EE 511 Simulation Methods for Stochastic Systems
Project #2

Problem 1 [Waiting]
Use the inverse CDF method to generate independent samples, X_i, of the exponential random variable with average waiting time of 0.2 time units. Evaluate the quality of your generator with goodness of fit tests. poisson

Problem 2 [Counting]
Each exponential random sample represents the waiting time until an event occurs. Implement a routine to count the number of events that occur in 1 unit of time. Generate such counts for 1000 separate unit time intervals. How are these counts distributed? Justify your answer

You will need to learn to use functions for plotting networks in the next questions. Recent versions of MATLAB have built-in network plotting functions. Python and R have the iGraph library. Python also has the networkx library.

Problem 3 [Networking]
Given n=50 people at a networking event. Imagine that any given unordered pair of two people connect at random and independently with probability p.
Generate and plot sample networks for each value of p={0.02, 0.09}. Briefly discuss the structure of these sample graphs.

Problem 4 [Networking at larger scale]
Count the number of connections (edges) to a *vertex* (node) in one of your sample networks from Problem 3. This statistic is the *degree* of that vertex. The vertex degrees for all vertices in a random network are random. Vertex degree is a binomially distributed statistic for small networks.
Plot a histogram of vertex degrees for one of your sample networks in Problem 3. Repeat for the other sample network.
Generate a network with (n, p) = (250, 0.08) and plot the histogram of its vertex degrees. What distribution fits this data? Justify your claim with any probabilistic limit laws you know.

Turn in:

- A summary of your experiments including histograms of your data, any relevant plots, and relevant numerical results
- brief discussions of the results
- a print out of your code.