ECEn 370

Homework Problem Set 4

Due on Wednesday, February 5, 2014.

From Bertsekas and Tsitsiklis, *Introduction to Probability, 2nd Ed.* and *Schaum's Outline.*

1. (5 pts) Chapter 2 Problem 16.

2. (5 pts) Schaum's 2.47

3. (5 pts) Chapter 2 Problem 24.

4. (5 pts) Chapter 2 Problem 26.

5. (5 pts) Schaum's 2.53

6. (5 pts) Chapter 2 Problem 31.

7. (5 pts) Schaum's 3.12 a, b

8. (5 pts) Schaum's 3.13 a, b, c

9. (5 pts) Chapter 2 Problem 35. - The solution is there. This is good practice of going through the formulas for expectation.

10. (30 pts) MATLAB Problem. Please download all of the files associated with this homework and put them into your working directory when you do this problem. The file "simulate_joint_PMF.m" is necessary for "HW4_prob_example.m" to work correctly.

    Read through "HW4_prob_example.m" and execute it so you can see how a joint PMF can be described in terms of matrices, simulated, and visualized.

    You have been employed by McTacoKing to do an analysis of their customer purchasing habits. They have given you data on 10,000 normal customers: X is the number of burgers each ordered, and Y is the number of servings of fries. All normal customers order at least one burger and at least one serving of fries. For all normal customers, the maximum number of burgers is six and the maximum number of fries is four. This data is given to you as a "burgerfry.mat" file that you must load which contains the variable "outcomes" which has the customer data.

    a) First, plot the estimated joint PMF of the burger/fry data as a 3-dimensional X, Y graph as shown in the example code. Turn in your plot and the corresponding matrix. This will serve as the actual PMF for the rest of the problem.
    b) What is the probability that a normal customer will buy three burgers and two servings of fries?
    c) What is the marginal PMF for the number of burgers a normal customer will buy? Plot this and turn it in.
    d) What is the marginal PMF for the number of fries servings a normal customer will buy? Plot this and turn it in.
    e) What is the expected number of burgers that a normal customer will buy?
    f) What is the expected number of fries servings that a normal customer will buy?
    g) If burgers cost $2.00 and fries servings cost $1.00, what is the expected amount of money that you will obtain from each normal customer?
    h) If a normal customer buys two fries servings, what is the PMF of the number of burgers that he will buy? Plot this and turn it in.