

IT24104177 PS LAB 7

1.

The screenshot displays the RStudio interface with two main panels. The top panel shows the source editor with R code for calculating the probability of a train arriving between 10 and 25 minutes, given a uniform distribution between 0 and 40 minutes. The bottom panel shows the console output, which includes the execution of the code and the resulting probability value.

Source Editor:

```
1 # Train arrives uniformly between 0 and 40 minutes
2 # Find P(10 ≤ X ≤ 25)
3
4 a <- 0
5 b <- 40
6 lower <- 10
7 upper <- 25
8
9 prob_uniform <- (upper - lower) / (b - a)
10 print(paste("Q1: P(10 ≤ X ≤ 25) =", round(prob_uniform, 4)))
```

Console:

```
R 4.5.1 ~ /
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[workspace loaded from ~/.RData]

> a <- 0
> b <- 40
> lower <- 10
> upper <- 25
> prob_uniform <- (upper - lower) / (b - a)
> print(paste("Q1: P(10 ≤ X ≤ 25) =", round(prob_uniform, 4)))
[1] "Q1: P(10 ≤ X ≤ 25) = 0.375"
>
```

Environment Panel:






Global Environment

values	
a	0
b	40
lower	10
prob_uniform	0.375
upper	25

Q2.

```
11
12 ### Question 2: Exponential Distribution
13 #  $\lambda = 1/3 \rightarrow \text{mean} = 3 \text{ hours}$ 
14 # Find  $P(X \leq 2)$ 
15
16 lambda <- 1/3
17 prob_exp <- pexp(2, rate = lambda)
18 print(paste("Q2:  $P(X \leq 2) =$ ", round(prob_exp, 4)))
19
```

```
> lambda <- 1/3
> prob_exp <- pexp(2, rate = lambda)
> print(paste("Q2:  $P(X \leq 2) =$ ", round(prob_exp, 4)))
[1] "Q2:  $P(X \leq 2) = 0.4866$ "
>
```

Environment	History	Connections	Tutorial
  130 MiB  List 			
R  Global Environment <input type="text"/>			
values			
lambda	0.333333333333333		
prob_exp	0.486582880967408		



Q3

```
20 ### Question 3: Normal Distribution
21 # Mean = 100, SD = 15
22
23 # i.  $P(X > 130)$ 
24 mean_iq <- 100
25 sd_iq <- 15
26 prob_above_130 <- 1 - pnorm(130, mean = mean_iq, sd = sd_iq)
27 print(paste("Q3.i:  $P(IQ > 130) =$ ", round(prob_above_130, 4)))
28
29 # ii. 95th percentile
30 iq_95th <- qnorm(0.95, mean = mean_iq, sd = sd_iq)
31 print(paste("Q3.ii: 95th Percentile IQ =", round(iq_95th, 2)))
32
```

```

> # i. P(X > 130)
> mean_iq <- 100
> sd_iq <- 15
> prob_above_130 <- 1 - pnorm(130, mean = mean_iq, sd = sd_iq)
> print(paste("Q3.i: P(IQ > 130) =", round(prob_above_130, 4)))
[1] "Q3.i: P(IQ > 130) = 0.0228"
> # ii. 95th percentile
> iq_95th <- qnorm(0.95, mean = mean_iq, sd = sd_iq)
> # ii. 95th percentile
> iq_95th <- qnorm(0.95, mean = mean_iq, sd = sd_iq)
> print(paste("Q3.ii: 95th Percentile IQ =", round(iq_95th, 2)))
[1] "Q3.ii: 95th Percentile IQ = 124.67"

```

Environment	History	Connections	Tutorial
<div>   130 MiB </div> <div> R Global Environment </div>			
values			
iq_95th	124.672804404272		
mean_iq	100		
prob_above_130	0.0227501319481792		
sd_iq	15		