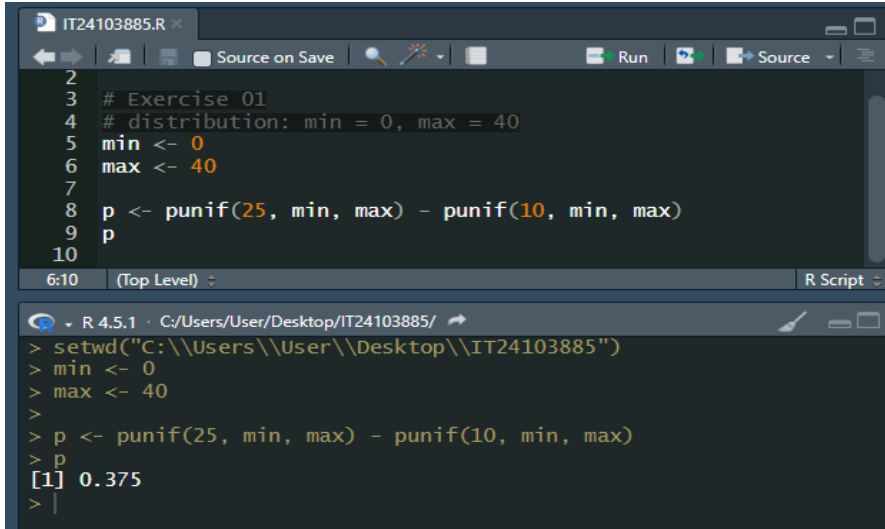


IT2120 - Probability and Statistics

Lab Sheet 07

IT24103885 - Senarathna Y.M.C.S

1. A train arrives at a station uniformly between 8:00 a.m. and 8:40 a.m. Let the random variable X represent the number of minutes the train arrives after 8:00 a.m. What is the probability that the train arrives between 8:10 a.m. and 8:25 a.m.?

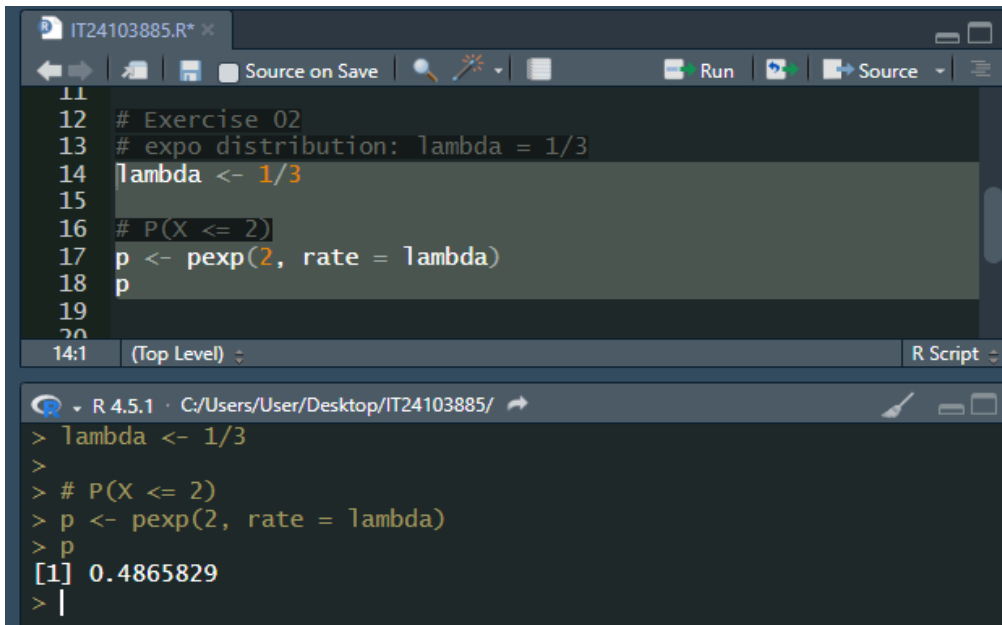


```
IT24103885.R
# Exercise 01
# distribution: min = 0, max = 40
min <- 0
max <- 40
p <- punif(25, min, max) - punif(10, min, max)
p
```

6:10 (Top Level) R Script

```
R 4.5.1 C:/Users/User/Desktop/IT24103885/
> setwd("C:\\Users\\User\\Desktop\\IT24103885")
> min <- 0
> max <- 40
>
> p <- punif(25, min, max) - punif(10, min, max)
> p
[1] 0.375
> |
```

2. The time (in hours) to complete a software update is exponentially distributed with rate $\lambda = 1/3$. Find the probability that an update will take at most 2 hours.



