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## Assignment 1

# AI1110: Probability and Random Variables INDIAN INSTITUTE OF TECHNOLOGY, HYDERABAD

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11.16.3.4: 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 card is an ace of spades.
- (c) Calculate the probability that the card is (i) an ace and (ii) black card.

### **Solution:**

S is a sample space of given cards,

Let the random variables 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	1/2
Y	1,2,3,4	1/4
Z	1 to 13	1/13

(a) Since no. of cards in the pack is 52,

$$n(S) = 52. (1)$$

(b) The probability when the card choosen is an ace(Z = 1) of spades(Y = 1),

$$Pr((Y = 1)(Z = 1)) = Pr(Y = 1)Pr(Z = 1)$$
(2)

$$= \left(\frac{1}{4}\right) \left(\frac{1}{13}\right) \tag{3}$$

$$=\frac{1}{52}.\tag{4}$$

- (c) The probability when the card choosen is,
  - (a) an ace(Z = 1)

$$\Pr(Z=1) = \frac{1}{13}.$$
 (5)

(b) black card(X = 1)

$$\Pr(X=1) = \frac{1}{2}.$$
 (6)