Lab Sheet 07

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.?

```
> # Question 1: Uniform Distribution
> # X ~ U(0, 40)
> # P(10 ≤ X ≤ 25)
> punif(25, min = 0, max = 40, lower.tail = TRUE) - punif(10, min = 0, max =
40, lower.tail = TRUE)
[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.

```
> # Question 2: Exponential Distribution
> # X ~ Exp(rate = 1/3)
> # P(X ≤ 2)
> pexp(2, rate = 1/3, lower.tail = TRUE)
[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?

```
> # Question 3 - Part i: Normal Distribution
> # X ~ N(100, 15)
> # P(X > 130)
> 1 - pnorm(130, mean = 100, sd = 15, lower.tail = TRUE)
[1] 0.02275013
```

ii. What IQ score represents the 95th percentile?

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> # Question 3 - Part ii: 95th percentile of N(100, 15)
> qnorm(0.95, mean = 100, sd = 15, lower.tail = TRUE)
[1] 124.6728
```