Q: A die is thrown 5 times. Find the probability that an odd number will come up exactly three times.
Solution: :

Parameter	Values	Description
n	5	Number of throws
k	3	Number being odd numbers
p	$\frac{3}{6} = \frac{1}{2}$	Probability of being odd number
X	1 if odd 0 if even	Bernoulli Random Variable
Y	$\sum_{i=1}^{n} X_i$	Binomial Random Variable

TABLE 0
TABLE 1

$$p_Y(k) = \Pr(Y = k) \tag{1}$$
$$= {}^nC_k p^k (1-p)^{n-k}, (1 \le k \le n) \tag{2}$$

We require $\Pr(Y = 3)$. Since $n = 5$,

$$\Pr(Y = 3) = p_Y(3) \tag{3}$$
$$= {}^nC_k p^k (1-p)^{n-k} \tag{4}$$
$$= \frac{5}{16} \tag{5}$$