Statistical Inference Course Project PART1

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Overview

This is the course project for the statistical inference class from Coursera.I created this report describes the exponential distribution in R and compare it with the Central Limit Theorem.

1. The sample mean and the theoretical mean of distribution

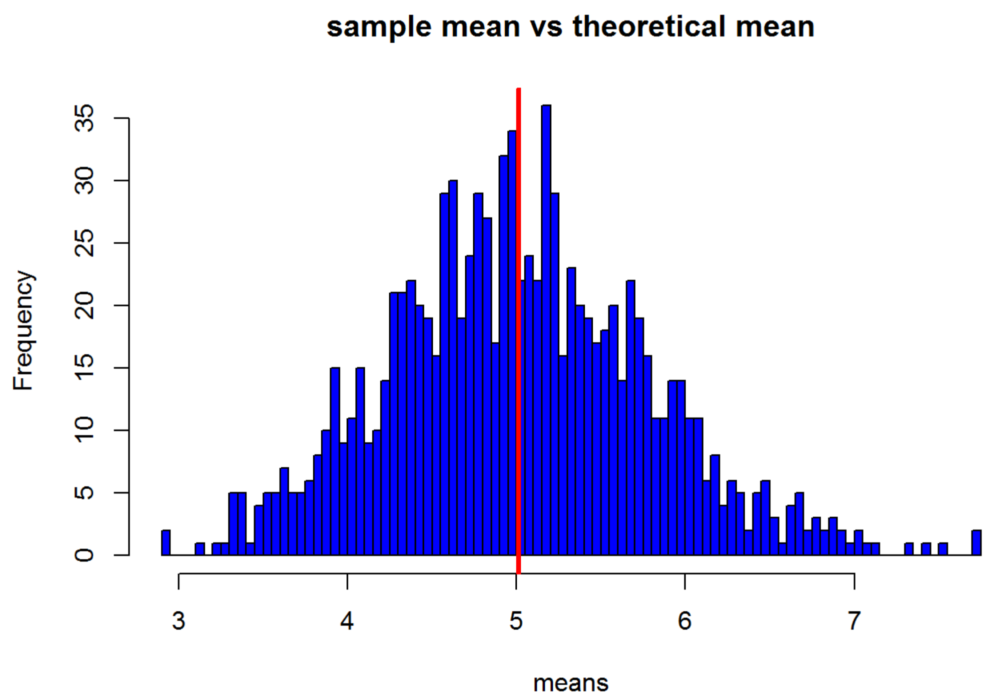
```
# seed can make my code reproducible
set.seed(123)

n <- 40
lambda <- .2
simulation <- 1000

expd <- NULL
for(i in 1:simulation){
  expd <- rbind(expd,rexp(n,lambda))
}

means <- apply(expd,1,mean)
## so, we can know sample mean
sample_m <- mean(means)
sample_m
```

```
## [1] 5.011911
```

```
## thesample()oretical mean equal to 1/lambda
theoretical <- 1/lambda
theoretical
```

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

```
## Draw a histogram show data
hist(means,col="blue",main="sample mean vs theoretical mean",breaks=100)
abline(v=mean(means),col="red",lwd=3)
```



So, the sample mean is 5.011911, theoretical mean is 5.

2. The variance of distribution: sample vs theoretical

```
## standard deviation and sample distribution
means_sd <- sd(means)
means_sd
```

```
## [1] 0.7749147
```

```
## variance of sample distribution
var_sample <- means_sd^2
var_sample
```

```
## [1] 0.6004928
```

```
## standard deviation  of theoretical distribution
sd_theory <- (1/lambda)/sqrt(n)
sd_theory
```

```
## [1] 0.7905694
```

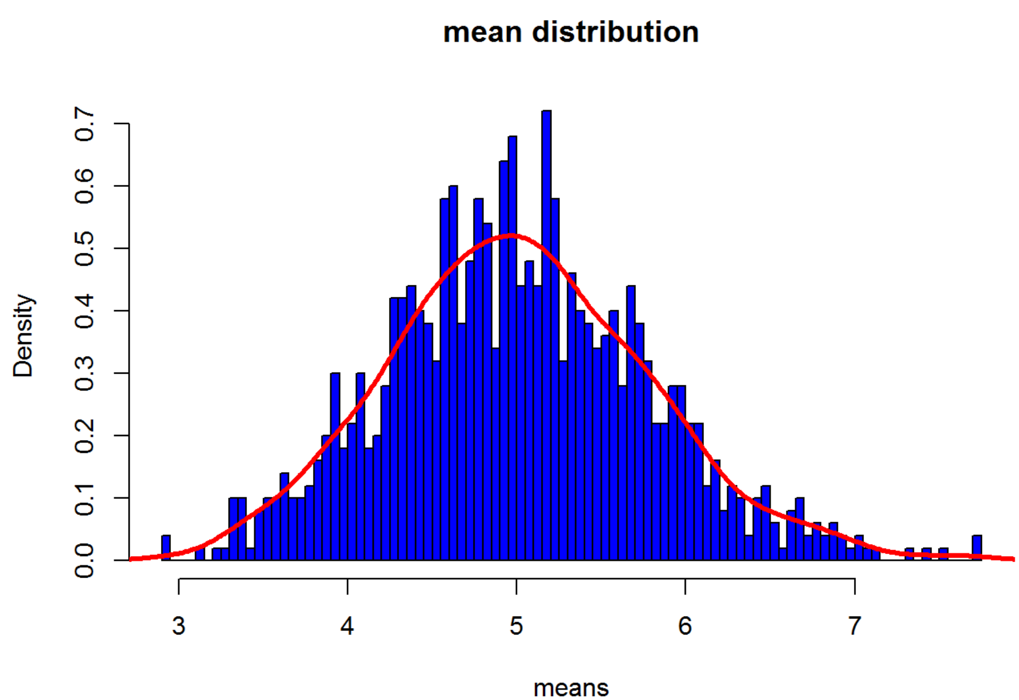
```
## variance of theoretical distribution
var_theory <- ((1/lambda)*(1/sqrt(n)))^2
var_theory
```

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

So, we calculated standard deviation of sample distribution is 0.7762079 ,variance of distribution is 0.6024988 ; For theoretical standard deviation is 0.7905694 and variance of distribution is 0.625.

3. The distribution is approximately narmal

```
hist(means,col="blue",main="mean distribution",probability = TRUE,breaks=100)
## add density line, so we can see it looks like normal distribution
lines(density(means),lwd=3,col="red")
```



So, as show in graph , the distribution looks like normal ,because the curve likes a bell.