**Assignment 1**

**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:**

Formula to calculate k successes in n trials = C(n,k) sk(1−s)(n−k) C(n,k)

sk(1−s)(n−k)

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

Here the probability of success = probability of giving a right answer = s = 1414

Hence, the probability of failure = 1 - 1414 = 3434

So, P (exactly 5 out of 20 answers incorrect) = C (20, 5) **(14)(14) 1515** (34)(34) 55

→→ P (5 out of 20) =

(20∗19∗18∗17∗16)(5∗4∗3∗2∗1)(20∗19∗18∗17∗16)(5∗4∗3∗2∗1) **(14)(14) 1515** (34)(34)55

**= 0.0000034 (approximately)**

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**Problem Statement 2:**

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

***Solution:***

Here, n = 50, k = 5, n - k = 4/5.

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.**

**Solution:**

**First determine the probabilities of the events.**

**Table of Probability of events**

|  |  |
| --- | --- |
| **Events** | **Probability** |
| 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 |

The probability of 0 black balls (RR)is 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) is 1/3

**If Z is the random variable representing the number black balls. The probability distribution will be :**

**Z** **p(Z)**

1. **2/15**
2. **8/15**
3. **1/3**

**Notice that the sum of the probabilities = 2/15+8/15+1/3 = 1**

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