

Ncert exemplar

KUNWAR DUSHYANT SINGH EE22BTECH11031

Question 12.13.3.17

Bag I contains 3 black and 2 white balls, Bag II contains 2 black and 4 white balls. A bag and a ball is selected at random. Determine the probability of selecting a black ball.

Solution:

Random variable	Value	Definition
X	0	Bag 1
	1	Bag 2
Y	0	White ball
	1	Black ball

TABLE I
DISTRIBUTION

Probability of choosing Bag

$$\Pr(X = 0) = \frac{1}{2} \quad (1)$$

$$\Pr(X = 1) = \frac{1}{2} \quad (2)$$

conditional probability

$$\Pr(Y = 1|X = 0) = \frac{3}{5} \quad (3)$$

$$\Pr(Y = 1|X = 1) = \frac{1}{3} \quad (4)$$

Probability of black balls

$$\Pr(Y = 1) = \Pr(Y = 1|X = 0) \Pr(X = 0) + \Pr(Y = 1|X = 1) \Pr(X = 1)$$

$$\Pr(Y = 1) = \frac{3}{10} + \frac{1}{6} \quad (5)$$

$$= \frac{7}{15}$$