Statistical Inference Course Project Part 1

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Overview:

This project investigates the exponential distribution in R and compare it with the Central Limit Theorem.

Simulations:

The exponential distribution can be simulated in R with rexp(n, lambda) where lambda is the rate parameter. The mean of exponential distribution is 1/lambda and the standard deviation is also 1/lambda. Set lambda = 0.2 and number to average is 40. I do a thousand simulations.

```
lambda = 0.2
n = 40
nSim = 1:1000
set.seed(200)
Means <- data.frame(x = sapply(nSim, function(x) {
    mean(rexp(n, lambda))
}))
```

Sample Mean versus Theoretical Mean:

```
s_mean<-mean(Means$x)
s_mean
```

```
## [1] 4.984126
```

```
t_mean<-(1/lambda)
t_mean
```

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

The sample mean is almost the same as the theoretical mean with 0.016 difference.

Sample Variance versus Theoretical Variance:

```
s_var<-var(Means$x)
s_var
```

```
## [1] 0.6580709
```

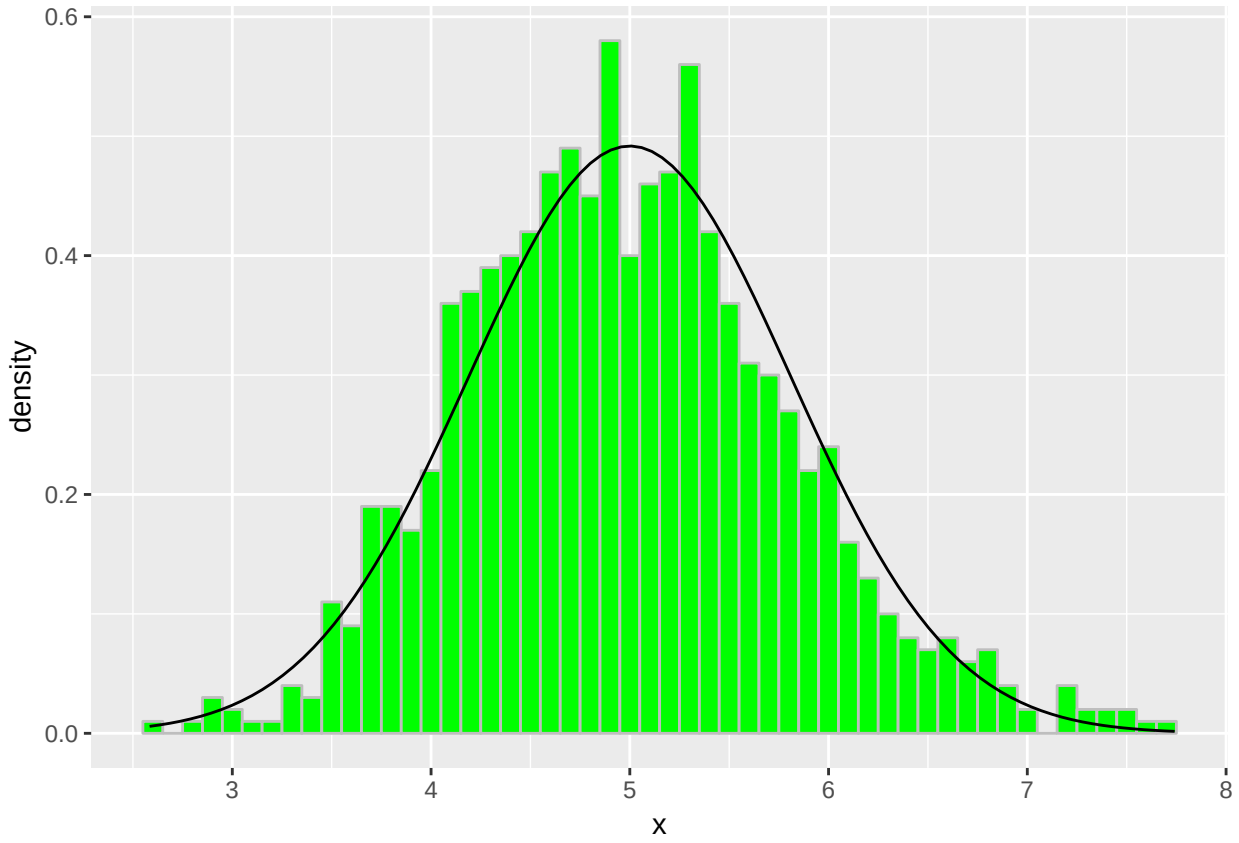
```r
t_var<-((1/lambda)/sqrt(n))^2
t_var
```

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

The sample variance is almost the same as the theoretical variance with 0.033 difference.

Distribution:

```r
library(ggplot2)
ggplot(data=Means,aes(x=x))+geom_histogram(aes(y=..density..),fill="green",binwidth=0.1,color="grey")+s
```



Yes the distribution is approximately normal.