

Sri Lanka Institute of Information Technology



Lab Submission Lab sheet 07

IT23746046

Dhanasena K.B.S.

Probability and Statistics| IT2120

B.Sc. (Hons) in Information Technology

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.?
2. The time (in hours) to complete a software update is exponentially distributed with rate $\lambda = \frac{1}{3}$. Find the probability that an update will take at most 2 hours.
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?
 - ii. What IQ score represents the 95th percentile?

```
1 # Set working directory
2 setwd("C:\\Users\\LENOVO\\OneDrive\\Desktop")
3
4 # Exercise Question 1: Uniform Distribution
5
6 prob_q1 <- punif(25, min=0, max=40) - punif(10, min=0, max=40)
7 cat("Q 1: Probability that the train arrives between 8:10 a.m. and 8:25 a.m.", "\n", prob_q1, "\n")
8
9 # Exercise Question 2: Exponential Distribution
10
11 prob_q2 <- pexp(2, rate=1/3)
12 cat("Q 2: Probability that an update takes at most 2 hours ", "\n", prob_q2, "\n")
13
14 # Exercise Question 3i: Normal Distribution
15
16 prob_q3i <- 1 - pnorm(130, mean=100, sd=15)
17 cat("Q 3i: Probability of IQ above 130 ", "\n", prob_q3i, "\n")
18
19 # Exercise Question 3ii: 95th Percentile
20
21 iq_95th <- qnorm(0.95, mean=100, sd=15)
22 cat("Q 3ii: IQ score for 95th percentile ", "\n", iq_95th, "\n")
```

```
> prob_q1 <- punif(25, min=0, max=40) - punif(10, min=0, max=40)
> cat("Q 1: Probability that the train arrives between 8:10 a.m. and 8:25 a.m.", "\n", prob_q1, "\n")
Q 1: Probability that the train arrives between 8:10 a.m. and 8:25 a.m.
0.375
```

```
> prob_q2 <- pexp(2, rate=1/3)
> cat("Q 2: Probability that an update takes at most 2 hours ", "\n", prob_q2, "\n")
Q 2: Probability that an update takes at most 2 hours
0.4865829
>
```

```
> prob_q3i <- 1 - pnorm(130, mean=100, sd=15)
> cat("Q 3i: Probability of IQ above 130 ", "\n", prob_q3i, "\n")
Q 3i: Probability of IQ above 130
0.02275013
>
```

```
> iq_95th <- qnorm(0.95, mean=100, sd=15)
> cat("Q 3ii: IQ score for 95th percentile ", "\n", iq_95th, "\n")
Q 3ii: IQ score for 95th percentile
124.6728
>
```