

Stats Inference Project

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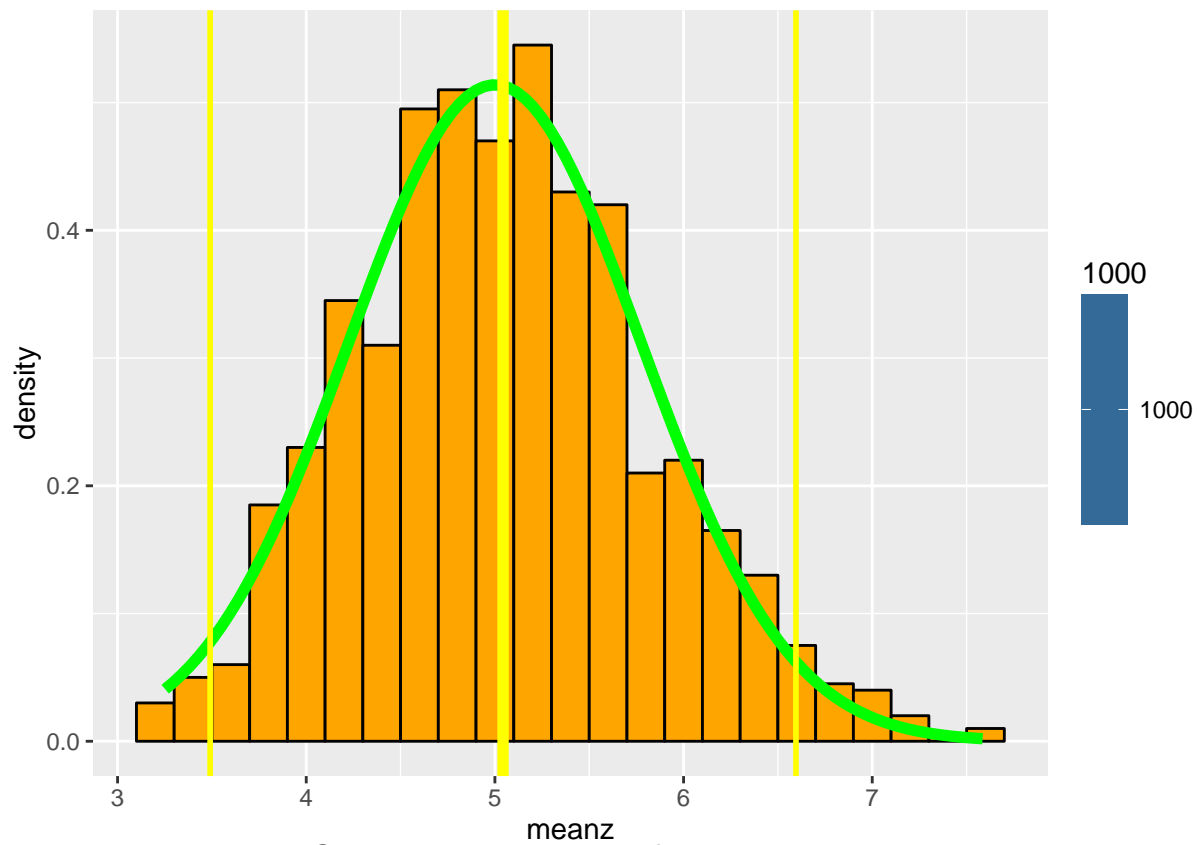
Overview

I ran a simulation where an exponential random set of 40 results - with a mean of 5 and a standard deviation of 5, were generated 1000 times. I found the mean and standard deviation of each set of 40 results and compared the simulated results of the 1000 trials with the theoretical, expected results (expected mean of 5 and standard deviation of 5).

