Assignment

EE23010: Probability and Random Processes
Indian Institute of Technology,Hyderabad

Aman Kumar
EE22BTECH11006

Question: Four candidates A, B, C, D have applied for the assignment to coach a school cricket team. If A is twice as likely to be selected as B, and B and C are given about the same chance of being selected, while C is twice as likely to be selected as D, what are the probabilities that

1) C will be selected?
2) A will not be selected?

Solution: Let X be a random variable

$$X = \begin{cases} 0 & \text{A is selected} \\ 1 & \text{B is selected} \\ 2 & \text{C is selected} \\ 3 & \text{D is selected} \end{cases} \tag{1}$$

Given,

$$p_X(0) = 2p_X(1) \tag{2}$$
$$p_X(1) = p_X(2) \tag{3}$$
$$p_X(2) = 2p_X(3) \tag{4}$$

Using axioms of probability:

$$\sum_{k=0}^{3} p_X(k) = 1 \tag{5}$$

which gives

$$p_X(0) = \frac{4}{9} \tag{6}$$
$$p_X(1) = \frac{2}{9} \tag{7}$$
$$p_X(2) = \frac{2}{9} \tag{8}$$
$$p_X(3) = \frac{1}{9} \tag{9}$$

1) For C getting selected:

$$\implies p_X(2) = \frac{2}{9} \tag{10}$$

2) For A not getting selected:

$$= 1 - p_X(1) \tag{11}$$
$$= 1 - \frac{4}{9} \tag{12}$$
$$\implies \frac{5}{9} \tag{13}$$