

## Binomial Distribution

**Binomial Distribution** is the discrete Probability distribution that gives only two possible results in experiment.

**For example** If we toss a coin there could be only two possible outcomes heads or tails. and if any test is taken there could be only two results: pass or fail. This distribution is also called a binomial probability distribution.

- The boolean-valued Outcome is represented either with success/yes/true (probability  $p$ ) or failure/no/false/zero (probability  $q$ ) ( $1-p$ )

## Binomial Distribution formula

$$P(x; n, p) = {}^n C_x p^x (q)^{n-x}$$

where,

$n$  = the number of experiments

$x$  = 0, 1, 2, 3, 4

$p$  = probability of success in single experiment.

$q$  = " " failure " " "  
 $= 1 - p$

Example :- If a coin is tossed 5 times, find the probability of:

- Exactly 3 heads

Sol -  $n=5$

$$p = \frac{1}{2}$$

$$q = \frac{1}{2}$$

$$P(X=3) = {}^5C_3 \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^2$$

$$= \frac{5!}{3! \times 2!} \times \left(\frac{1}{2}\right)^5$$

$$= \frac{5 \times 4 \times 3!}{3! \times 2 \times 1}$$

$$= \frac{5}{2} \times \frac{1}{2} = \frac{5}{4} \times \frac{1}{2} = \frac{5}{8} \text{ Ans}$$

Notes by :- @jpwebdevelopers