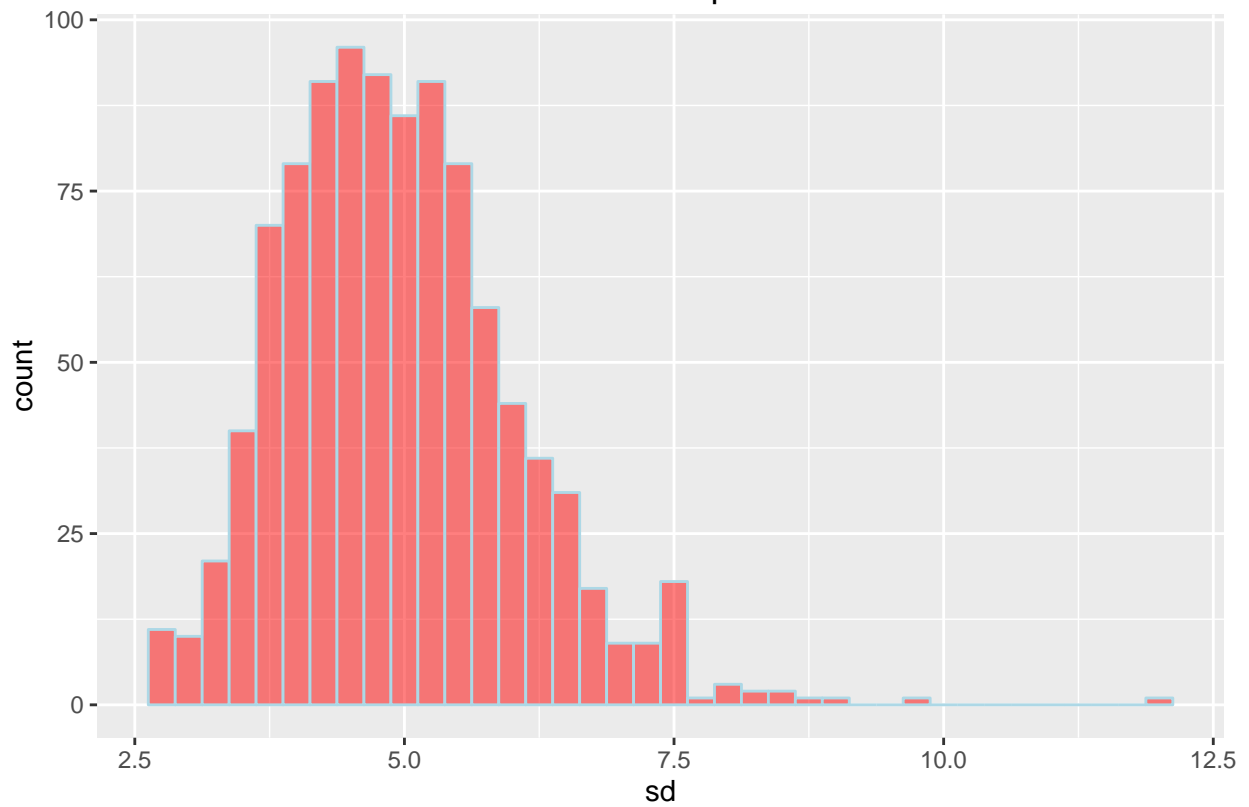
```
set.seed(5)
library(matrixStats)
```

