IT24102757 – Perera R.A.G.N.S

IT2120 - Probability and Statistics

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
3
4  #Q1
5  #Uniform Distribution
6  #Let X - The number of minutes the train arrives after 8:00 a.m.
7  #P(10 <= X <= 25) = P(X <= 25) - P(X <= 10)
8  punif(25, min = 0, max = 40, lower.tail = TRUE) - punif(10, min = 0, max = 40, lower.tail = TRUE)
```

```
> #Q1
> #Uniform Distribution
> #Let X - The number of minutes the train arrives after 8:00 a.m.
> #P(10 <= X <= 25) = P(X <= 25) - P(X <= 10)
> punif(25, min = 0, max = 40, lower.tail = TRUE) - punif(10, min = 0, max = 40, lower.tail = TRUE)
[1] 0.375
```

Q1)

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.

```
12  #Q2
13  #Exponential Distribution
14  #Let X - The time (in hours) to complete a software update
15  #P(X <= 2)
16  pexp(2, rate = 0.33, lower.tail = TRUE)
```

```
> #Q2
> #Exponential Distribution
> #Let X - The time (in hours) to complete a software update
> #P(X <= 2)
> pexp(2, rate = 0.33, lower.tail = TRUE)
[1] 0.4831487
```

Q2)

Q3)

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?

```
#Q3
#Normal Distribution
#i) P(X > 130) = 1 - P(X <= 130)
1 - pnorm(130, mean = 100, sd = 15, lower.tail = TRUE)
#ii) P (X <= x) = 0.95
qnorm(0.95, mean=100, sd=15, lower.tail=TRUE)
```

```
> #Q3
> #Normal Distribution
> #i) P(X > 130) = 1 - P(X <= 130)
> 1 - pnorm(130, mean = 100, sd = 15, lower.tail = TRUE)
[1] 0.02275013
> #ii) P (X <= x) = 0.95
> qnorm(0.95, mean=100, sd=15, lower.tail=TRUE)
[1] 124.6728
```