EE 511 Simulation Methods for Stochastic Systems
Project #1 [2 Weeks]

[A Few Coins]
Three distributions based on Bernoulli trials.

- Write a routine to simulate a fair Bernoulli trial in your language of choice. Generate a histogram for 100 simulated Bernoulli trials.
- Write a routine to count the number of successes in 7 fair Bernoulli trials. Generate a histogram for 100 samples of this *success-counting* random variable.
- Write a routine to count the longest run of heads in 100 Bernoulli samples. Generate a histogram for this random variable.

Identify and compare the distributions in each of the simulations above.

[Counting Successes]
Take your Bernoulli success-counting random variable (the binomial random variable). Generate and sum k=5 samples from this routine. Generate 300 such sums and histogram your results. Repeat for k={10, 30, 50}. Comment on the histograms you observe for the different values of k.

[Continuous Distributions]
Use the inverse CDF method to generate 1000 samples of the X~exp(5) and Y~Cauchy(0,2). Generate histograms of the samples. Suggests other methods for testing goodness-of-fit.

Turn in:
- A summary of your experiments including plots and statistics
- a brief discussion of the results for each question (max 1 page per problem)
- a print out of your code.

If you are working in Python/R, consider turning in a PDF of your jupyter/Rmarkdown notebook containing all of the above.