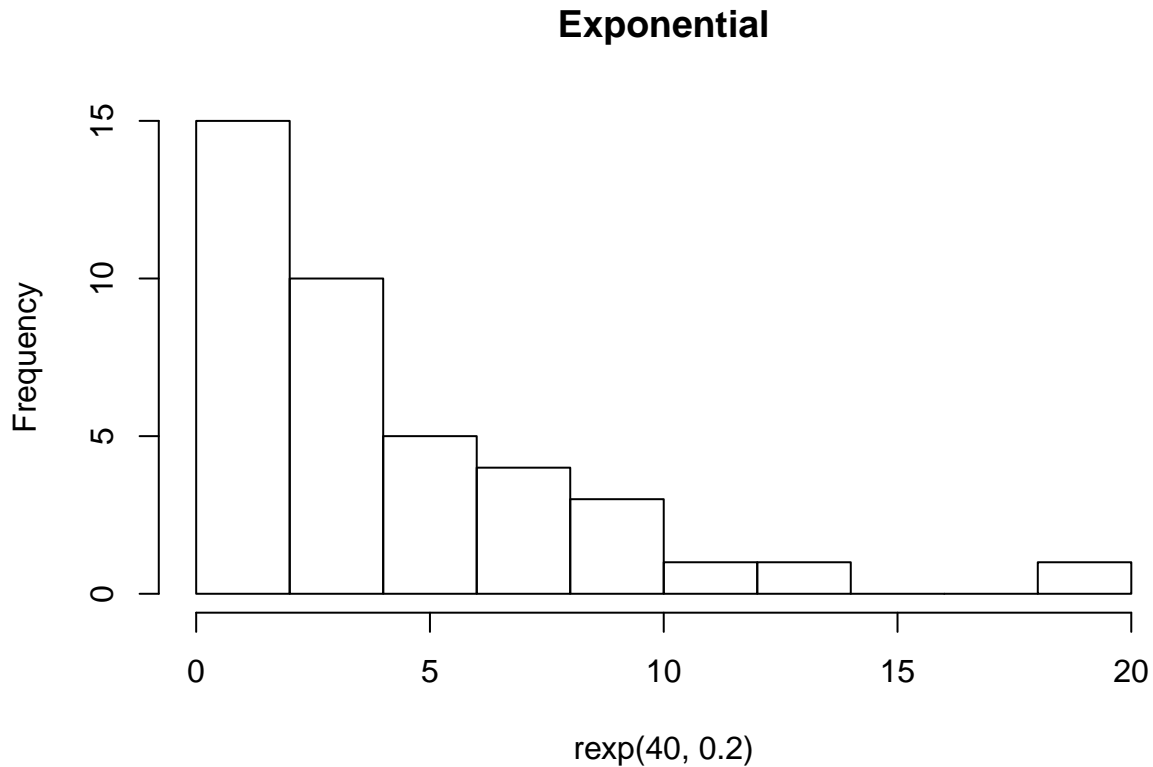


# Statistical Inference

In this project is going to be reported a comparative study between the Mean and Variance of the Exponential distribution vs the Theoretical mean and Variance of it.

