

Assignment 12.11442

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:

Problem Statement 2:

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

Total no. of questions = 20

Total no. of options = 4

no. of questions answered wrong = 5

no. of correct options = 1

Probability of correct questions = $\frac{1}{4}$

Probability of incorrect question = $1 - \frac{1}{4} = \frac{3}{4}$

Probability of 5 questions to be wrong

$$= {}^{20}C_5 \times \left(\frac{3}{4}\right)^5 \times \left(\frac{1}{4}\right)^{15}$$

$$= \frac{20!}{15! \times 5!} \times \left(\frac{3}{4}\right)^5 \times \left(\frac{1}{4}\right)^{15}$$

$$= 0.00000343$$

Problem Statement 2:

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

Solution:

$$\text{no. of trials} = 50$$

$$\text{no. of possible outcome of rolling a die} = 5$$

$$\text{probability of getting D} = \frac{1}{5}$$

$$\text{probability of not getting D} = 1 - \frac{1}{5} = \frac{4}{5}$$

$$\text{probability of getting "D" for exactly 5 times is}$$

$$= {}^{50}C_5 \times \left(\frac{1}{5}\right)^5 \times \left(\frac{4}{5}\right)^{45}$$

$$= 0.029$$

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:

Total no. of balls = 10

no. of red balls = 4

no. of black balls = 6

2 balls can be drawn in following ways

1. First ball is red & 2nd ball is black
2. First ball is black & 2nd ball is red
3. Both balls are Red
4. Both balls are Black

1) Probability of 1st ball is red & 2nd ball is black

$$= \frac{{}^4C_1 \times {}^6C_1}{{}^{10}C_2}$$
$$= 0.533$$

2) Probability of 1st ball is black & 2nd ball is red

$$= \frac{{}^6C_1 \times {}^4C_1}{{}^{10}C_2} = 0.533$$

3) Probability of both balls are red

$$= \frac{{}^4C_2}{{}^{10}C_2} = 0.133$$

4) Probability of both balls are black

$$= \frac{{}^6C_2}{{}^{10}C_2} = 0.333$$