Statistical Inference Assessment Part 1

Question 1

Firstly creating 1000 simulations of 40 exponential(0.2)s, and taking their corresponding means,

```
NoOfExponentials<-40
NoOfSamples<-1000
lambda = 0.2
SimulatedResults<-apply(matrix(rexp(NoOfExponentials*NoOfSamples, lambda),NoOfSamples,NoOfExponentials)
```

and distribution is centered at,

```
mean(SimulatedResults)
```

```
## [1] 5.029006
```

and theoretical center of the distribution,

```
1/lambda
```

```
## [1] 5
```

So, they are quite close to each other.

Question 2

Variance of the distribution is,

```
var(SimulatedResults)
```

```
## [1] 0.6293432
```

and theoretical variance is,

```
((1/lambda)/sqrt(40))^2
```

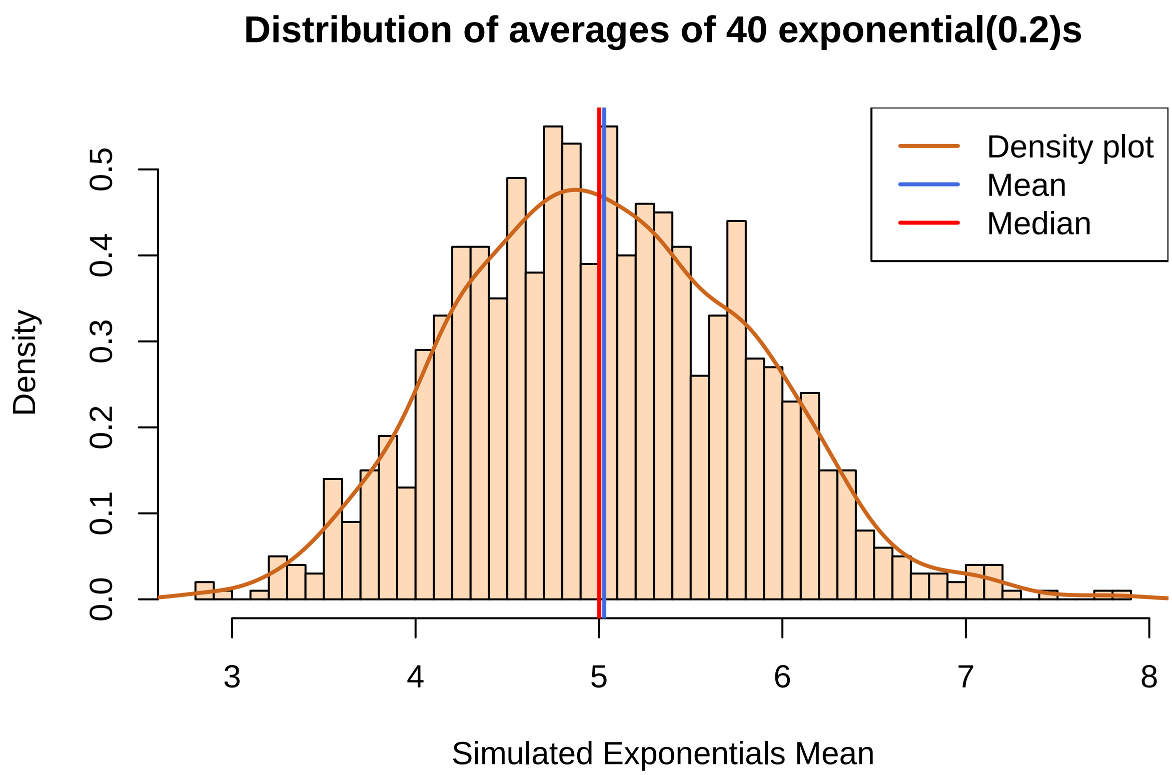
```
## [1] 0.625
```

So, they are quite close to each other.

Question 3

By looking at distribution, we easily infer that it is normal distribution.

```r
hist(SimulatedResults, # histogram
     col = "peachpuff", # column color
     border = "black",
     prob = TRUE, # show densities instead of frequencies
     xlab = "Simulated Exponentials Mean",
     main = "Distribution of averages of 40 exponential(0.2)s",
     breaks = 60)
lines(density(SimulatedResults),lwd = 2, col = "chocolate3")
abline(v = mean(SimulatedResults),col = "royalblue",lwd = 2)
abline(v = median(SimulatedResults),col = "red",lwd = 2)
legend(x = "topright",c("Density plot", "Mean", "Median"),col = c("chocolate3", "royalblue", "red"),lwd
```



Question 4

The coverage of the confidence interval for 1/lambda: X¯±1.96*S/???n.

```r
mean(SimulatedResults) + c(-1,1)*1.96*sd(SimulatedResults)/sqrt(1000)
```

```
## [1] 4.979836 5.078176
```