

Ncert exemplar

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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

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

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

$$(3)$$

Conditional Probability,

$$\Pr(Y = 1|X = 0) = \frac{3}{5} \quad (4)$$

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

$$(6)$$

Probability of black balls

$$\Pr(Y = 1) = \Pr(Y = 1|X = 0) \Pr(X = 0) \quad (7)$$

$$+ \Pr(Y = 1|X = 1) \Pr(X = 1) \quad (8)$$

$$\Pr(Y = 1) = \frac{3}{10} + \frac{1}{6} \quad (9)$$

$$= \frac{7}{15} \quad (10)$$