exp.R

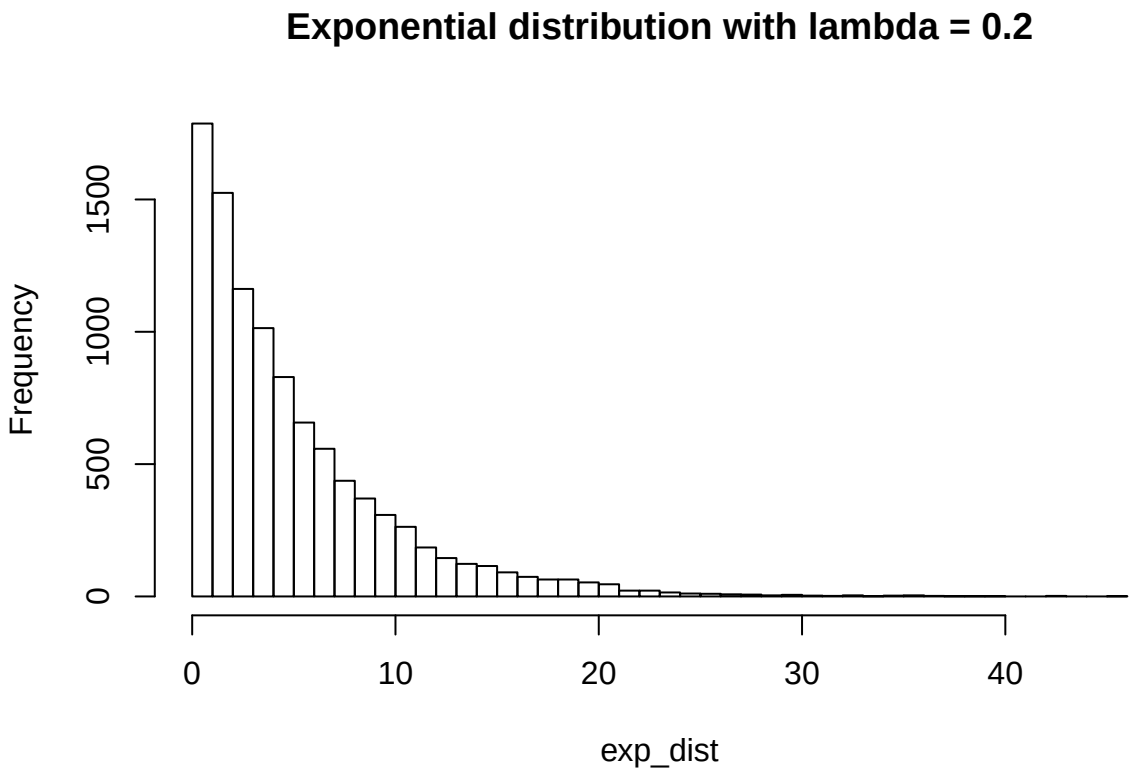
boga

Mon Mar 16 11:38:28 2015

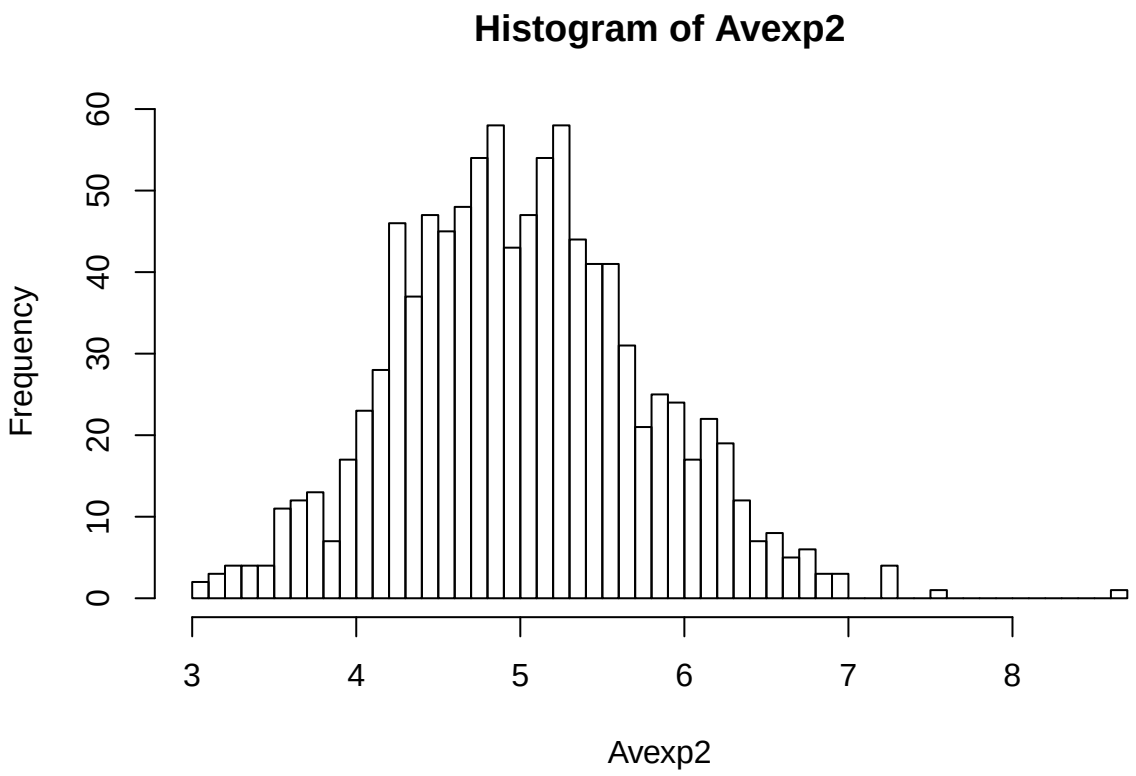
```
lambda <- 0.2
size <- 40 #size of the sample
nsim <- 1000 #number of simulations

#mean and sd of the exponential distribution are defined as 1/lambda
mean <- 1/lambda
std <- 1/lambda

#let's have a look at the exp distribution
set.seed(123)
exp_dist <- rexp(10000, lambda)
h <- hist(exp_dist, breaks=50,main="Exponential distribution with lambda = 0.2")
```




```
#average of 40 exponentials
exp2 <- matrix(rexp(nsim*size, rate=lambda), nsim, size)
Avexp2 <- rowMeans(exp2)
hh <- hist(Avexp2, breaks = 50)
```




```
#mean of new distribution and comparison with theoretical mean
smean = mean(Avexp2)
smean; mean
```

```
## [1] 5.016402
```

