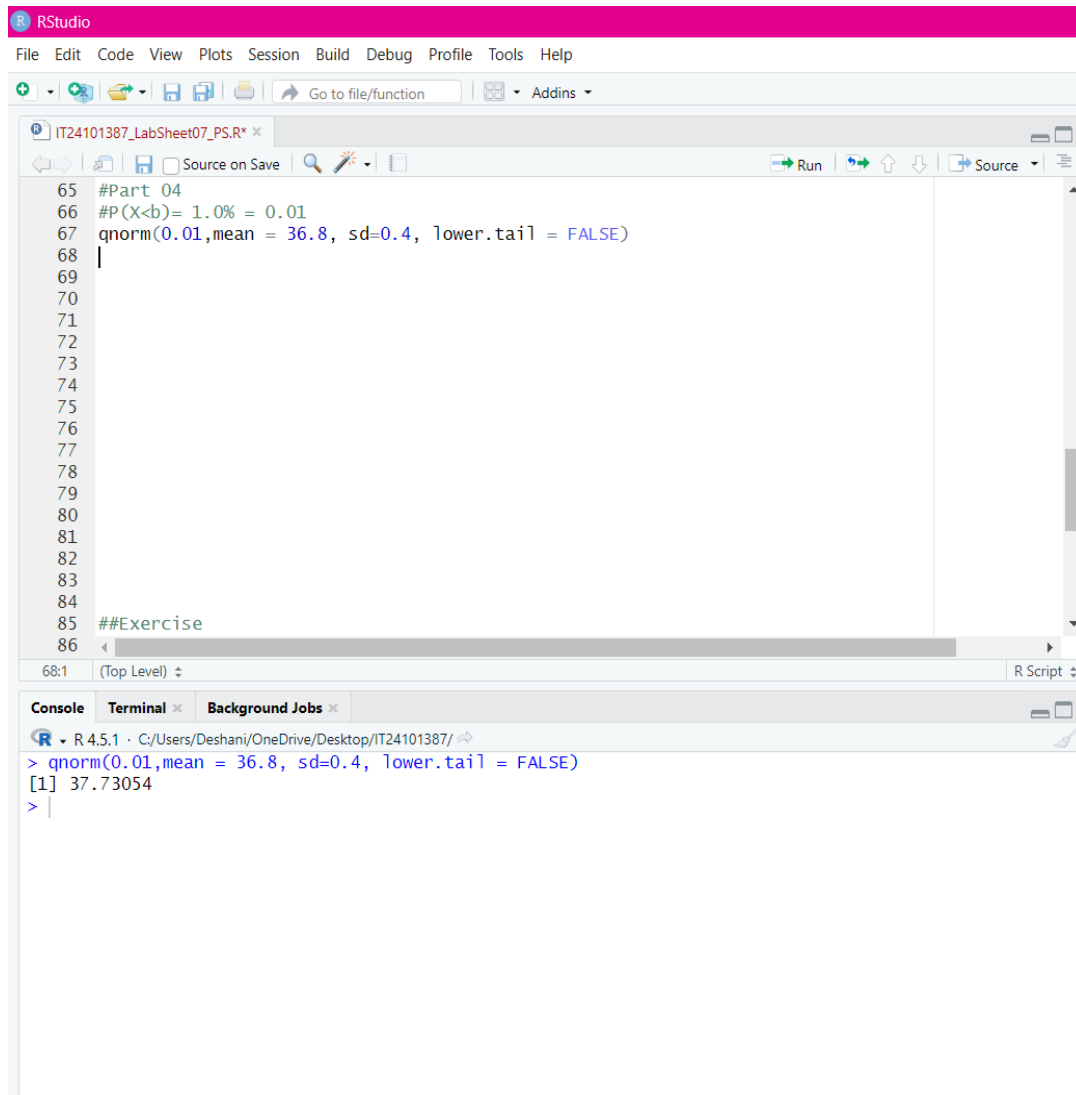
The screenshot shows the RStudio interface. The script editor displays the following R code:

```
60 #Part 03
61 #P(X<b)= 1.2% = 0.012
62 qnorm(0.012,mean = 36.8, sd=0.4, lower.tail = TRUE)
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79 #Part 04
80 #P(X<b)= 1.0% = 0.01
81
```

The console shows the execution of the code on line 62:

```
> qnorm(0.012,mean = 36.8, sd=0.4, lower.tail = TRUE)
[1] 35.89715
>
```

Part – 04



The screenshot shows the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. Below the menu is a toolbar with icons for file operations and a search bar. The main editor window displays a script file named 'IT24101387_LabSheet07_PS.R'. The script contains the following code:

