Statistical Inference Course Project1

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Overview

Overview to be writting here...

Simulations

```
#set seed
set.seed = 1234

#number of simulations to run
simnum <- 1000

#number of distributions to generate
exp_n <- 40

#exponential distribution parameters
exp_lambda <- 0.2
expMean <- NULL
expVar <-NULL
for (a in 1:simnum) {
    expMean = c(expMean, mean(rexp(exp_n, exp_lambda)))
    expVar = c(expVar, var(rexp(exp_n, exp_lambda)))
}
```

Plots Comparing Simulation to Population

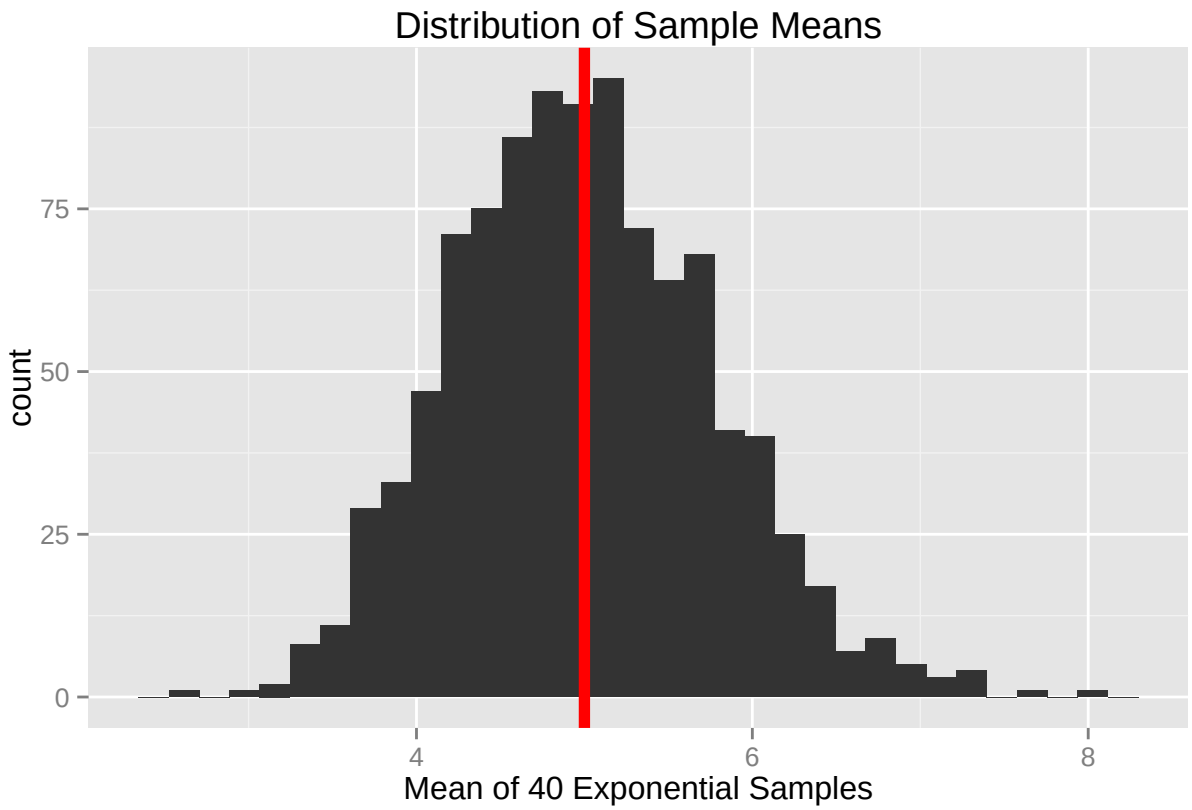
```
#load ggplot2
library(ggplot2)

#Compare Means
popMean <- 1 / exp_lambda
simMean <- mean(expMean)
popMean
```

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

```
simMean
```

```
## [1] 4.991592
```

```r
#Compare Means visually
plt <- qplot(expMean) +
    xlab("Mean of 40 Exponential Samples") +
    ggtitle("Distribution of Sample Means") +
    geom_vline(xintercept = 1 / exp_lambda, colour = "red", size = 2) +
    theme(legend.key = element_rect(fill = "white", color = "white")) +
    theme(legend.background = element_blank())
plt
```



