

Statistical Inference Course Project

Set Parameters for exponential distribution and simulation

```
lambda = .2  
n = 40  
sim = 10000
```

Simulating the mean of a thousand trials

```
set.seed(1)  
means = replicate(sim, expr = mean(rexp(n,lambda)))
```

Theoretical Distribution Mean

```
1/lambda
```

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

Simulated Mean

```
mean(means)
```

```
## [1] 5.003
```

As you can see the results are quite close

Similarly

Theoretical Variance

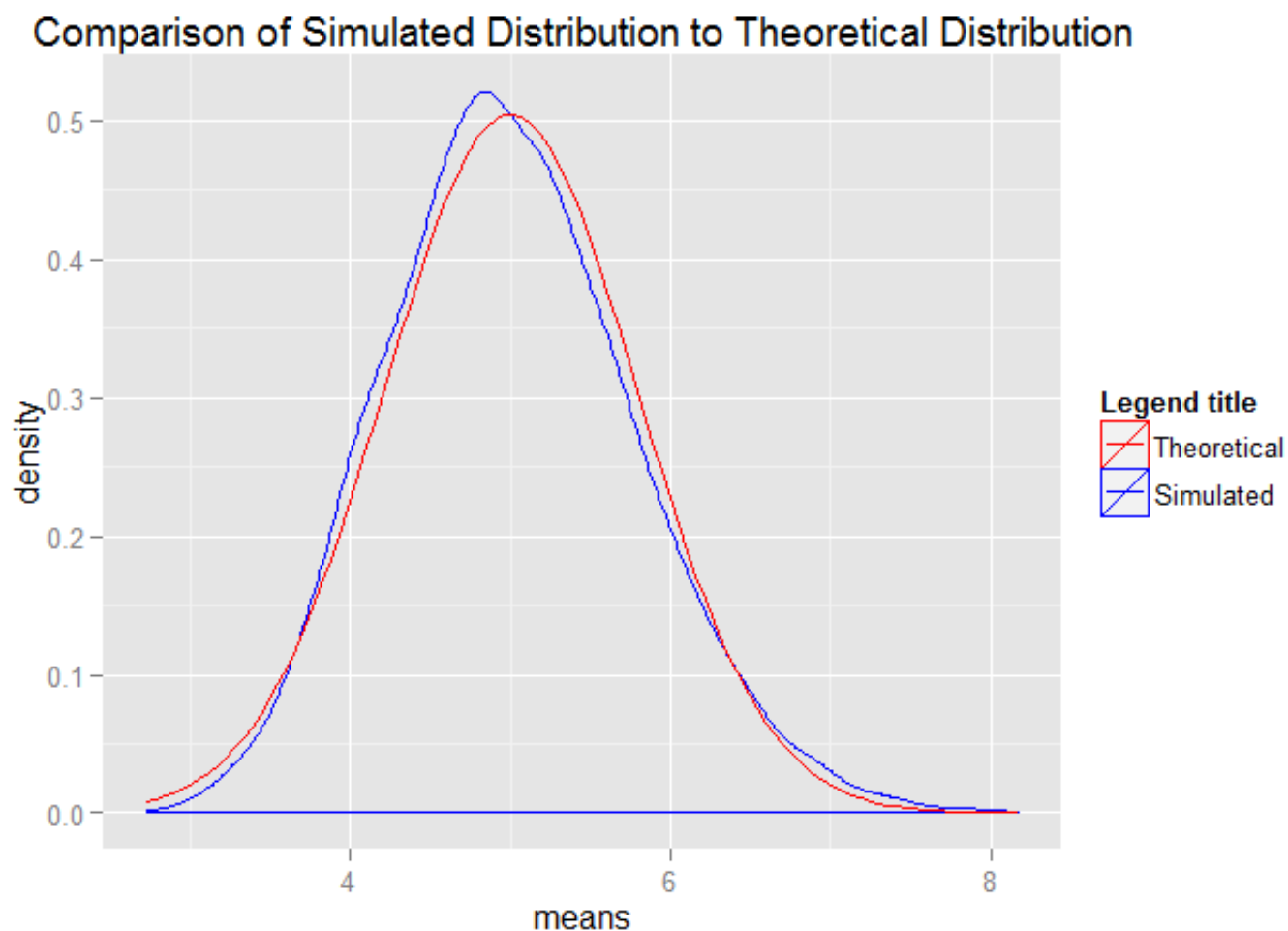
```
1/lambda^2
```

```
## [1] 25
```

```
var(means)*n
```

```
## [1] 24.58
```

```
library(ggplot2)
ggplot(data.frame(means), aes(x=means, color="red")) + geom_density() + stat_function(fun = dnorm, aes(
  color = "blue"), arg = list(mean = 1/lambda, sd=sqrt(lambda^-2/n))) + scale_colour_manual("Legend t
  itle", values = c("red", "blue"), labels = c("Theoretical","Simulated"))+ggtitle("Comparison of Simul
  ated Distribution to Theoretical Distribution")
```



The confidence intervals of the mean estimate

```
mean(means) + c(-1,1)*sd(means)/sqrt(40)*qnorm(.975)
```

```
## [1] 4.760 5.246
```