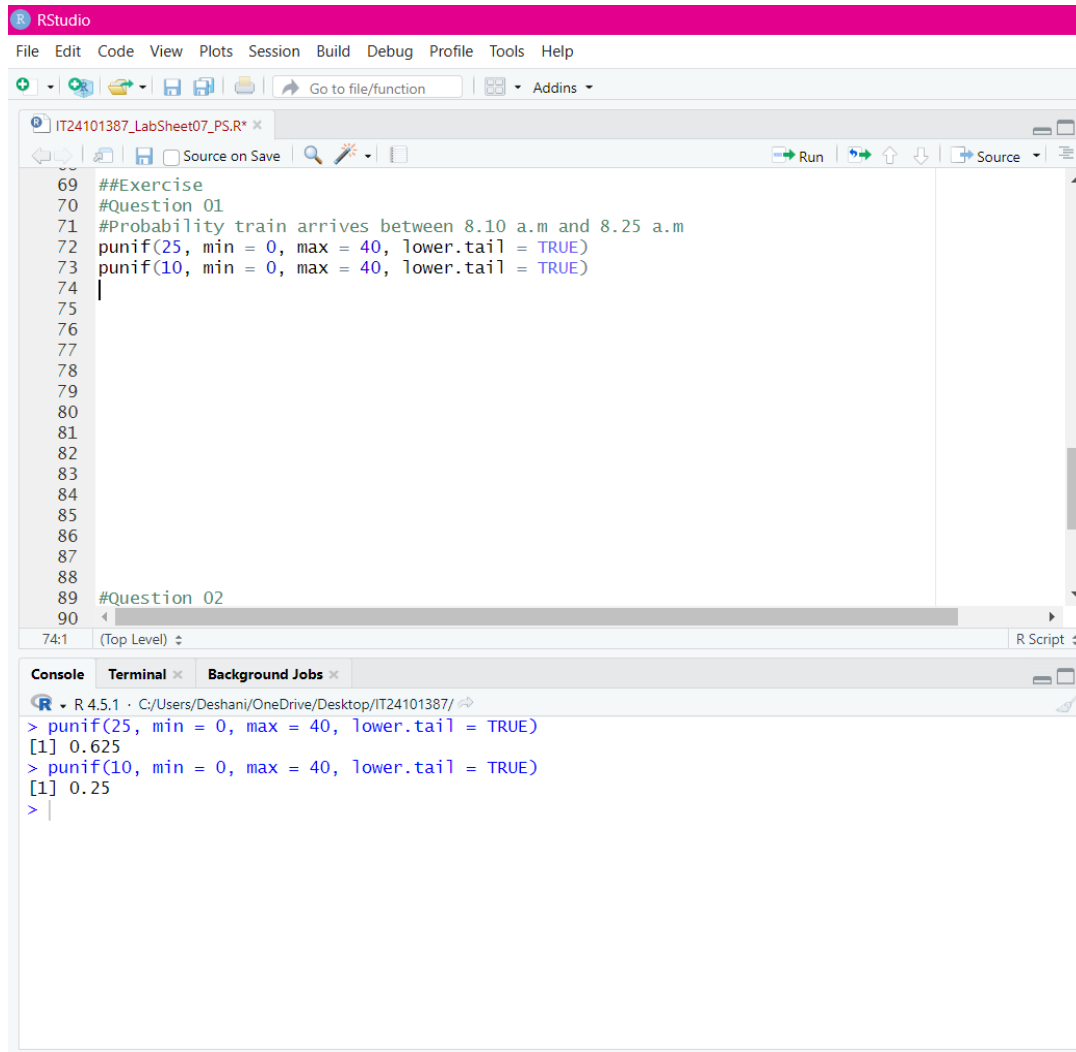
```
65 #Part 04
66 #P(X<b)= 1.0% = 0.01
67 qnorm(0.01,mean = 36.8, sd=0.4, lower.tail = FALSE)
68 |
69
70
71
72
73
74
75
76
77
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79
80
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82
83
84
85 ##Exercise
86
```

The status bar at the bottom of the editor shows '68:1 (Top Level)' and 'R Script'. Below the editor is a console window with tabs for Console, Terminal, and Background Jobs. The console shows the execution of the command:

```
> qnorm(0.01,mean = 36.8, sd=0.4, lower.tail = FALSE)
[1] 37.73054
> |
```