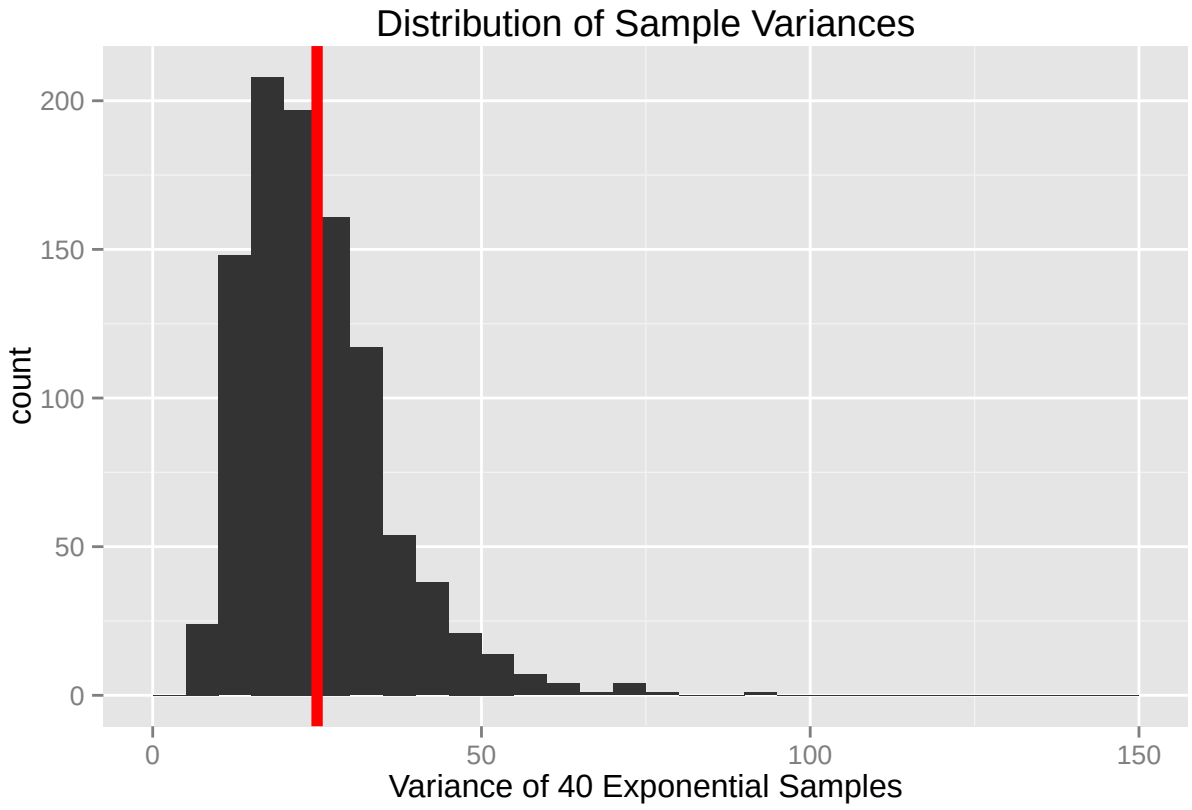

```r
#Compare Variances
popVariance <- (1 / exp_lambda) ^ 2
simVariance <- mean(expVar)
popVariance
```

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

```r
simVariance
```

```
## [1] 24.89016
```

```r
#compare Variances visually
plt.two <- qplot(expVar, main = "Distribution of Sample Variances") +
    xlim(0, 150) +
    xlab("Variance of 40 Exponential Samples") +
    geom_vline(size = 2, xintercept = (1 / exp_lambda)^2, colour = "red")
plt.two
```

