Part 1: Simulation Exercise

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Question 1: Show the sample mean and compare it to the theoretical mean distribution

```
set.seed(12345)
n <- 40
lambda = .2
sim <- 1000
simmean <- NULL
for(i in 1:sim) {
  simmean <- c(simmean, mean(rexp(n, lambda)))
}
mean(simmean) ##the simulation mean
```

```
## [1] 4.971972
```

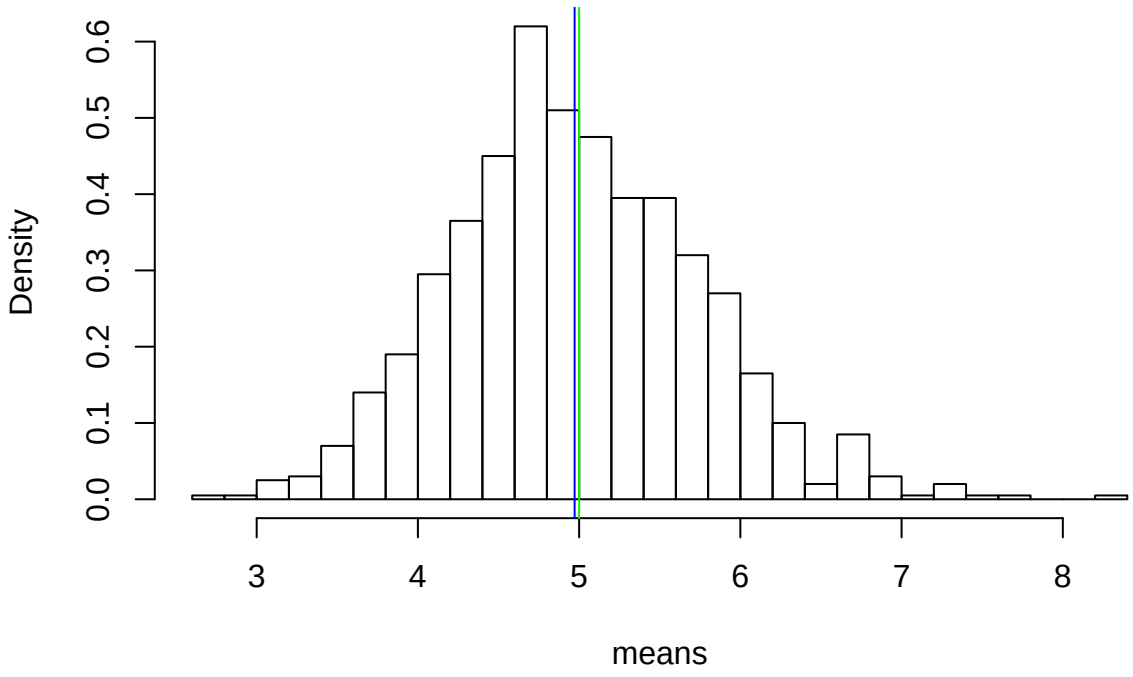
```
theomean <- mean(1/lambda) ##the theoretical mean
theomean
```

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

the simulation mean is 4.97 and the theoretical mean is 5. Therefore our sample is quite close to the theoretical mean and the CLT holds!

Now lets plot it to show just how close they are!

```
hist(simmean,breaks = n, prob = TRUE, xlab = "means", main = "sample mean versus theoretical mean")
abline(v = theomean, pch =30, col = "green")
abline(v = mean(simmean), pch = 30, col = "blue")
```



Question 2: Show the sample is (via variance) and compare it to the theoretical variance of the distribtution

```
var(simmean) ##samplevariance
```

```
## [1] 0.5954369
```

```
(lambda * sqrt(n))^-2 ##theoretical variance
```

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

not large difference between the theoretical variance and the sample variance!