Assignment 3

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Abstract

This document gives the solution for Assignment 3 (CBSE Class 12 Maths Exercise 15.1 Q.8).

Question

(Q.8) Q.) A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is (i) red ? (ii) not red ?

Solution

Solution : We obtain the following distribution of balls in the bag :-

Number of Red Balls	3
Number of Black Balls	5
Total Number of Balls	8

Table:

Let the random variable $X = \{0, 1\}$ represent the outcome of the experiment, where
$X = 0$ if the ball drawn is red,
$X = 1$ if the ball drawn is black (ball drawn is not red)

(i)

$$\Pr(X = 0) = \frac{\text{Number of red balls in the bag}}{\text{Total number of balls in the bag}} \tag{1}$$

$$= \frac{3}{8} \tag{2}$$

$$= 0.375 \tag{3}$$

Therefore, the probability that the ball drawn is red is 0.375.

(ii) The probabilty that the ball drawn is not red is the same as the probabilty that the ball drawn is black.
Hence, we will calculate the probability of the ball drawn being black.

$$\Pr(X = 1) = \frac{\text{Number of black balls in the bag}}{\text{Total number of balls in the bag}} \tag{4}$$

$$= \frac{5}{8} \tag{5}$$

$$= 0.625 \tag{6}$$

Alternatively, since we know that the two events are mutually exclusive and exhaustive, we get :-

$$\Pr(X = 0) + \Pr(X = 1) = 1 \tag{7}$$

$$\begin{aligned} \Rightarrow \Pr(X = 1) &= 1 - \Pr(X = 0) && (8)\\ &= 1 - 0.375 && (9)\\ &= 0.625 && (10) \end{aligned}$$

Therefore, the probabilty that the ball drawn is not red is 0.625.

The code in

Assignment3/codes/prob.py

verifies the solution.