Exploring Exponential Distributions

James Whedbee

September 25, 2015

The purpose of this report is to investigate the exponential distribution. To aid in this investigation, a distribution of means of 40 exponentials was created using 1000 simulations. A lambda value of 0.2 was chosen for all simulations.

```
set.seed(416)
expSimul <- NULL
lambda <- 0.2
n <- 40
for(i in 1:1000) expSimul  <-  c(expSimul,mean(rexp(n,lambda)))
```

This report aims to accompish three goals:

1) Show the sample mean achieved through simulation and compare it to the theoretical mean of the distribution.

The theoretical mean is given by 1/lambda, which is shown below:

```
1/lambda
```

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

The sample mean is calculated as follows:

```
mean(expSimul)
```

```
## [1] 5.013728
```

We can see that the values are quite close.

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

The theoretical variance is given by 1/(((lambda)^2)*(n)), which is shown below:

```
1/(((lambda)^2)*(n))
```

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

The sample variance is calculated as follows:

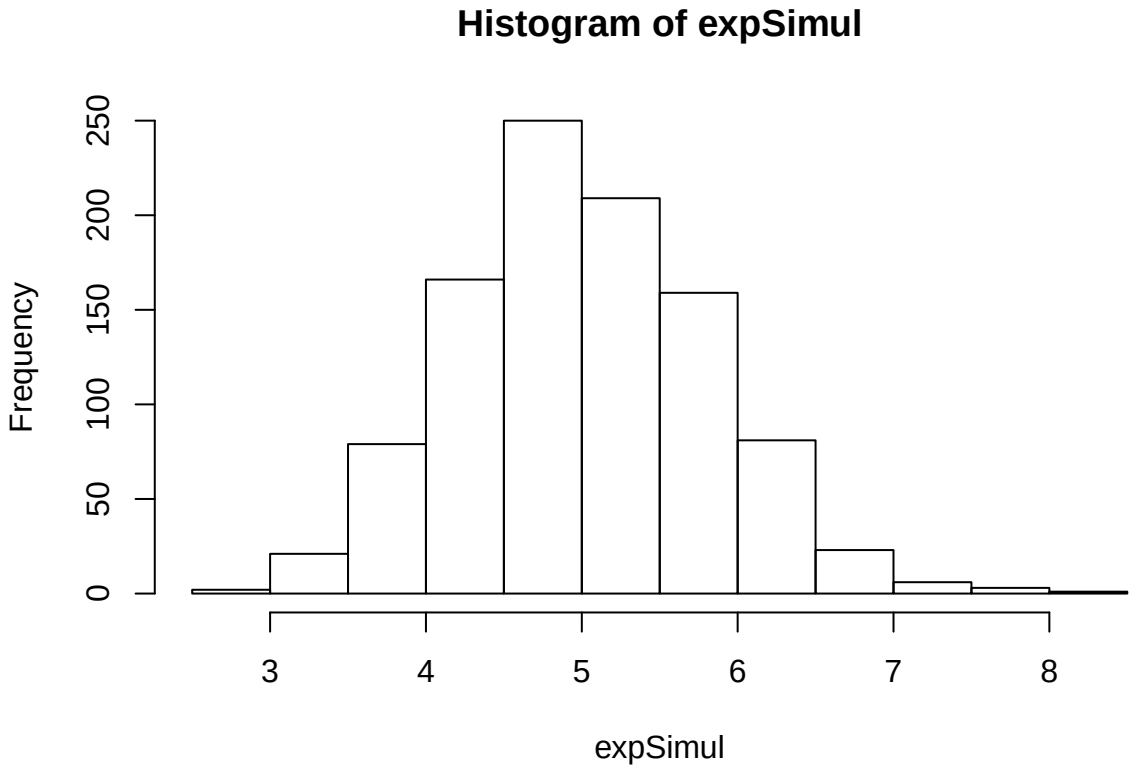
```
var(expSimul)
```

```
## [1] 0.6508008
```

We can see that the values are quite close.

3) Show that the distribution is approximately normal.

Here we can see the distribution of the mean of the simulations is approximately normal:



In contrast, here is the distribution of exponentials from a single simulation of 1000 values: