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 λ = 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?

```
12 iq_95_percentile <- qnorm(0.95, mean = 100, sd = 15, lower.tail = TRUE)
13 print( iq_95_percentile)
14
```

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