Statistical Inference Course Project Part 1

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10/03/2020

Part 1: Simulations

The following was created for part 1 of Courera's Statistical Inference course project. Data was be simulated from the exponential distribution and was used to investigate the Central Limit Theorem. It was found that taking averages of sets of samples of the exponential distribution produced an approximately Normal distribution, while the distribution without means was not approximately normal.

Simulation

Simulation data is created from the exponential distribution.

```
set.seed(150)
lambda <- 0.2
n <- 40
number_simulations <- 1000

simulated_sample <- replicate(number_simulations, rexp(n, lambda))
means_exp <- apply(simulated_sample, 2, mean)
```

Sample Mean vs Theoretical Mean

```
sample_mean <- mean(means_exp)
theo_mean <- 1 / lambda
diff_means <- abs(theo_mean - sample_mean)
```

The diffrence between the Sample Mean and Theoretical Mean is : 0.002 The sample mean and the theoretical mean are very close.

Sample Variance vs theoretical variance

```
sample_var <- var(means_exp)
theo_var  <- (1 / lambda)^2 / (n)
diff_var <- abs(sample_var - theo_var)
```

The diffrence between the Sample Variance and Theoretical Variance is : 0.025 Both variance values are very close to each other.

Distribution

You can also embed plots, for example: