NCERT Assignment

A.Rakesh Kumar EE22BTECH11005*

Three letters are dictated to three persons and an envelope is addressed to each of them, the letters are inserted into the envelopes at random so that each envelope contains exactly one letter. Find the probability that at least one letter in its proper envelope.

Solution:

Parameter	Values	Description
X	0,1,2,3	No.of envelopes with correct letters.

TABLE 0
DEFINITION OF X AND PARAMETERS.

$$p_X(k) = \begin{cases} \frac{2}{6} & \text{k} = 0 \\ \frac{3}{6} & \text{k} = 1 \\ 0 & \text{k} = 2 \\ \frac{1}{6} & \text{k} = 3 \end{cases} \tag{1}$$

$$F_X(k) = \Pr(X \le k) \tag{2}$$

$$= \sum_{k=0}^{k} p_X(k) \tag{3}$$

$$F_X(k) = \begin{cases} \frac{1}{3} & \text{k} = 0 \\ \frac{5}{6} & \text{k} = 1 \\ 0 & \text{k} = 2 \\ 1 & \text{k} = 3 \end{cases} \tag{4}$$

$$\Pr(X \ge k) = 1 - F_X(k-1) \tag{5}$$

$$\Pr(X \ge 1) = 1 - F_X(0) \tag{6}$$

$$= 1 - \frac{1}{3} \tag{7}$$

$$= \frac{2}{3} \tag{8}$$

$\therefore$ The probability that at least one letter in its proper envelope is 0.667.