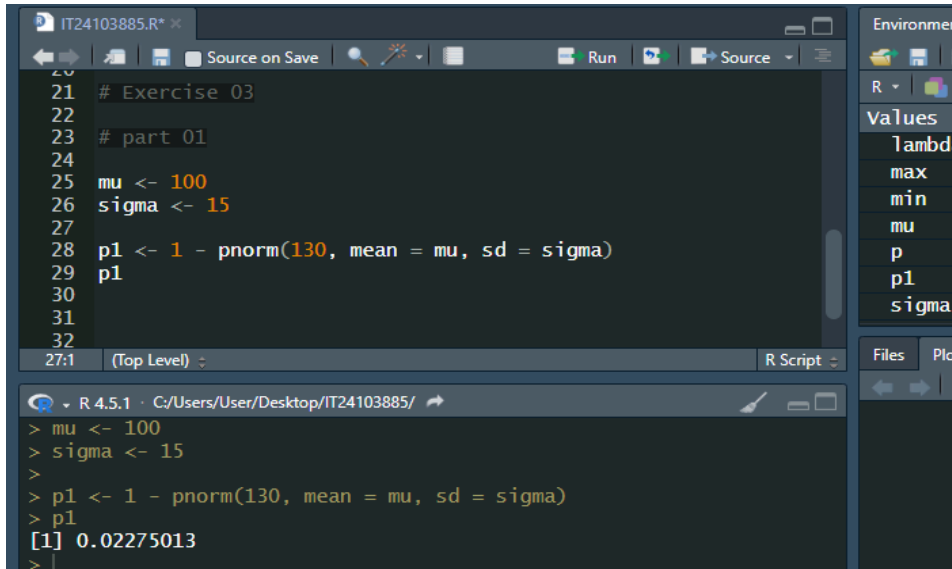
```
IT24103885.R
# Exercise 02
# expo distribution: lambda = 1/3
lambda <- 1/3
# P(X <= 2)
p <- pexp(2, rate = lambda)
p
```

14:1 (Top Level) R Script

```
R 4.5.1 C:/Users/User/Desktop/IT24103885/
> lambda <- 1/3
>
> # P(X <= 2)
> p <- pexp(2, rate = lambda)
> p
[1] 0.4865829
> |
```

3. Suppose IQ scores are normally distributed with a mean of 100 and a standard deviation of 15 :

i. What is the probability that a randomly selected person has an IQ above 130?



The screenshot shows an R script editor with the following code:

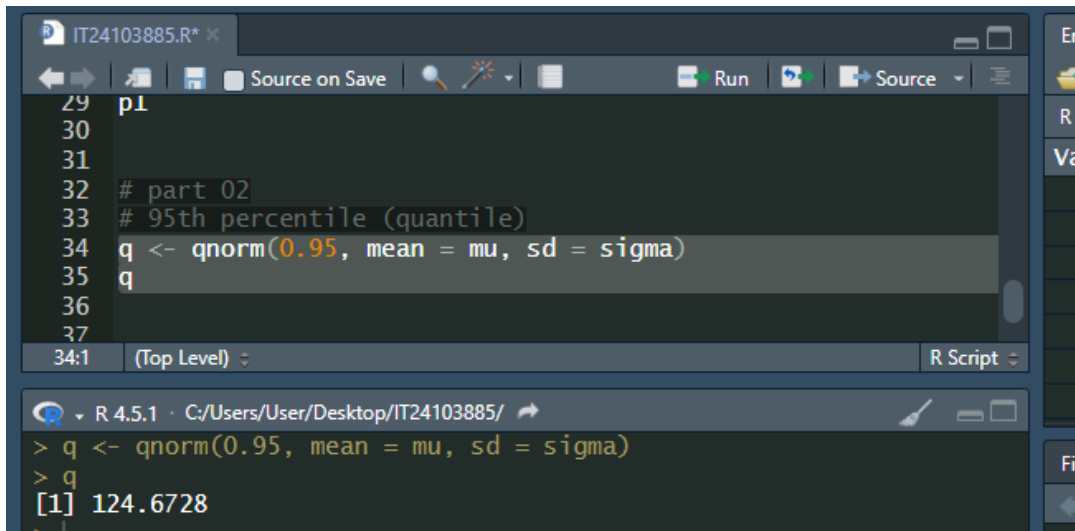
```
21 # Exercise 03
22
23 # part 01
24
25 mu <- 100
26 sigma <- 15
27
28 p1 <- 1 - pnorm(130, mean = mu, sd = sigma)
29 p1
30
31
32
```

The console output shows the result of the calculation:

```
> mu <- 100
> sigma <- 15
>
> p1 <- 1 - pnorm(130, mean = mu, sd = sigma)
> p1
[1] 0.02275013
```

The Environment pane on the right shows the variables: lambda, max, min, mu, p, p1, and sigma.

ii. What IQ score represents the 95th percentile?



The screenshot shows an R script editor with the following code:

```
29 p1
30
31
32 # part 02
33 # 95th percentile (quantile)
34 q <- qnorm(0.95, mean = mu, sd = sigma)
35 q
36
37
```

The console output shows the result of the calculation:

```
> q <- qnorm(0.95, mean = mu, sd = sigma)
> q
[1] 124.6728
```