# EE 511 Simulation Methods for Stochastic Systems
# Project #1

**[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.

**[Networking: part 1]**

Given n=20 people in a social network. Imagine that any given unordered pair of two people are connected at random and independently with success probability p=0.05.

- How many possible edges or connections, N, exist in a group of n=20 people?
- Write a routine to select edges with probability p=0.05 out of the N candidate edges. (think of the presence or absence of each distinct candidate edge as a Bernoulli trial)
- What is the distribution of the random number of edges selected in this way? Generate histograms to support your answer.

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.