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

```
#mean of the distribution of the average of 40 exponentials is close to the theoretical mean (as expect

#I compute now the theoretical standard deviation of sample means (theo_sd) and compare
#with the actual standard deviation of the sample means (ssd).
theo_sd <- std / sqrt(size)
ssd <- sd(Avexp2)
ssd; theo_sd
```

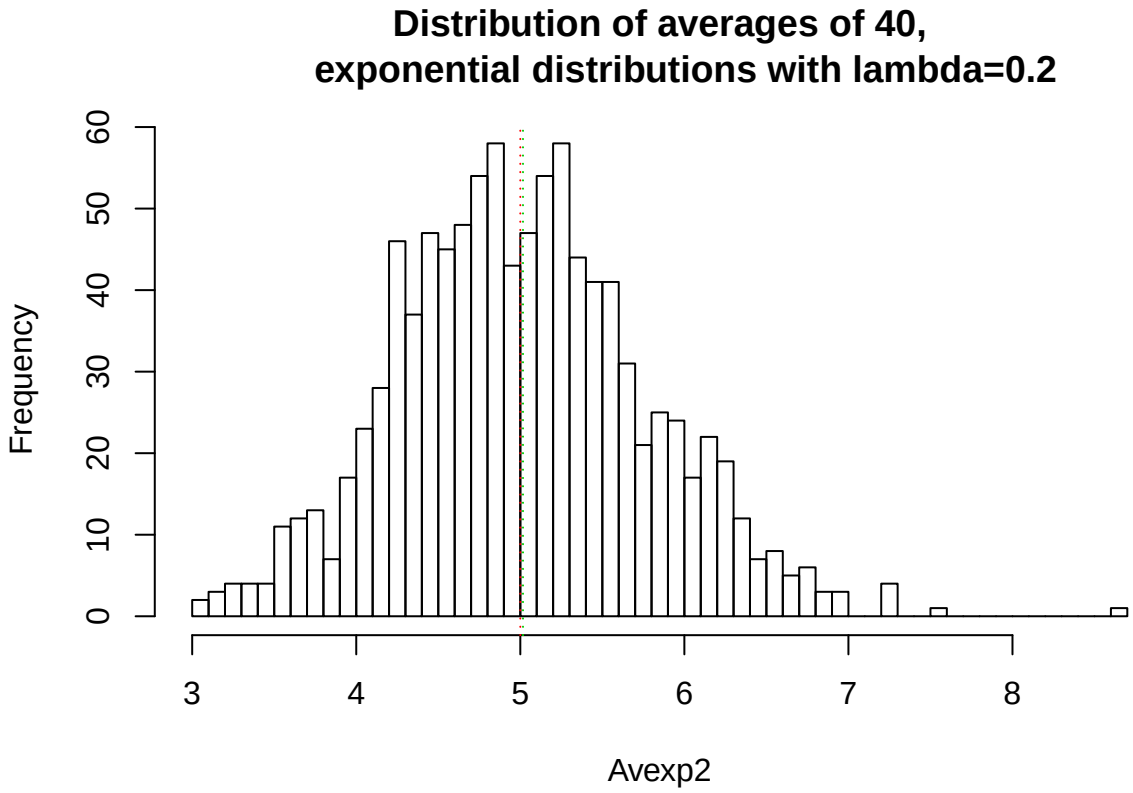
```
## [1] 0.7637965
```

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

```
#As you can see the standard deviation of the averages is close to the theoretical standard deviation

#Now I show that the distribution of the averages of 40 exponential is approximately normal
#The two vertical lines show the sample and theoretical mean

hist(Avexp2, breaks=50,main="Distribution of averages of 40,
     exponential distributions with lambda=0.2")
abline(v=smean,col=3,lty=3)
abline(v=mean, col=2, lty=3)
```




```
qqnorm(Avexp2); qqline(Avexp2)
```