**Problem 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.**

**Solution**

We use binomial theorem for the above problem

n = 20,

n - k = 5,

k = 20 - 5 = 15

Here the probability of success = probability of correct choice = s = 1/4

Hence, the probability of failure = probability of wrong choice = 1 - s

= 1 – 1/4 = 3/4

We know that Binomial theorem = C(n,k)\*s(n-k)\*(1-s)k

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

= 0.0000034

Thus the required probability is 0.0000034

**Problem Statement 2:**

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

**times.**

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**

We know that Binomial theorem = C(n,k)\*s(n-k)\*(1-s)k

So, P (exactly 5 D’s out of 50 rolls) = C (50, 5) \* (1/5)45 \* (3/4)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.**

First determine the probabilities of the events.

We can draw either RedRed, RedBlack, BlackRed or BlackBlack

P(RedRed) = 4/10\*3/9 = 2/15

P(RedBlack) = 4/10\*6/9 = 4/15

P(BlackRed) = 6/10\*4/9 = 4/15

P(BlackBlack) = 6/10\*5/9 = 1/3

The probability of 0 black balls (RedRed) is 2/15

The probability of 1 black ball is (RedBlack or BlackRed) is 4/15+4/15 = 8/15

The probability of 2 black balls (BlackBlack) is 1/3