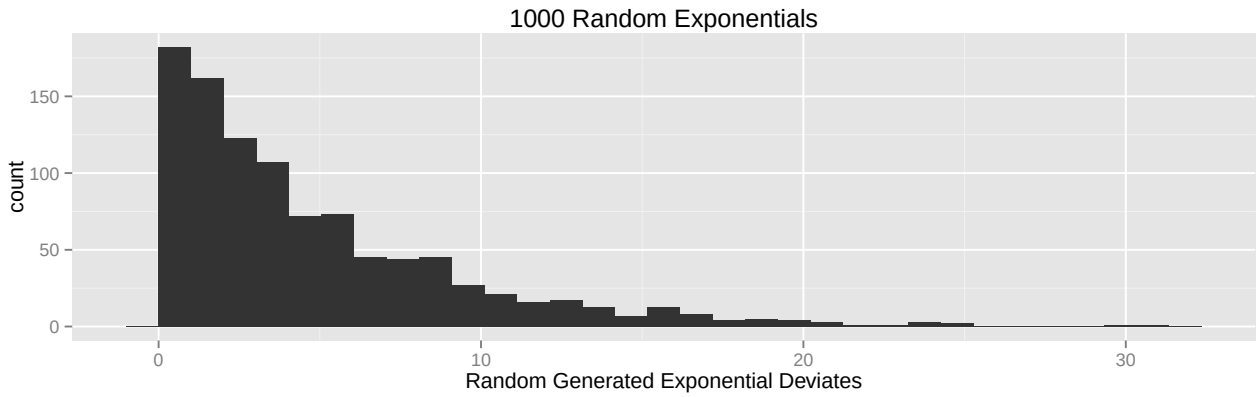


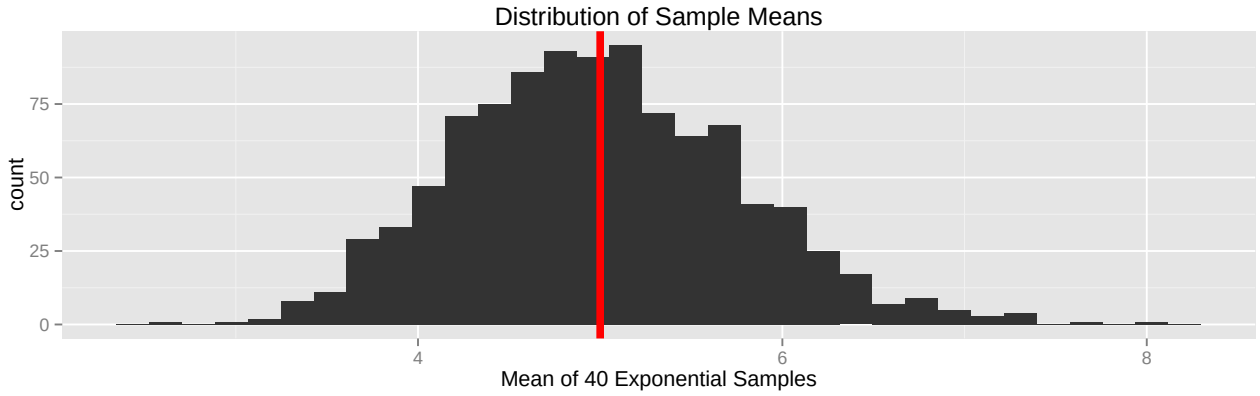
Comparison between Random Variables and Sample Distributions

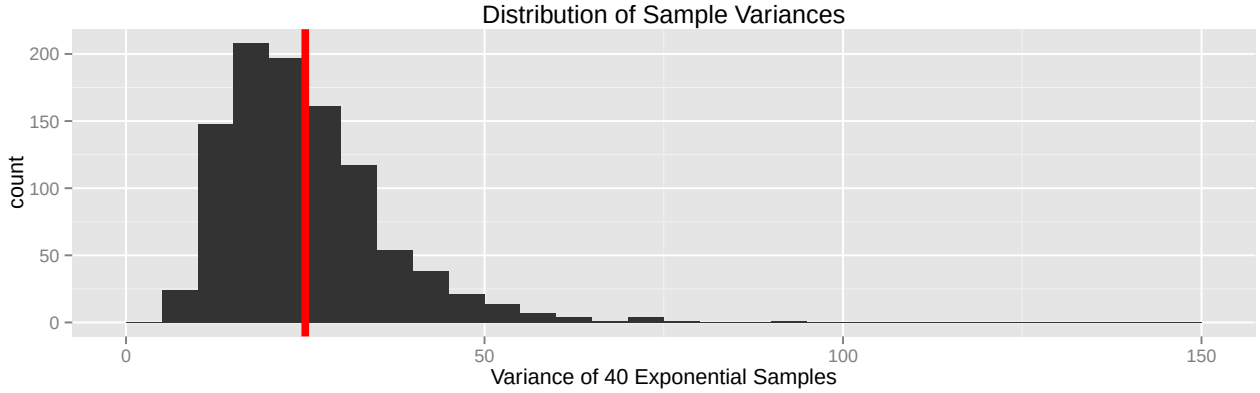
```
#load libs
library(gtable)
```

```
## Loading required package: grid
```

```
library(gridExtra)

#Make 1000 Exponentials
r1 <- qplot(rexp(simnum, exp_lambda),
            main = "1000 Random Exponentials") +
    xlab("Random Generated Exponential Deviates")

#plot
grid.arrange(r1, plt, plt.two)
```


1000 Random Exponentials
count
150
100
50
0
0
10
20
30
Random Generated Exponential Deviates


Distribution of Sample Means
count
75
50
25
0
4
6
8
Mean of 40 Exponential Samples


Distribution of Sample Variances
count
200
150
100
50
0
0
50
100
150
Variance of 40 Exponential Samples