Ps lab 7

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Exercise

Question 1: Uniform Distribution

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.?

```
# Exercise
#Question 1: Uniform Distribution
# What is the probability that the train arrives between 8:10 a.m. and 8:25 a.m.?
prob_q1 <- punif(25, min=0, max=40) - punif(10, min=0, max=40)
cat(prob_q1)
```

```
> prob_q1 <- punif(25, min=0, max=40) - punif(10, min=0, max=40)
> cat(prob_q1)
0.375
```

Question 2: Exponential Distribution

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

```
> #Question 2: Exponential Distribution
> prob_q2 <- pexp(2, rate=1/3)
> cat(" Probability that an update takes at most 2 hours", prob_q2)
 Probability that an update takes at most 2 hours 0.4865829
```

Question 3i: Normal Distribution

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 3i: Normal Distribution
prob_q3i <- 1 - pnorm(130, mean=100, sd=15)
cat("Probability of IQ above 130 " , prob_q3i)
```

```
> #Question 3i: Normal Distribution
> prob_q3i <- 1 - pnorm(130, mean=100, sd=15)
> cat("Probability of IQ above 130 " , prob_q3i)
Probability of IQ above 130  0.02275013
```

ii.) What IQ score represents the 95th percentile?

```
#Question 3ii: 95th Percentile
iq_95th <- qnorm(0.95, mean=100, sd=15)
cat("IQ score for 95th percentile", iq_95th)
```

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