Ncert exempler

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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

Probablity of chosing Bag

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

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

conditional probablity

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

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

Probablity of black balls

$$\begin{aligned}\Pr(Y=1) &= \Pr(Y=1|X=0)\Pr(X=0)\\ &\quad+\Pr(Y=1|X=1)\Pr(X=1)\\ \Pr(Y=1) &= \frac{3}{10}+\frac{1}{6} \qquad (5)\\ &= \frac{7}{15}\end{aligned}$$