

IT2120- Probability and Statistics

Lab Sheet 07

IT24103576

Exercise

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.?

```
1 setwd("C:\\Users\\USER\\OneDrive\\Desktop\\IT24103576")
2
3 prob_train <- punif(25, min = 0, max = 40, lower.tail = TRUE) - punif(10, min = 0, max = 40, lower.tail = TRUE)
4 print( prob_train)
```

```
Console Terminal Background Jobs
R 4.5.1 C:/Users/USER/OneDrive/Desktop/IT24103576/
> prob_train <- punif(25, min = 0, max = 40, lower.tail = TRUE) - punif(10, min = 0, max = 40, lower.tail = TRUE)
> print( prob_train)
[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.

```
6 prob_update <- pexp(2, rate = 1/3, lower.tail = TRUE)
7 print(prob_update)
> prob_update <- pexp(2, rate = 1/3, lower.tail = TRUE)
> print(prob_update)
[1] 0.4865829
```

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

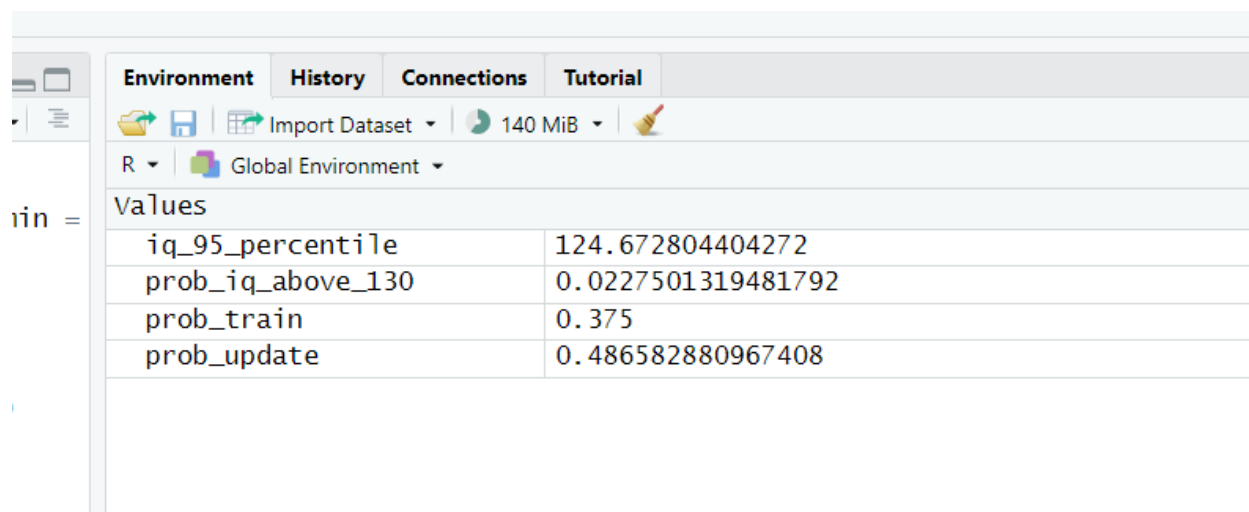
i. What is the probability that a randomly selected person has an IQ above 130?

```
9 prob_iq_above_130 <- 1 - pnorm(130, mean = 100, sd = 15, lower.tail = TRUE)
10 print( prob_iq_above_130)
11
> prob_iq_above_130 <- 1 - pnorm(130, mean = 100, sd = 15, lower.tail = TRUE)
> print( prob_iq_above_130)
[1] 0.02275013
```

ii. What IQ score represents the 95th percentile?

```
2 iq_95_percentile <- qnorm(0.95, mean = 100, sd = 15, lower.tail = TRUE)
3 print( iq_95_percentile)
4
```

```
> iq_95_percentile <- qnorm(0.95, mean = 100, sd = 15, lower.tail = TRUE)
> print( iq_95_percentile)
[1] 124.6728
```



The screenshot shows the RStudio Environment pane. The 'Environment' tab is selected, displaying the 'Global Environment'. A table lists the current objects in the environment:

Values	
<code>iq_95_percentile</code>	124.672804404272
<code>prob_iq_above_130</code>	0.0227501319481792
<code>prob_train</code>	0.375
<code>prob_update</code>	0.486582880967408