Assignment 17.2 : Problem Statement

A die marked A to E is rolled 50 times. Find the probability of getting a "D" exactly 5 times.

Solution

Let us assume that in this exercise ,

- ⇨ 'n' is representing the number of trials attempted, and that
- ⇨ 'k' is the count of successes that is to be attained in those 'n' trials.
- ⇨ This implies that number of failures clearly will be 'n - k'.

Here, n =50, k = 5, n - k = 50 - 5 = 45

Assuming, 's' to be the probability of succeeding in a trial, we get that the probability of failure is '1 - s'.

Here the probability of success = probability of giving a "D" = s = 1/5
Hence, the probability of failure = probability of not getting a "D" = 1 - s
= 1 – (1/5) = 4/5

P ('k' successes in 'n' trials) = C(n,k) s^k $(1-s)^{(n-k)}$

C (n, k) is called the coefficient for binomial distribution or binomial coefficient.

When we substitute these values in the formula for Binomial distribution we get,

P (getting a "D" exactly 5 times) = C(n,k) s^k $(1-s)^{(n-k)}$

= C (50, 5) * $(1/5)^5$ * $(4/5)^{45}$

C(50,5) = (50*49*48*47*46)/(5*4*3*2*1) = 2118760

- ⇨ $(1/5)^5$ = 0.00032
- ⇨ $(4/5)^{45}$ = 0.0000435561
- ⇨ P (getting a "D" exactly 5 times out of 50)
  = 2118760 * 0.00032 * 0.0000435561
  = 0.029531175

  = 0.02953 (approximately)

Thus the required probability of getting a "D" exactly 5 times is 0.02953 .