GATE Assignment

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Three unbiased coins were tossed. Provided that at least two outcomes are tails,the probability of having all three outcomes as tails is

Solution:

Parameter	Values	Description
X	0,1,2,3	No.of Tails.

TABLE 1: Definition of X and parameters.

$$p_X(k) = \frac{{}^3C_k}{8} \tag{1}$$

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

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

$$\implies F_X(k) = \sum_{k=0}^{k} \frac{{}^3C_k}{8} \tag{4}$$

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

$$\implies \Pr(X \ge 2) = 1 - F_X(1) \tag{6}$$

$$= 1 - \frac{1}{2} \tag{7}$$

$$= \frac{1}{2} \tag{8}$$

$$\Pr(X = 3 | X \ge 2) = \frac{\Pr(X \ge 2 \quad \& \quad X = 3)}{\Pr(X \ge 2)} \tag{9}$$

$$= \frac{\Pr(X = 3)}{\Pr(X \ge 2)} \tag{10}$$

$$= \frac{\left(\frac{1}{8}\right)}{\left(\frac{1}{2}\right)} \tag{11}$$

$$= \frac{1}{4} \tag{12}$$

$\therefore$ The probability of having all three outcomes as tails is 0.25.