NCERT Assignment 2

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Question : A card is selected from a pack of 52 cards.

(a) How many points are there in the sample space?
(b) Calculate the probability that the card is an ace of spades.
(c) Calculate the probability that the card is (i) an ace and (ii) black card.

Solution: The probabilities are as follows:

TABLE 3
RANDOM VARIABLES AND PROBABILITY TABLE

Random Variable	Value of R.V.	Description
X	1, 2, 3, 4	Type of the card
Y	1, 2, 3, ..., 13	Number of the card
Z	1, 2	Colour of the card

$$p_X(k) = \frac{1}{4}, \quad k \in [1,4] \tag{1}$$

$$p_Y(k) = \frac{1}{13}, \quad k \in [1,13] \tag{2}$$

$$p_Z(k) = \frac{1}{2}, \quad k \in [1,2] \tag{3}$$

(a) The sample space consists of all possible outcomes when selecting a card. Therefore, the sample space contains 52 points.

(b)

$$p_{XY}(1,1) = p_X(1)p_Y(1) \tag{4}$$

$$= \left(\frac{1}{4}\right)\left(\frac{1}{13}\right) = \frac{1}{52} \tag{5}$$

(c) The probability when the card choosen is ,

(i) An ace

$$p_Y(1) = \frac{1}{13} \tag{6}$$

(ii) Black card (Z=1)

$$p_Z(1) = \frac{1}{2} \tag{7}$$