

# Solution 11.16.3.4

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**Question 4** 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 cards is an ace of spades.
- (c) Calculate the probability that the card is (i) an ace (ii)black card.

**Solution:** S is a sample space of given cards ,  
Let the random variables(r.v) X,Y and Z denote colour,type and value of the card choosen, where X,Y and Z are uniformly distributed r.v's.  
X,Y and Z are independent random variables.

TABLE 3  
RANDOM VARIABLE AND PROBABILITY TABLE

Random variable	value of R.V	Probability
X	1,2	26/52
Y	1,2,3,4	13/52
Z	$1 \leq Z \leq 13$	1/13

(a)

$$\Pr(Y = 1, Z = 1) = \Pr(Y = 1) \Pr(Z = 1) \quad (1)$$

$$= \left(\frac{1}{4}\right) \left(\frac{1}{13}\right) \quad (2)$$

$$= \frac{1}{52} \quad (3)$$

(b) The probability when the card choosen is ,

(i) an ace ( $Z = 1$ )

$$\Pr(Z = 1) = \frac{1}{13}. \quad (4)$$

(ii) black card ( $X = 1$ )

$$\Pr(X = 1) = \frac{1}{2}. \quad (5)$$

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