Stat 121 (Mathematical Statistics I)

Problem Set No. 8

Instruction: Answer the following as indicated.

1. Contracts for two construction jobs are randomly assigned to one or more of three firms, A, B, and C. Let Y_1 denote the number of contracts assigned to firm A and Y_2 the number of contracts assigned to firm B. Recall that each firm can receive 0, 1, or 2 contracts.

    a. Find the joint probability function for Y_1 and Y_2.

    b. Find $P(Y \leq 1, Y = 2)$.

    c. Find the marginal PMF of Y_1 and Y_2.

2. Let Y_1 and Y_2 have the joint probability density function given by

$$f_{(Y_1,Y_2)}(y_1, y_2) = \begin{cases} k(1 - y_2), & 0 < y_1 < y_2 < 1 \\ 0, & \text{elsewhere} \end{cases}$$

a. Find the value of k that makes this a valid probability density function.

b. Find $P(Y_1 \leq 0.75, Y_2 \geq 0.5)$.

c. Derive the marginal PDFs of Y_1 and Y_2.