EE23010 NCERT Exemplar

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Question 10.13.3.35
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:

Random variable	Value	Definition	pmf
X	0	Box A	$\frac{1}{3}$
	1	Box B	$\frac{2}{3}$
	2	Box C	1
Y	0	Slips of Rs 1	$\frac{64}{75}$
	1	Slips of Rs 5	$\frac{6}{75}$
	2	Slips of Rs 13	$\frac{5}{75}$

TABLE I
DISTRIBUTION

$$p_{XY}(20) = p_X(0) \times p_{XY}(00) + p_X(1) \times p_{XY}(10) \quad (1)$$

$$p_{XY}(20) = \frac{64}{75} \quad (2)$$

Using the third axiom of probability

$$p_{XY}(20) + p_{XY}(21) + p_{XY}(22) = 1 \quad (3)$$

$$p_{XY}(21) + p_{XY}(22) = \frac{11}{75} \quad (4)$$

which is a number between 0 and 1.
Therefore, the probability that the slip drawn from the combined box is marked other than Rs 1 is $\frac{11}{75}$.