Exercise

Question – 01



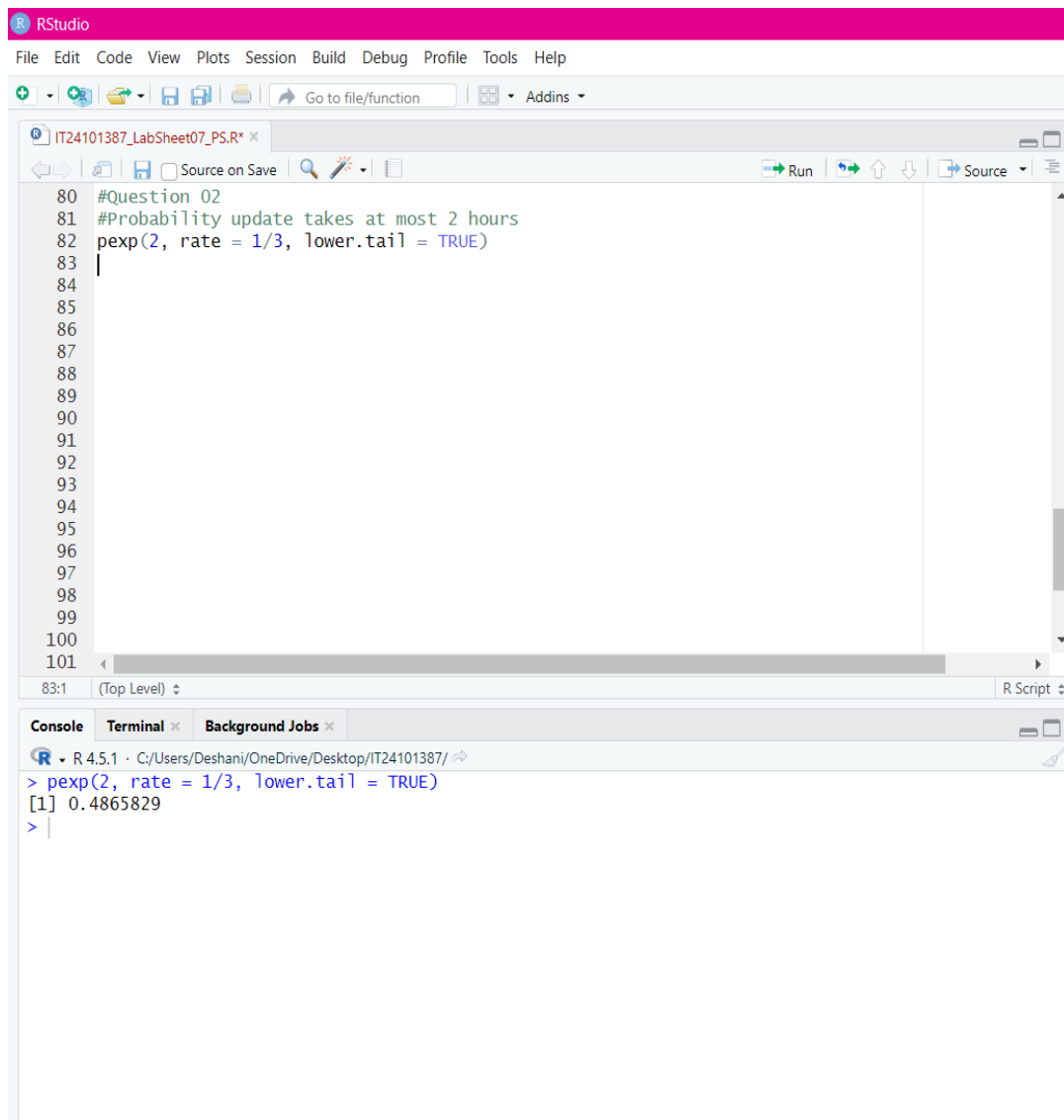
The screenshot shows the RStudio interface with a script file named 'IT24101387_LabSheet07_PS.R'. The script contains the following code:

```
69 ##Exercise
70 #Question 01
71 #Probability train arrives between 8.10 a.m and 8.25 a.m
72 punif(25, min = 0, max = 40, lower.tail = TRUE)
73 punif(10, min = 0, max = 40, lower.tail = TRUE)
74 |
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89 #Question 02
90 |
```

The console output shows the results of the two `punif` function calls:

```
> punif(25, min = 0, max = 40, lower.tail = TRUE)
[1] 0.625
> punif(10, min = 0, max = 40, lower.tail = TRUE)
[1] 0.25
> |
```

Question – 02



The screenshot shows the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. Below the menu is a toolbar with icons for file operations and a search bar. The main editor window displays a script titled 'IT24101387_LabSheet07_PS.R'. The code in the script is as follows:

