

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

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

X_1	0	1	2
$\Pr(X_1)$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

Table 13.4.1.4: probability distribution of X

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

By using binomial distribution

$$\Pr(X_2) = {}^nC_{X_2} p^{X_2} q^{n-X_2} \quad (13.4.2.2)$$

X_2	0	1	2	3
$\Pr(X_2)$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

Table 13.4.2.6: Probability distribution of X

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

$$\Pr(X_3) = {}^nC_{X_3} p^{X_3} q^{n-X_3} \quad (13.4.3.3)$$

X_3	0	1	2	3	4
$\Pr(X_3)$	$\frac{1}{16}$	$\frac{4}{16}$	$\frac{6}{16}$	$\frac{4}{16}$	$\frac{1}{16}$

Table 13.4.3.8: Probability distribution of X