AI1110 - Assignment 2

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Question ***Exemplar 11.16.3.9 :***

Four candidates A, B, C and 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 $\Pr(A)$ denote the probability of A being selected
Let $\Pr(B)$ denote the probability of B being selected
Let $\Pr(C)$ denote the probability of C being selected
Let $\Pr(D)$ denote the probability of D being selected

Given,

$$\Pr(A) = 2\Pr(B) \tag{1}$$
$$\Pr(B) = \Pr(C) \tag{2}$$
$$\Pr(C) = 2\Pr(D) \tag{3}$$

Now,

From (2) and (3),

$$\Pr(B) = 2\Pr(D) \tag{4}$$
$$\implies \Pr(A) = 4\Pr(D) \tag{5}$$

From the Law of Total Probability,

$$\Pr(A) + \Pr(B) + \Pr(C) + \Pr(D) = 1 \tag{6}$$

Substituting (3), (4), (5) in (6)

$$4\Pr(D) + 2\Pr(D) + 2\Pr(D) + \Pr(D) = 1 \tag{7}$$
$$\implies 9\Pr(D) = 1 \tag{8}$$
$$\implies \Pr(D) = \frac{1}{9} \tag{9}$$
$$\implies \Pr(A) = \frac{4}{9} \tag{10}$$
$$\implies \Pr(B) = \frac{2}{9} \tag{11}$$
$$\implies \Pr(C) = \frac{2}{9} \tag{12}$$

Answer :

1) $\Pr(C) = \frac{2}{9}$
2) $\Pr(A') = \frac{5}{9}$