Course Project-Part 1

YYC

May 7, 2017

Overview

The exponential distribution in R and comparison of it with the Central Limit Theorem will be investigated in this part of project.

1000 times of simulations for exponention distribution

```
set.seed(2017)
la=0.2
n=40
mns=NULL
for (i in 1:1000) {mns=c(mns,mean(rexp(n,la)))}
```

Compare sample mean and theoretical mean

```
# calulate the sample mean
samplemean=mean(mns)
samplemean
```

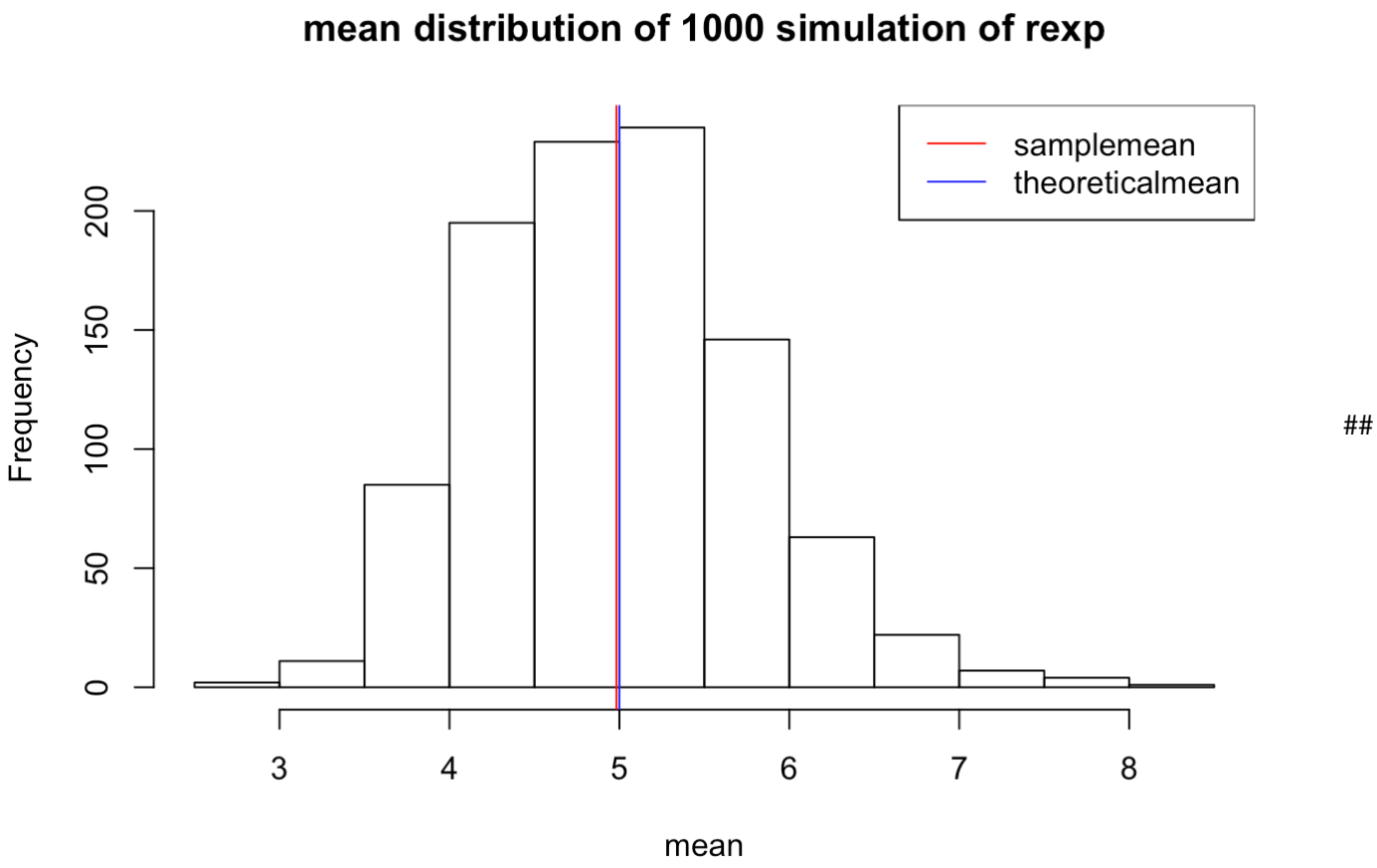
```
## [1] 4.982863
```

```
#calulate the theoretical mean
theoreticalmean=1/la
theoreticalmean
```

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

Plot of simulation and comparasion of means

```
hist(mns,xlab="mean",main="mean distribution of 1000 simulation of rexp")
abline(v=samplemean, col="red")
abline(v=theoreticalmean,col="blue")
legend("topright",c("samplemean","theoreticalmean"),lty=c(1,1),col = c("red","blue"))
```



