Assignment 4

Challa Akshay Santoshi-CS21BTECH11012

CBSE Class 10 Probability

Excercise: 15.1 Question: 14

One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting

1) a king of red colour
2) a face card
3) a red face card
4) the jack of hearts
5) a spade
6) the queen of diamonds

Solution:

Let $X \in \{0, 1, 2, 3\}$ be a random variable representing different suits in a deck of cards, that is, clubs, diamonds, hearts and spades.
Let $Y \in \{0, 1, 2\}$ be a random variable representing the face cards, that is, King, Queen and Jack.

Description	Random Variable	Probability
Getting a king	Y = 0	$\frac{1}{13}$
Getting a queen	Y = 1	$\frac{1}{13}$
Getting a jack	Y = 2	$\frac{1}{13}$
Getting a club	X = 0	$\frac{1}{4}$
Getting a diamond	X = 1	$\frac{1}{4}$
Getting a heart	X = 2	$\frac{1}{4}$
Getting a spade	X = 3	$\frac{1}{4}$

TABLE 6: Probable Events Representation

Diamonds and Spades are red coloured cards.
Clubs and Hearts are black coloured cards.
King, Queen and Jack are the face cards.

1) The probability of getting a king of red colour

$$\Pr(Y = 0|X = 1) + \Pr(Y = 0|X = 3) = \frac{1}{52} + \frac{1}{52} = \frac{1}{26} \quad (0.0.1)$$

2) The probability of getting a face card

$$\Pr(Y = 0) + \Pr(Y = 1) + \Pr(Y = 2) = \frac{1}{13} + \frac{1}{13} + \frac{1}{13} = \frac{3}{13} \quad (0.0.2)$$

3) The probability of getting a red face card

$$\Pr(Y = 0|X = 1) + \Pr(Y = 0|X = 3) + \Pr(Y = 1|X = 1) + \Pr(Y = 1|X = 3) + \Pr(Y = 2|X = 1) + \Pr(Y = 2|X = 3) = \frac{1}{52} + \frac{1}{52} + \frac{1}{52} + \frac{1}{52} + \frac{1}{52} + \frac{1}{52} = \frac{3}{26} \quad (0.0.3)$$

4) The probability of getting the jack of hearts

$$\Pr(Y = 2|X = 2) = \frac{1}{52} \quad (0.0.4)$$

5) The probability of getting a spade

$$\Pr(X = 3) = \frac{1}{4} \quad (0.0.5)$$

6) The probability of getting the queen of diamonds

$$\Pr(Y = 1|X = 1) = \frac{1}{52} \quad (0.0.6)$$