Assignment 1

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Problem 10.15.1.8:-

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:-

Let S be the sample space.
Let R be the event that the selected ball is red and B be the event that the selected ball is black.

$$\text{Number of red balls in the bag} = n(R) = 3 \quad (1)$$

$$\text{Number of black balls in the bag} = n(B) = 5 \quad (2)$$

$$\text{Total number of balls in the bag} = n(S) \quad (3)$$

$$= n(R) + n(B) = 8 \quad (4)$$

Let X be a Bernoulli random variable, such that $X \sim Ber(p)$.

$$X = \begin{cases} 1 & \text{if drawn ball is red} \\ 0 & \text{otherwise.} \end{cases} \quad (5)$$

(i) Probability that the drawn ball is red

$$= \Pr(X = 1) \quad (6)$$

$$= \frac{n(R)}{n(S)} = \frac{3}{8} \quad (7)$$

$$\implies p = \frac{3}{8} \quad (8)$$

(ii) Probability that the drawn ball is not red

$$= \Pr(X = 0) \quad (9)$$

$$= 1 - p = 1 - \frac{3}{8} = \frac{5}{8} \quad (10)$$