Assignment: Session 15

**2. Problem Statement**

**Statement 1:**

A test is conducted which is consisting of 20 MCQs (multiple choices questions) with

every MCQ having its four options out of which only one is correct. Determine the

probability that a person undertaking that test has answered exactly 5 questions wrong.

**Problem Statement 2:**

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

times.

**Problem Statement 3:**

Two balls are drawn at random in succession without replacement from an urn

containing 4 red balls and 6 black balls.

Find the probabilities of all the possible outcomes.

**3. Output**

**Statement 1:**

A test is conducted which is consisting of 20 MCQs (multiple choices questions) with

every MCQ having its four options out of which only one is correct. Determine the

probability that a person undertaking that test has answered exactly 5 questions wrong.

**Answer**

The formula for calculating the achievement of ‘k’ successes in ‘n’ trials is given below:

P (‘k’ successes in ‘n’ trials) = C(n,k)sk(1−s)(n−k)

C (n, k) is called the coefficient for binomial distribution or binomial coefficient. It is on this coefficient that the distribution is named.

The factorial of any number ‘m’ is the product of all natural numbers starting from m, (m - 1) to 1.

Here, n = 20, n - k = 5, k = 20 - 5 = 15

Here the probability of success = probability of giving a right answer = s = 1/4

Hence, the probability of failure = probability of giving a wrong answer = 1 - s

= 1 – 1/4 = 3/4

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

So, P (exactly 5 out of 20 answers incorrect) = C (20, 5) \* (1/4) raise to 15 \* (3/4) raise to 5

→→ P (5 out of 20) = ( (20∗19∗18∗17∗16)/(5∗4∗3∗2∗1)(20∗19∗18∗17∗16) ) (1/4) raise to 15 \* (3/4) raise to 5

= 0.0000034 (approximately)

**Thus the required probability is 0.0000034 approximately.**

**Problem Statement 2:**

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

times.

**Answer:**

Here, n = 50, k = 5, n - k = 45.

The probability of success = probability of getting a “D”= s = 1/5

Hence, the probability of failure = probability of not getting a “D” = 1 - s = **4/5**.

**Problem Statement 3:**

Two balls are drawn at random in succession without replacement from an urn

containing 4 red balls and 6 black balls.

Find the probabilities of all the possible outcomes.

**Answer**

Total Outcomes= 6+4 = 10

probability of getting red ball= 4/10=2/5

probability of getting black ball = 6/10 = 3/5