

NCERT 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.

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

$$F_X(k) = \Pr(X \leq k) \quad (2)$$

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

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

$$\Pr(X \geq k) = 1 - F_X(k-1) \quad (5)$$

$$\Rightarrow \Pr(X \geq 2) = 1 - F_X(1) \quad (6)$$

$$= 1 - \frac{1}{2} \quad (7)$$

$$= \frac{1}{2} \quad (8)$$

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

$$= \frac{\Pr(X = 3)}{\Pr(X \geq 2)} \quad (10)$$

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

$$= \frac{1}{4} \quad (12)$$

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