ECEn 370

Homework Problem Set 3

Due on Wednesday, January 29, 2014.

From Bertsekas and Tsitsiklis, *Introduction to Probability, 2nd Ed.*

1. (5 pts) Chapter 2 Problem 1.

2. (5 pts) Schaum's 2.1

3. (5 pts) Schaum's 2.2

4. (5 pts) Schaum's 2.3

5. (5 pts) Chapter 2 Problem 4.

6. (5 pts) Schaum's 2.15

7. (5 pts) Chapter 2 Problem 13

8. (5 pts) Chapter 2 Problem 14

9. (5 pts) Chapter 2 Problem 15

10. (30 pts) MATLAB Problem. In this example you will learn about how to simulate various random variables in MATLAB. So far, we have actually used a pseudo-continuous random variable through the "rand" command. You can also generate the discrete random variables that we use in ECEn 370 through the "random" command. Type "help random" at the MATLAB prompt to read more information about the "random" command.

    For example, you can type "random('Binomial', 10, 0.6, 10, 1)" to simulate a Binomial random variable with n=10, p=0.6, in a vector of length 10. You can do this for 'Binomial', 'Poisson', and 'Geometric' random variables. One way to visualize the probability mass function of the distribution is shown in the example on the website associated with this homework.

    Simulate and plot the probability mass functions for the following random variables (turn in your code and plots):
    1. Binomial with parameters n = 20 and p = 0.2 (you will need more bins in your histogram)
    2. Geometric random variable with parameter p = 0.1 (choose reasonable number of bins). Note that they dene the geometric as the number of failures after a success which is why you can get zero.
    3. Poisson random variable with parameter $\lambda = 3$.

    Imagine now that you have a binomial random variable, X_1, defined by parameters n=4, p=1/4.
    Now define the function $Y = (X_1 - 1)^2$. What is the probability mass function for Y? Simulate and plot the random variables X_1 and Y in MATLAB. Does simulation of the PMF of Y compare well with the probability mass function you computed analytically?