Course project 2

Part 1

Question 1 : Show the sample mean and compare it to the theoretical mean distribution

```
n <- 40
Simulations <- 1000
Lambda <- 0.2
SampleMean <- NULL
for(i in 1:Simulations) {
  SampleMean <- c(SampleMean, mean(rexp(n, Lambda)))
}
mean(SampleMean)
```

```
## [1] 4.98999
```

Question 2: Show the sample variance and compare it to the thoretical variance of the distribtution.

The theoretical standard deviation of the distribution is also 1/lambda , which, for a lambda of 0.2 , equates to 5 . The variance is the square of the standard deviation, which is 25
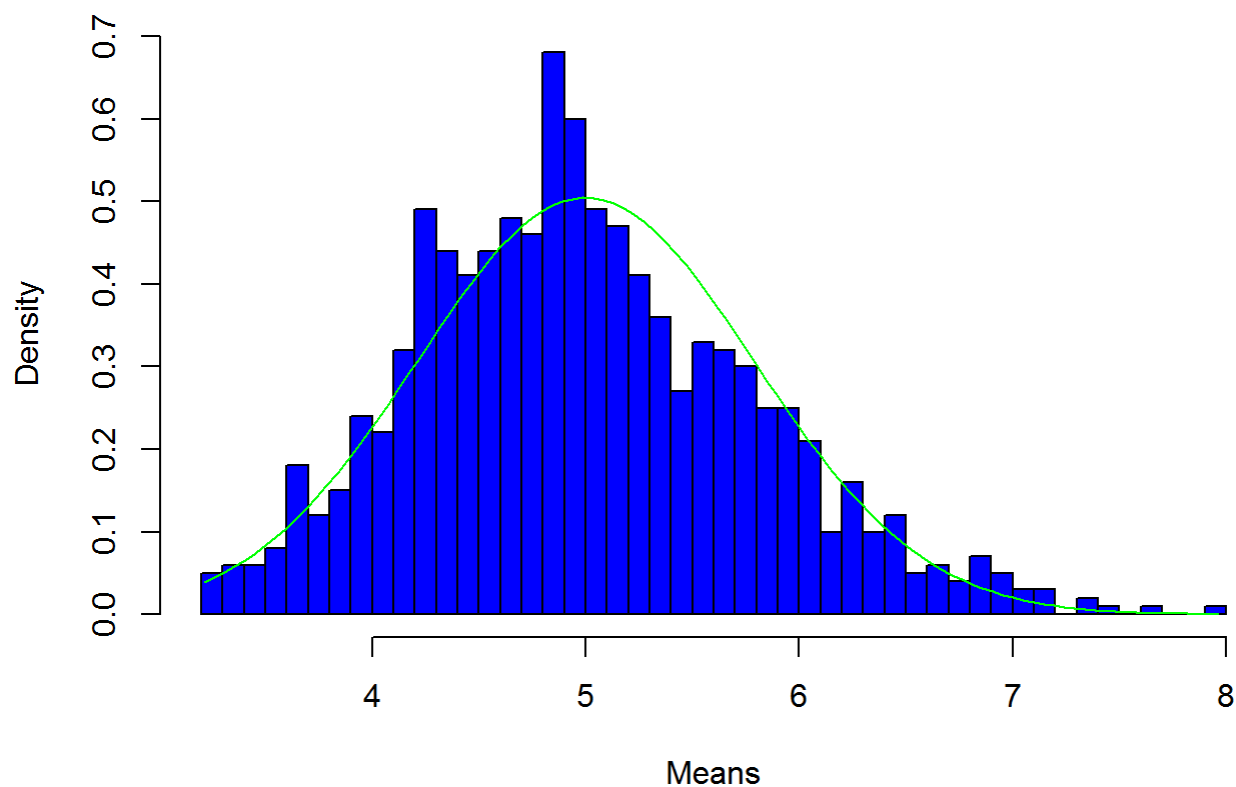
```
Variance <- var(SampleMean)
```

0.6 is close to the theoretical distribution.