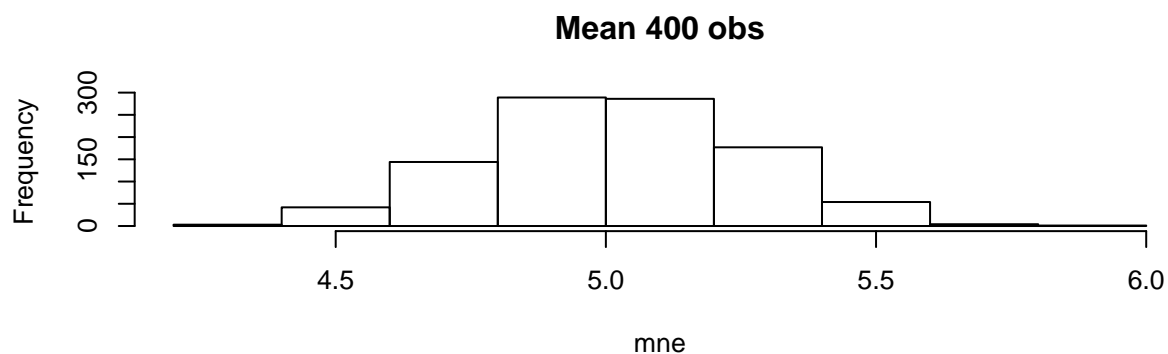
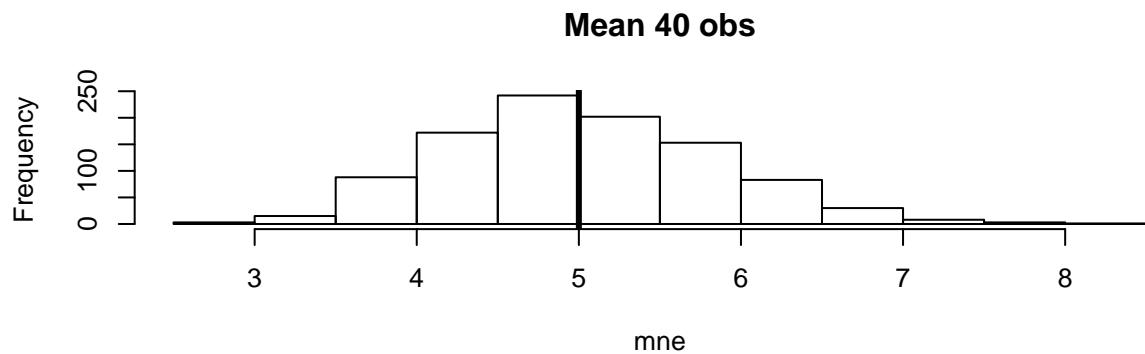
Below is the code for a histogram of 40 random variables of an exponential distribution with  $\lambda = 0.2$

```
hist(rexp(40, 0.2), main="Exponential")
```



**1. Show the sample mean and compare it to the theoretical mean of the distribution.**

Sample Mean versus Theoretical Mean:



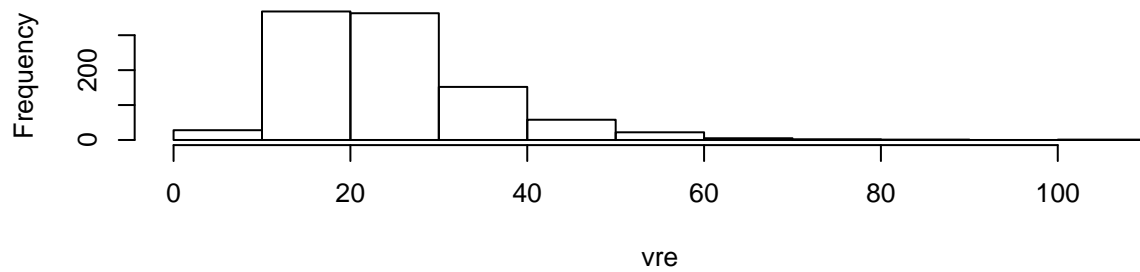
Theoretical mean is  $1/\lambda$  therefore mean =  $1/0.2 = 5$  If we encrease the number observations we can see the data more centered around the teoethical mean.

