Statistical Inference Course Project - Part1

Overview

In this project you will investigate the exponential distribution in R and compare it with the Central Limit Theorem.

```
library(ggplot2)
library(dplyr)
```

Part 1: Simulation Exercise Instructions

The exponential distribution can be simulated in R with rexp(n, lambda) where lambda is the rate parameter. - Has mean = 1/lambda & standard deviation = 1/lambda. - Set lambda = 0.2 - Investigate the distribution of averages of 40 exponentials. - Note that you will need to do a 1000 simulations.

```
lambda = 0.2

# theoretical Mean & standard deviation
actual_mean = 1/0.2
actual_sd = 1/0.2

# simulate 1000
sample_means = NULL
for (i in 1 : 1000) sample_means = c(sample_means, mean(rexp(40, lambda)))
ggplot() +
  aes(sample_means) +
  geom_histogram(fill="#69b3a2", color="#e9ecef", alpha=0.9) +
  ggtitle("Distribution of 1000 simulations of averages of 40 exponentials") +
  geom_vline(xintercept = mean(sample_means), color="blue")
```

Distribution of 1000 simulations of averages of 40 exponentials
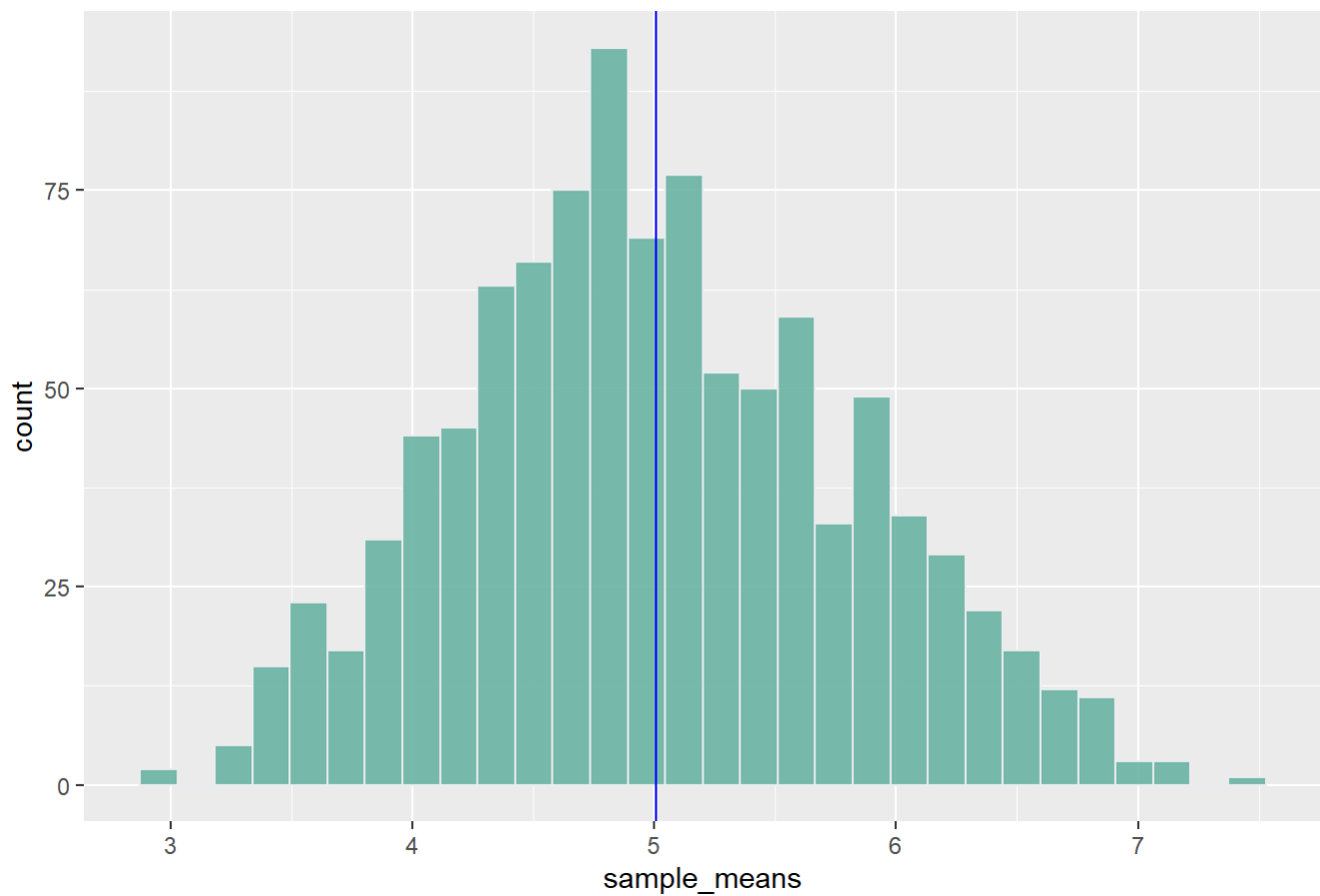
Actual Mean = 5 and the simulated mean = 5.0071016

Actual sd = 5 and the simulated mean = 0.8076906