Show that the distribution is appoximately normal

```
hist(SampleMean, breaks = n, prob = T, col = "blue", xlab = "Means")
x <- seq(min(SampleMean), max(SampleMean), length = 100)
```

```
lines(x, dnorm(x, mean = 1/Lambda, sd = (1/Lambda/sqrt(n))), pch = 25, col = "green")
```
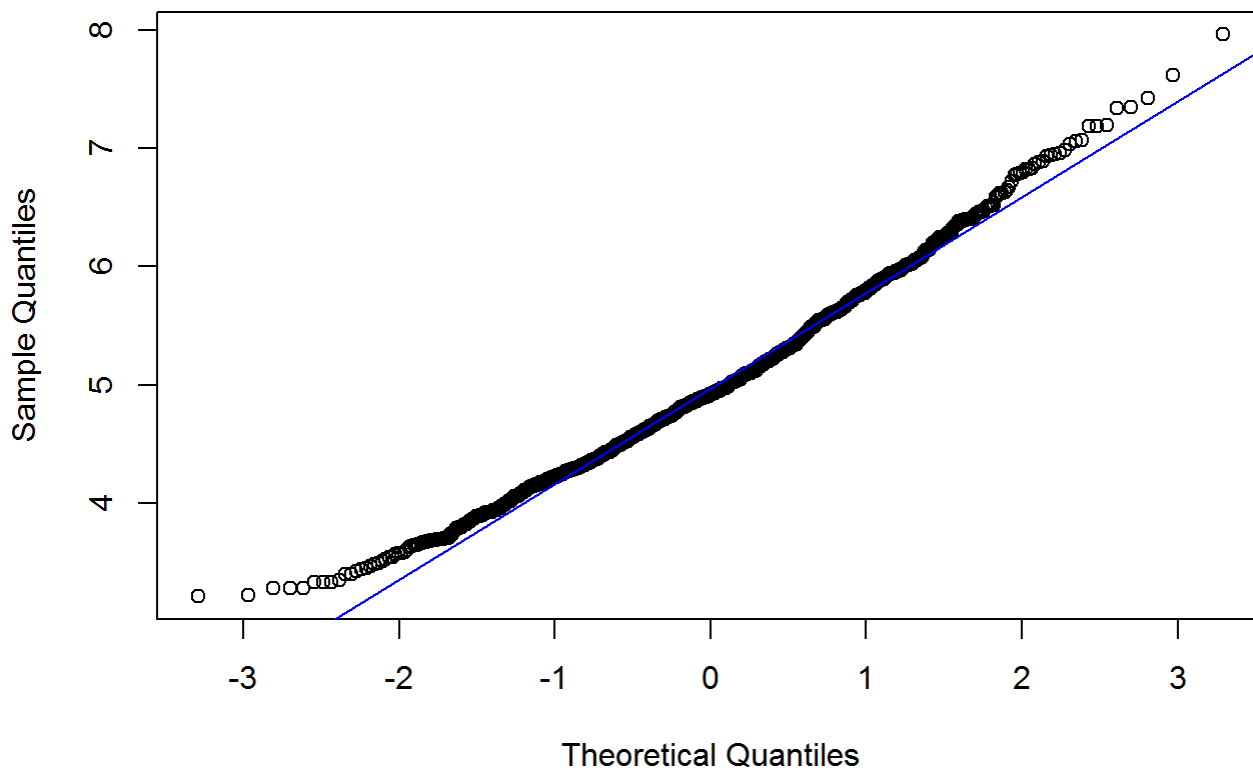
Histogram of SampleMean

Normal QQ Plot

```
qqnorm(SampleMean)
qqline(SampleMean, col = "blue")
```

Normal Q-Q Plot

The distribution averages of 40 exponentials is very close to a normal distribution