##

Compare sample variance and theoretical variance

```
# calulate the sample variance
sample_variance=sd(mns)^2
sample_variance
```

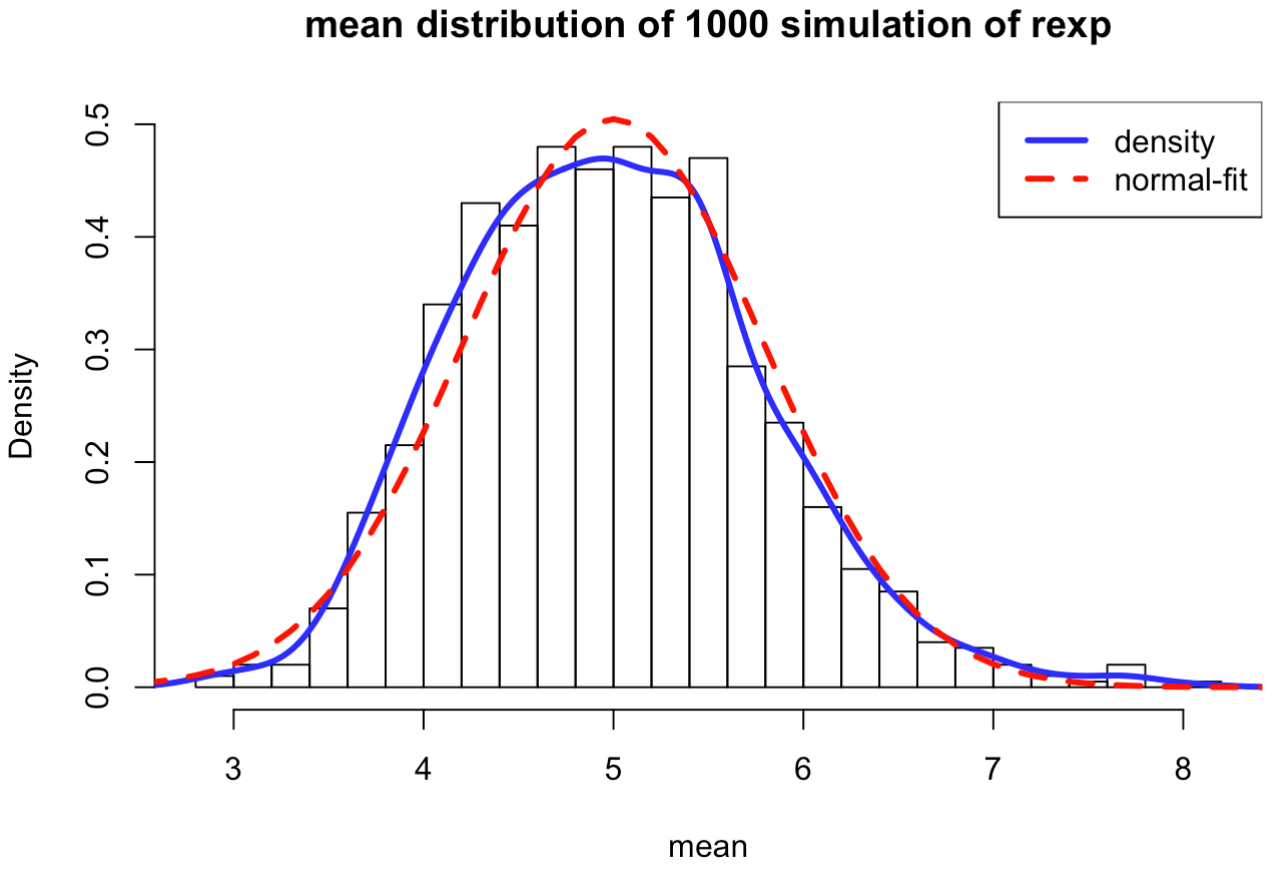
```
## [1] 0.6267826
```

```
# calulate the theoretical variance
theoretical_variance=(1/la)^2/n
theoretical_variance
```

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

Distribution of means

```
hist(mns,breaks=30,prob=TRUE,xlab="mean",main="mean distribution of 1000 simulation of r
exp",ylim=c(0,0.5))
lines(density(mns),col="blue",lwd=3)
normfit<-dnorm(seq(0,9,by=0.1),mean=theoreticalmean,sd=sqrt(theoretical_variance))
lines(seq(0,9,by=0.1),normfit,lty=2,col="red",lwd=3)
legend("topright",c("density","normal-fit"),lty=c(1,2),col = c("blue","red"),lwd=3)
```


mean distribution of 1000 simulation of rexp
density
normal-fit
Density
0.0
0.1
0.2
0.3
0.4
0.5
3
4
5
6
7
8
mean