

NCERT: Class XII

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13.4.4 Find the probability distribution of

- (i) number of heads in two tosses of a coin.
- (ii) number of tails in the simultaneous tosses of three coins.
- (iii) number of heads in four tosses of a coin.

Solution:

Variable	Value	Description
n	$\{2, 3, 4\}$	Number of trails
p	$\frac{1}{2}$	Probability of getting a head
q	$1 - p$	Probability of not getting a head
X_1	$\{0, 1, 2\}$	Number of heads in 2 tosses of a coin
X_2	$\{0, 1, 2, 3\}$	Number of tails in 3 tosses of a coin
X_3	$\{0, 1, 2, 3, 4\}$	Number of heads in 4 tosses of a coin

Table 13.4.0.2: Variable Description

(a) Number of heads in two tosses of a coin.

By using binomial distribution

$$P_X(X_1) = {}^nC_{X_1} p^{X_1} q^{n-X_1} \quad (13.4.1.1)$$

$$X_1 = k \quad (13.4.1.2)$$

$$F_X(k) = \begin{cases} {}^nC_k p^k q^{n-k}, & \text{if } 0 \leq k \leq 2 \end{cases} \quad (13.4.1.3)$$

(b) Number of tails in the simultaneous tosses of three coins.

By using binomial distribution

$$P_X(X_2) = {}^nC_{X_2} p^{X_2} q^{n-X_2} \quad (13.4.2.4)$$

$$X_2 = k \quad (13.4.2.5)$$

$$F_X(k) = \begin{cases} {}^nC_k p^k q^{n-k}, & \text{if } 0 \leq k \leq 3 \end{cases} \quad (13.4.2.6)$$

(c) Number of heads in four tosses of a coin.

By using binomial distribution

$$P_X(X_3) = {}^nC_{X_3} p^{X_3} q^{n-X_3} \quad (13.4.3.7)$$

$$X_3 = k \quad (13.4.3.8)$$

$$F_X(k) = \begin{cases} {}^nC_k p^k q^{n-k}, & 0 \leq k \leq 4 \end{cases} \quad (13.4.3.9)$$