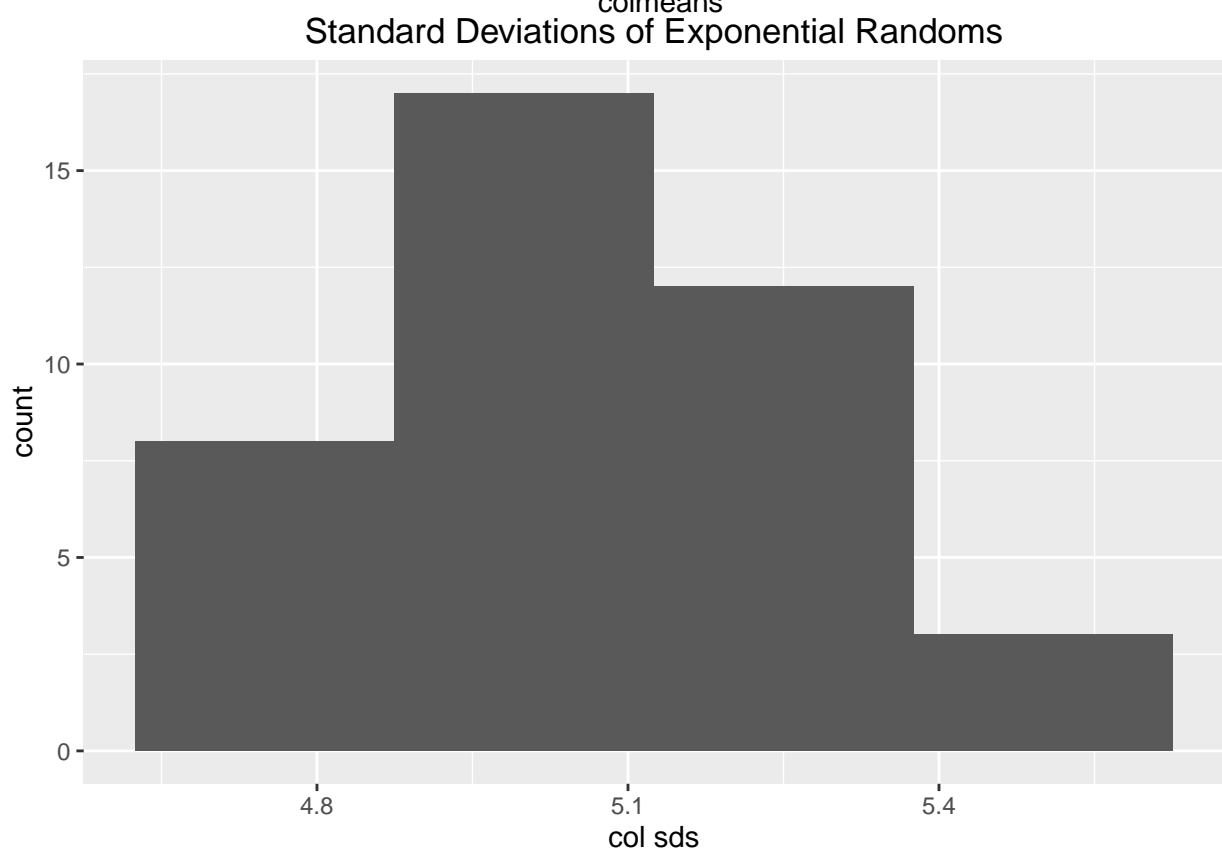
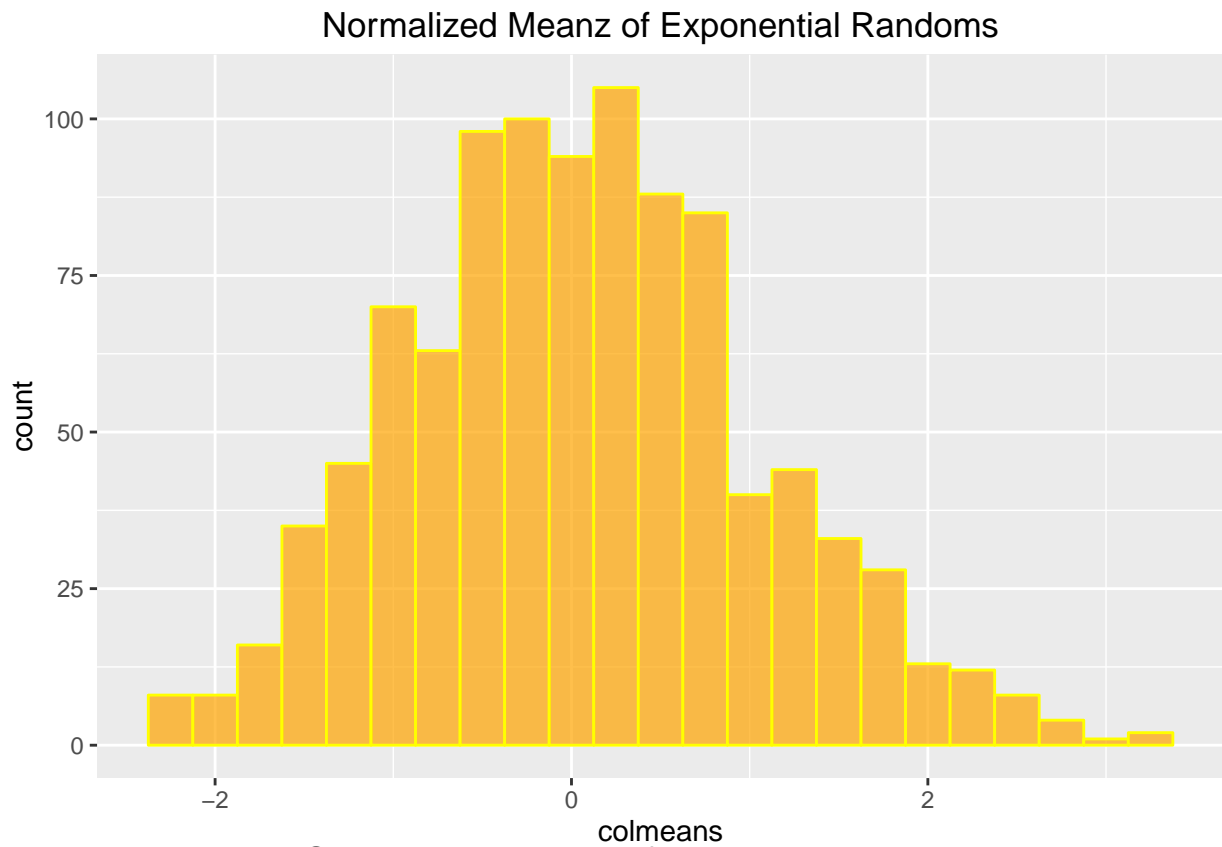
```
## matrixStats v0.50.2 (2016-04-24) successfully loaded. See ?matrixStats for help.
```

```
## create a matrix of 1000 rows and 40 columns - with each row generated by a random exponential distribution
trippy <- matrix(data = 1, nrow = 1000, ncol = 40)
for (i in 1:1000){
  trippy[i,] <- rexp(40, 0.2)
}
## get the means of each row of exponential randoms
meanz <- rowMeans(trippy)
## get sd of each row
sdz <- rowSds(trippy)
## find the mean of the means of each row
meanit <- mean(meanz)
sdomeanz <- sd(meanz)
expectedsd <- 1/(0.2*sqrt(40))
## now for the mean of the standard deviation and its standard deviation
meansd <- mean(sdz)
sdzsd <- sd(sdz)
colmeanz <- colMeans(trippy)
colsdz <- colSds(trippy)
```



Standard Deviations of Exponential Randoms





#Sample Mean versus Theoretical Mean:

The mean of the 1000 simulations was 5.043053 as compared to the theoretical expected value of 5.

The standard error of the means was 0.7762762. We expected this to be 5 divided by the square root of 40: 0.7905694. The difference between the inferred standard error and the theoretical is -0.0142932. So this was a good confirmation of our idea that the simulated values would be close to the theoretical ones.

And for the standard deviation, the mean of the simulated standard deviation was 4.951057, very close to the theoretical value of 5.