ASSIGNMENT 16 - STATISTICS - 2

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.

Answer:

Here,   n = 20

        n - k= 5,

          k= 20 - 5 = 15

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

Hence, the probability of failure = probability of giving a wrong answer = $(1 – p) = 1 – ¼ = 3/4$

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

$$P(k \text{ out of } n) = \frac{n!}{k!(n-k)!} p^k(1-p)^{(n-k)}$$

So, P (5 out of 20) = $\underline{20!}$ $(1/4)^{15} * (3/4)^5$

                    15!5!

P (5 out of 20) = $(20*19*18*17*16)/(5*4*3*2*1)) * (1/4)^{15} * (3/4)^5$

                = 0.0000034 (approximately)

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

Answer :

Here, n = 50, k = 5, n -k =15

Here the probability of success = probability of getting "D" = 1/5

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

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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 :

Probabilities of all the possible outcomes.

RR (4/10)(3/9) = **2/15**

RB (4/10)(6/9) = **4/15**

BR (6/10)(4/9) = **4/15**

BB (6/10)(5/9) = **1/3**

Red Balls

The probability of 0 Red balls (BB) = **1/3**

The probability of 1 Red ball is (RB or BR) is 4/15+4/15 = **8/15**

The probability of 2 Red balls (BB) = **2/15**

Black balls

The probability of 0 black balls (RR) = **2/15**

The probability of 1 black ball is (RB or BR) is 4/15+4/15 **= 8/15**

The probability of 2 black balls (BB) = **1/3**