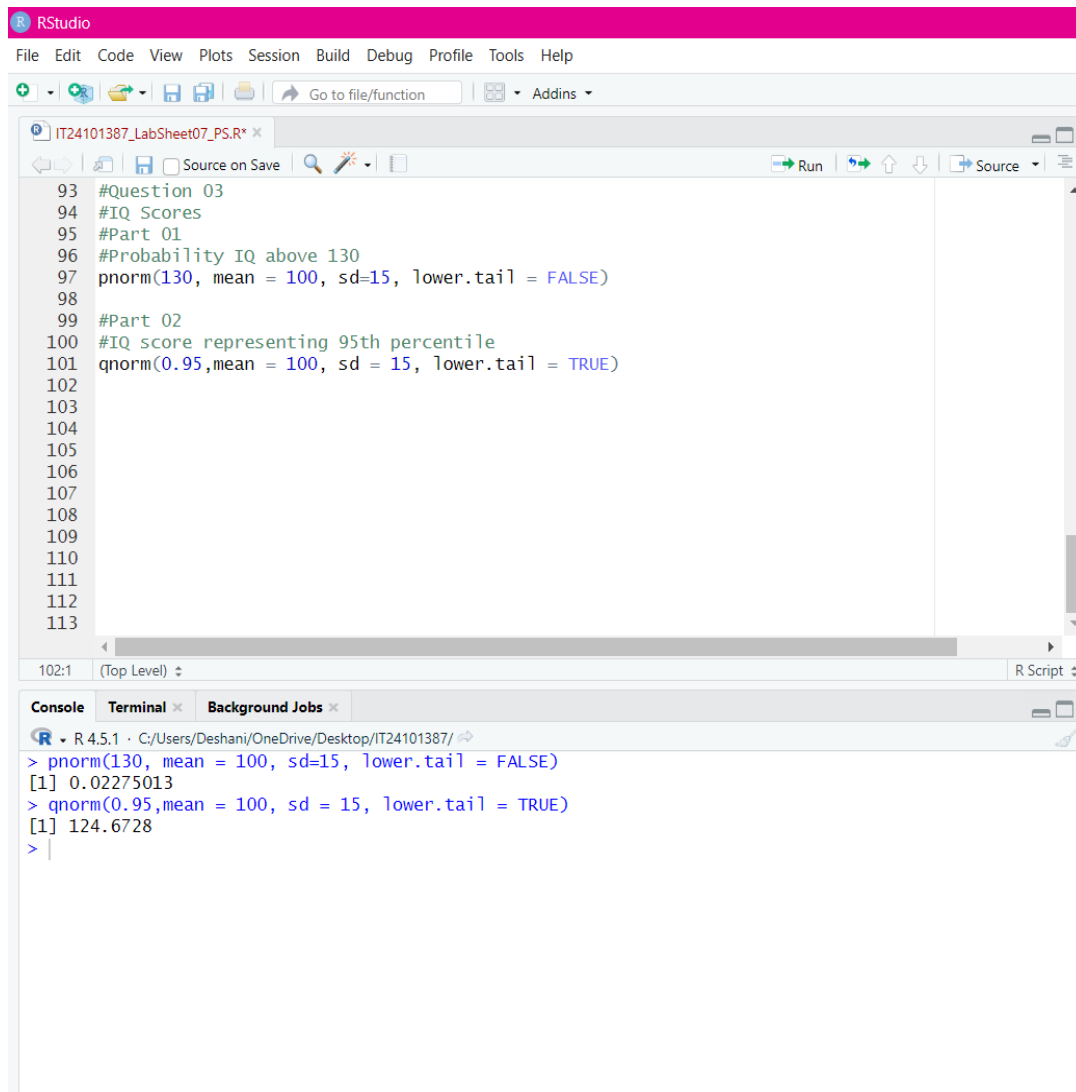
```
80 #Question 02
81 #Probability update takes at most 2 hours
82 pexp(2, rate = 1/3, lower.tail = TRUE)
83 |
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
```

The status bar at the bottom of the editor indicates '83:1 (Top Level)' and 'R Script'. Below the editor is a console window with the following output:

```
> pexp(2, rate = 1/3, lower.tail = TRUE)
[1] 0.4865829
> |
```


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:

```
93 #Question 03
94 #IQ Scores
95 #Part 01
96 #Probability IQ above 130
97 pnorm(130, mean = 100, sd=15, lower.tail = FALSE)
98
99 #Part 02
100 #IQ score representing 95th percentile
101 qnorm(0.95,mean = 100, sd = 15, lower.tail = TRUE)
102
103
104
105
106
107
108
109
110
111
112
113
```

The console shows the output of the executed code:

```
> pnorm(130, mean = 100, sd=15, lower.tail = FALSE)
[1] 0.02275013
> qnorm(0.95,mean = 100, sd = 15, lower.tail = TRUE)
[1] 124.6728
> |
```