

EE23010 NCERT Exemplar

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Question 10.13.35

Box A contains 25 slips of which 19 are marked Rs 1 and others are marked Rs 5 each. Box B contains 50 slips of which 45 are marked Rs 1 and others are marked Rs 13 each. Slips of both boxes are poured into a third box and reshuffled. A slip is drawn at random. What is the probability that it is marked other than Rs 1?

Solution:

Let

Random variable	Value	Definition
X	0	Slips of Rs 1
	1	Slips of Rs 5
	2	Slips of Rs 13
Y	0	Box A
	1	Box B

TABLE I
DISTRIBUTION

pmf of Y,

$$p_y = \begin{cases} \frac{1}{3} & \text{if } Y=0 \\ \frac{2}{3} & \text{if } Y=1 \end{cases} \quad (1)$$

Conditional Probability,

$$\Pr(Y = 0|X = 0) = \frac{19}{25} \quad (2)$$

which is the probability of drawing Rs 1 in Box A.

$$\Pr(Y = 0|X = 1) = \frac{6}{25} \quad (3)$$

which is the probability of drawing Rs 5 in Box A.

$$\Pr(Y = 1|X = 0) = \frac{45}{50} \quad (4)$$

which is the probability of drawing Rs 1 in Box B.

$$\Pr(Y = 1|X = 2) = \frac{5}{50} \quad (5)$$

which is the probability of drawing Rs 13 in Box B.

Probability that the slip is marked other than 1,

$$= p_Y(0) \times \Pr(Y = 0|X = 1) + p_Y(1) \times \Pr(Y = 1|X = 2) \quad (6)$$

$$= \frac{1}{3} \times \frac{6}{25} + \frac{2}{3} \times \frac{5}{50} \quad (7)$$

$$= \frac{11}{75} \quad (8)$$