

Statistical Inference Course - Project 2: Part 1

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Project Overview

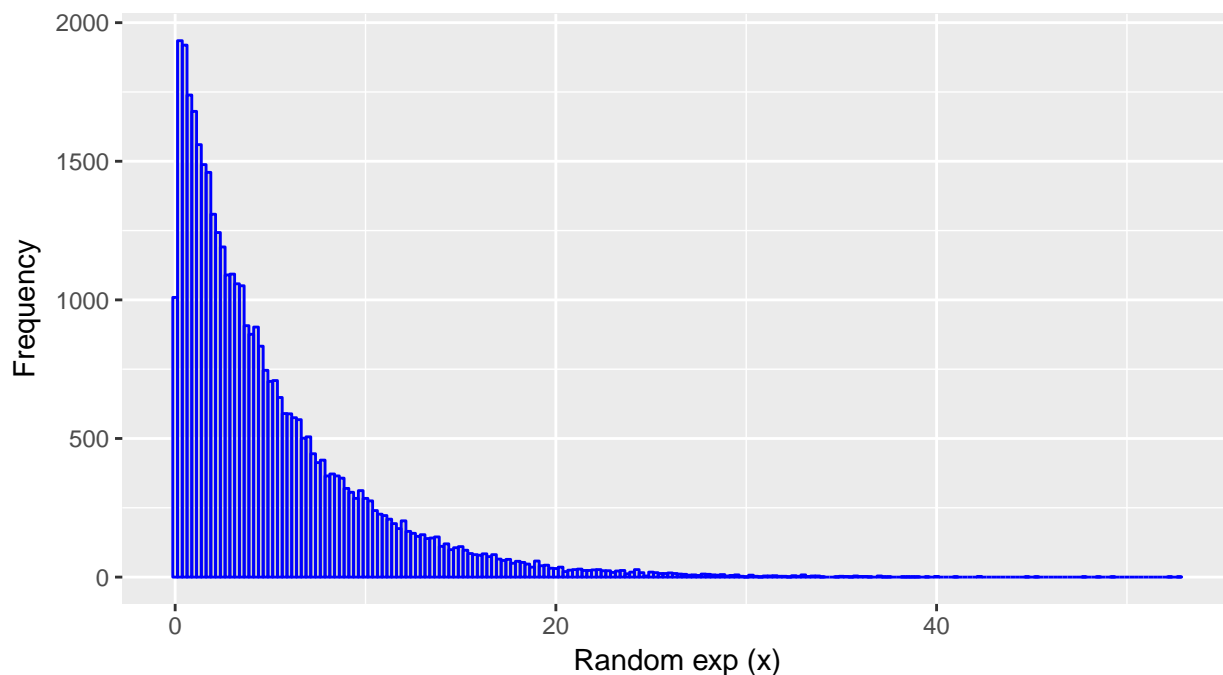
The goal of this project is to investigate the exponential distribution in R, comparing the exponential distribution to the normal distribution and the Central Limit Theorem. The source code for this project can be found on Github: <https://github.com/dproksch/Stat-Inf-projet2>

Create and Graph the Exponential Distribution

The exponential distribution is created using the R function, `rexp(n,lambda)`. For this simulation, lambda will be set at a constant 0.2, and n will be set to 40,000. 40,000 is derived by using a sample size of 40, and the number of simulations being set to 1,000. The R package, `ggplot`, will then be used to graph the generated `rexp` distribution.

Histogram representing the Exponential Distribution

Simulated using 40,000 random exp values



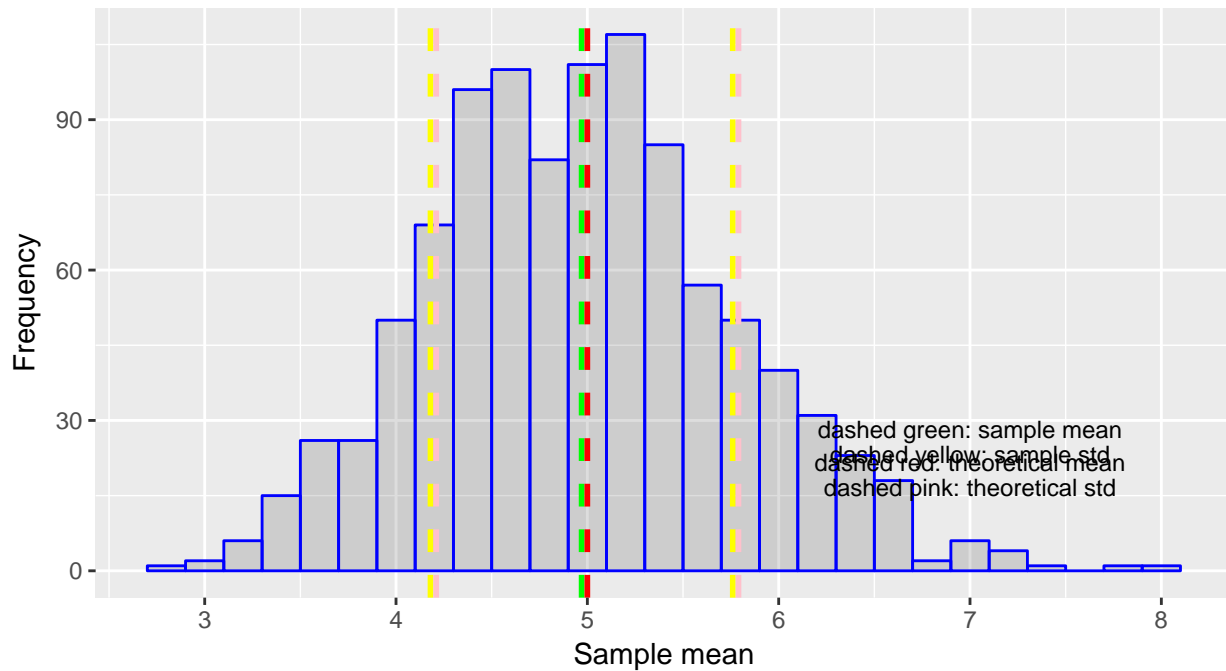
Compare Sample and Theoretical Means of the Distribution

The exponential distribution, with the same seed, will now be used to calculate the mean of 40 values which are created by running the `rexp(n,lambda)` function 1,000 times. Once the means have been calculated, a

histogram of the results will be created. After the histogram is created, the Sample and Theoretical Means will be calculated and plotted on the histogram.

Histogram of Exponential Sample Means

Sample size = 40, simulations = 1000



Compare the Standard Normal Distribution of Exponential Distribution Sample Means

Referring back to the histogram in the previous section, it does resemble a Gaussian distribution. Since this has similar properties to the Gaussian distribution, it can follow that the mean of this sample has a similar mean of the Normal Distribution. I did find that for larger simulations, the exponential distribution exhibited more Gaussian properties, however, this experiment was outside the scope of this three page report. It can be reproduce by modifying the associated R scripts and changing the number of simulations to a larger value.

Standard Normal Distribution of Exponential Distribution Sample Mean

Sample size = 40, simulations = 1000

