Coursera Statistical Inference Class 6

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Question 1 of 2

Illustrate via simulation and associated explanatory text the properties of the distribution of the mean of 40 exponential(0.2)s. You should

1. Show where the distribution is centered at and compare it to the theoretical center of the distribution.
2. Show how variable it is and compare it to the theoretical variance of the distribution.
3. Show that the distribution is approximately normal.
4. Evaluate the coverage of the confidence interval for 1/lambda: $\bar{X} \pm 1.96 Snv$.

Part 1

```
setwd("C:/Coursera/Course6_StatInf")
numsim <- 1000
numexp <- 40
lambda = .2

q1 <- replicate (numsim, rexp(numexp, lambda))
1/lambda

## [1] 5

m1 <- apply(q1,2,mean)
mean(m1)

## [1] 4.99
```

Part 2

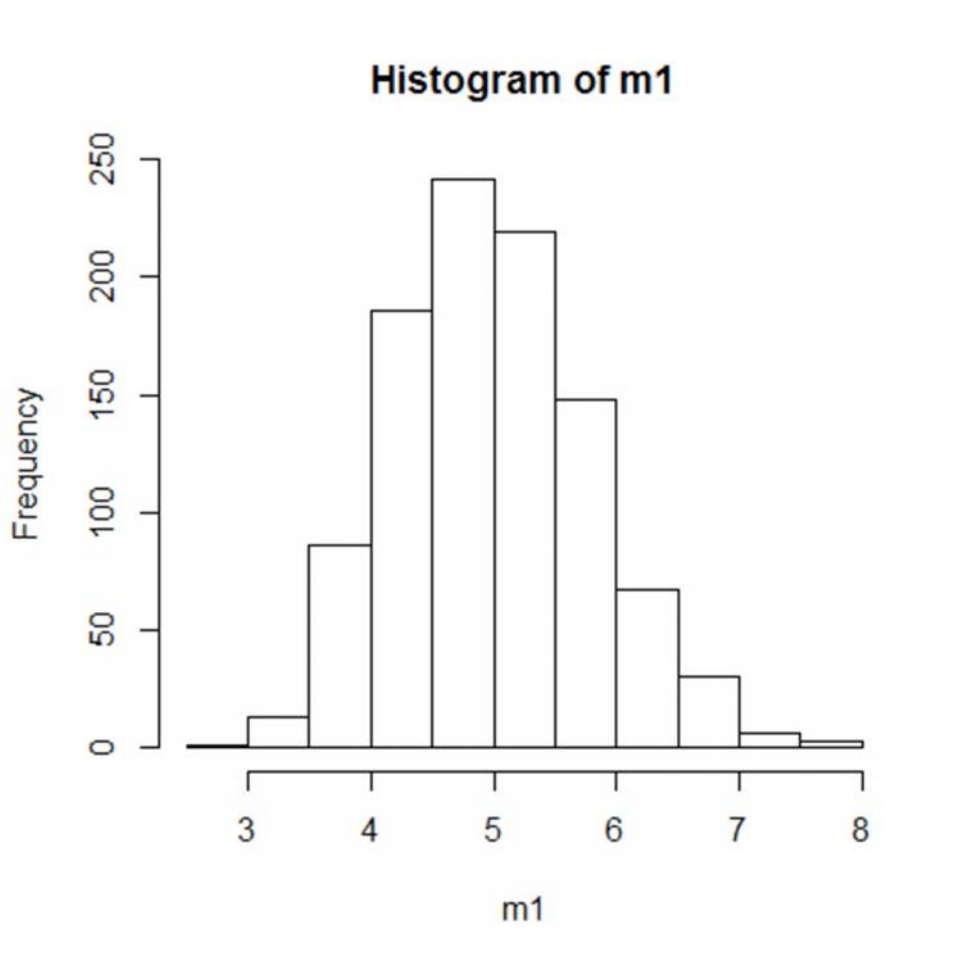
```
q1 <- replicate (numsim, rexp(numexp, lambda))
1/lambda

## [1] 5

sd(m1)^2

## [1] 0.6204
```

```
(1/lambda)^2/numexp
```

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

Part 3 - Show Normality - refer to m1 list of means in part 1

```
hist(m1)
```



The histogram of the 1000 means clearly shows an normal distribution

Part 4

```
cill <- m1 - 1.96*sd(m1)/sqrt(numexp)
ciul <- m1 + 1.96*sd(m1)/sqrt(numexp)

mean(cill < 1/lambda & ciul > 1/lambda)
```

```
## [1] 0.225
```

```
# So the coverage is valid as the Confidence Interval contains 95% of the Mea
n (SD) of Lamba
```