## 2. Show how variable the sample is (via variance) and compare it to the theoretical variance of the distribution.

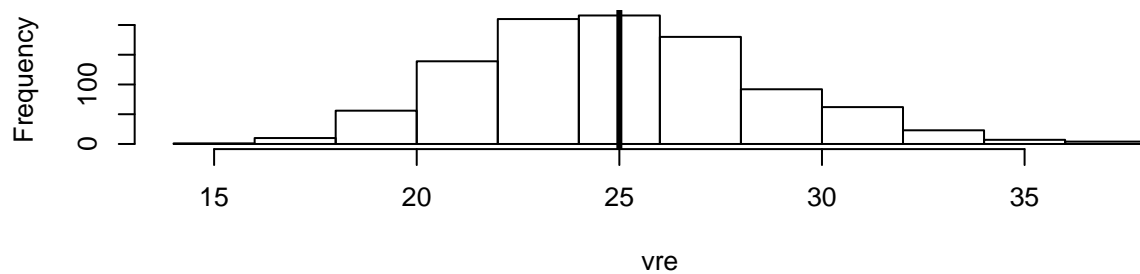
Sample Variance versus Theoretical Variance:

Theoretical variance is  $1/\lambda^2$  therefore variance=  $1/0.2^2$

**Histogram of vre**

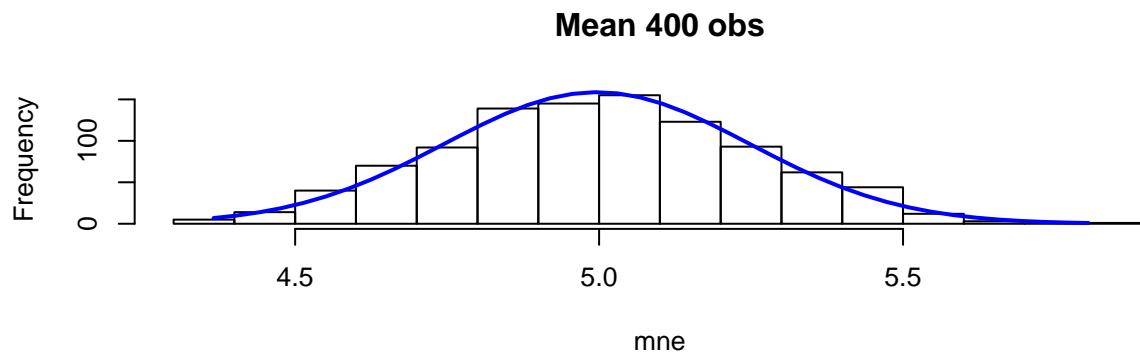
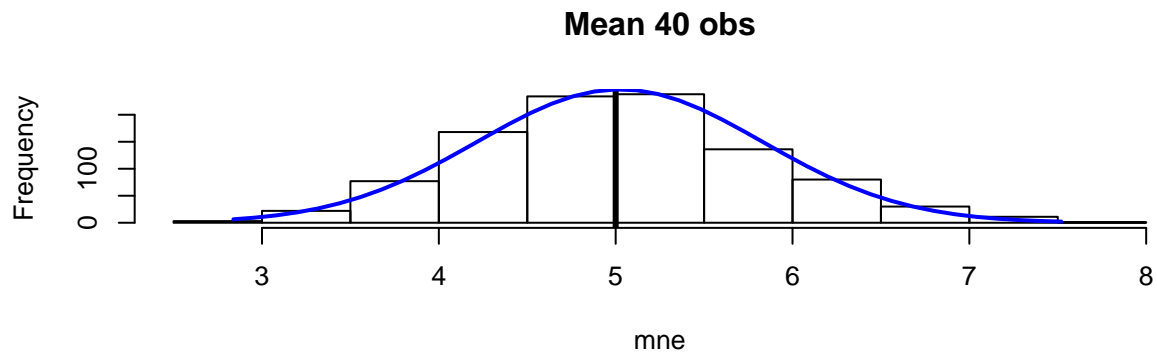


**Histogram of vre**



### 3. Show that the distribution is approximately normal.

Add a Normal Curve



The Central Limit Theorem states that a distribution of iid variables becomes that of a standard normal as the sample size increases.

if we see plots above we can see that in the increase of the samples. The Average tends to center at its real value.