MATLAB Assignment 1

Due: Thursday, 11/12/15 -- turn in a printout in class.

A. For the following, write a MATLAB function for each subpart of the following. Be sure to document your function, and also the rest of your MATLAB code.

1. Write a MATLAB simulation program to simulate the flipping of a fair coin.
2. Run 10,000 coin flips and collect statistics.
3. Plot the estimated density function of the experiment from the statistics, using the matlab command “stem” to plot delta functions.
4. Have your program compute the mean and variance (assuming H=1 and T=0), and print them on the plot.
5. Repeat 1-4 for a loaded coin with probabilities P(0)=0.3 and P(1)=0.7.
6. Repeat 1-4 for the rolling of 1 fair die.
7. Repeat for the total of rolling 2 independent fair dice.
8. Repeat 1-4 for the following experiment: flip the coin from part 5; if 0, roll 1 die; if 1, roll 2 dice.
9. Include a brief write-up (1/2 page max, word processed) discussing your results.
10. Turn in the plots, source code, and write-up. Make sure all graph axes are labeled properly.

B. For the following, write a MATLAB function for each subpart of the following. Be sure to document your function, and also the rest of your MATLAB code.

1. Write a MATLAB program to compute the sum of 10 standard uniform random variables.
2. Run this program 100,000 times, and collect statistics.
3. Plot a histogram of the statistics, using the matlab command “hist” with 100 bins. Make sure the axes are labeled properly.
4. Have your program compute the mean and variance of the data, and print them on your plot.
5. On a single graph, plot your histogram, along with the theoretical density function of a Gaussian that has the same mean and variance as your statistics.
6. On a separate graph, generate 100,000 samples of a Gaussian random variable with the same mean and variance found in part 4. Use the built-in MATLAB function “randn” for this. Plot a histogram on the same graph with the theoretical Gaussian density function.
7. Make a brief write-up (1/2 page max, word processed) discussing your results.
8. Turn in the plots, source code, and write-up.