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 in 2,3,4 tosses of a coin
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

$$X_1 = k \tag{13.4.1.1}$$

$$n = 2 \tag{13.4.1.2}$$

$$P_{X_1}(k) = \begin{cases} {}^nC_k p^k q^{n-k}, & 0 \leq k \leq 2 \end{cases} \tag{13.4.1.3}$$

(b) Number of tails in the simultaneous tosses of three coins.
By using binomial distribution

$$X_2 = k \tag{13.4.2.4}$$

$$n = 3 \tag{13.4.2.5}$$

$$P_{X_2}(k) = \begin{cases} {}^nC_k p^k q^{n-k}, & 0 \leq k \leq 3 \end{cases} \tag{13.4.2.6}$$

(c) Number of heads in four tosses of a coin.
By using binomial distribution

$$X_3 = k \tag{13.4.3.7}$$

$$n = 4 \tag{13.4.3.8}$$

$$P_{X_3}(k) = \begin{cases} {}^nC_k p^k q^{n-k}, & 0 \leq k \leq 4 \end{cases} \tag{13.4.3.9}$$