RD Sharma Solutions Class 11 Maths Chapter 33 Ex 33.4

Probability Ex 33.4 Q1(a)

Given,

$P(A) = 0.4$

$P(B) = 0.5$

$\therefore$ A and B are mutually exclusive events, then $P(A \cap B) = 0$

Now,

(i) $P(A \cup B) = P(A) + P(B)$

$= 0.4 + 0.5$

$= 0.9$

$\therefore$ $P(A \cup B) = 0.9$

(ii) $P(\bar{A} \cap \bar{B}) = 1 - P(A \cup B)$

$= 1 - 0.9$

$= 0.1$

$\therefore$ $P(\bar{A} \cap \bar{B}) = 0.1$

(iii) $P(\bar{A} \cap B) = P(B) - P(A \cap B)$

$= 0.5 - 0$

$\therefore$ $P(\bar{A} \cap B) = 0.5$

(iv) $P(A \cap \bar{B}) = P(A) - P(A \cap B)$

$= 0.4 - 0$

$= 0.4$

$\therefore$ $P(A \cap \bar{B}) = 0.4$

Probability Ex 33.4 Q1(b)

Given,

$$P(A) = 0.54$$
$$P(B) = 0.69$$
$$P(A \cap B) = 0.35$$

(i) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.54 + 0.69 - 0.35$

$= 1.23 - 0.35$

$\therefore$ $P(A \cup B) = 0.88$

(ii) $P(\bar{A} \cap \bar{B}) = 1 - P(A \cup B)$

$= 1 - 0.88$

$= 0.12$

$\therefore$ $P(\bar{A} \cap \bar{B}) = 0.12$

(iii) $P(A \cap \bar{B}) = P(A) - P(A \cap B)$

$= 0.54 - 0.35$

$= 0.19$

$\therefore$ $P(A \cap \bar{B}) = 0.19$

(iv) $P(B \cap \bar{A}) = P(B) - P(A \cap B)$

$= 0.69 - 0.35$

$= 0.34$

$\therefore$ $P(B \cap \bar{A}) = 0.34$

Probability Ex 33.4 Q1(c)

(i) Given,

$$P(A) = \frac{1}{3}, \quad P(A \cap B) = \frac{1}{15}$$

$$P(B) = \frac{1}{5}, \quad P(A \cup B) = \ldots$$

$$\because P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{1}{3} + \frac{1}{5} - \frac{1}{15}$$

$$= \frac{5+3-1}{15}$$

$$= \frac{8-1}{15} = \frac{7}{15}$$

$$\therefore \quad P(A \cup B) = \frac{7}{15}$$

(ii) Given,

$$P(A) = 0.35, \quad P(B) = \ldots$$

$$P(A \cap B) = 0.25, \quad P(A \cup B) = 0.6$$

$$\because P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$0.6 = 0.35 + P(B) - 0.25$$

$$0.6 = 0.10 + P(B)$$

$$P(B) = 0.6 - 0.1$$

$$P(B) = 0.5$$

(iii) Given,

$$P(A) = 0.5, \qquad P(B) = 0.35$$
$$P(A \cap B) = \ldots, \qquad P(A \cup B) = 0.7$$

$$\because P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
$$0.7 = 0.5 + 0.35 - P(A \cap B)$$
$$0.7 = 0.85 - P(A \cap B)$$
$$P(A \cap B) = 0.85 - 0.7$$

$$P(A \cap B) = 0.15$$

Probability Ex 33.4 Q2

We know by addition theorem on probability

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
$$\Rightarrow \quad 0.5 = 0.3 + 0.4 - P(A \cap B)$$
$$P(A \cap B) = 0.3 + 0.4 - 0.5$$
$$= 0.7 - 0.5$$
$$= 0.2$$

$$\therefore P(A \cap B) = 0.2$$

Probability Ex 33.4 Q3

We know by addition theorem on probability

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
$$= 0.5 + 0.3 - 0.2$$
$$= 0.8 - 0.2$$
$$= 0.6$$

$$\therefore P(A \cup B) = 0.6$$

Probability Ex 33.4 Q4

We know,

$$P(A \cup B) = 0.8$$

$$P(A \cap B) = 0.3$$

$$P(\overline{A}) = 0.5$$

$$\Rightarrow \quad 1 - P(A) = 0.5$$

$$\Rightarrow \quad P(A) = 1 - 0.5 = 0.5$$

Now, by addition theorem on probabiltiy

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$0.8 = 0.5 + P(B) - 0.3$$

$$0.8 = P(B) + 0.2$$

$$P(B) = 0.8 - 0.2$$

$$= 0.6$$

$$\therefore \quad P(B) = 0.6$$

Probability Ex 33.4 Q5

Given,

$$P(A) = \frac{1}{2}$$

$$P(B) = \frac{1}{3}$$

$\therefore$ A and B are mutually exclusive events, then $P(A \cap B) = 0$

$$P(A \cup B) = P(A) + P(B)$$

$$= \frac{1}{2} + \frac{1}{3}$$

$$= \frac{3+2}{6}$$

$$= \frac{5}{6}$$

$$\therefore \quad P(A \cup B) = \frac{5}{6}$$

Probability Ex 33.4 Q6

$P(\overline{A}) : P(B) = 8 : 3$

$\Rightarrow \quad \dfrac{1 - P(A)}{P(A)} = \dfrac{8}{3}$

$\Rightarrow \quad P(A) = \dfrac{3}{11}$

$P(\overline{B}) : P(B) = 5 : 2$

$\Rightarrow \quad \dfrac{1 - P(B)}{P(B)} = \dfrac{5}{2}$

$\Rightarrow \quad \dfrac{1}{P(B)} = \dfrac{5}{2} + 1 = \dfrac{7}{2}$

$\Rightarrow \quad P(B) = \dfrac{2}{7}$

$\because$ A, B and C are mutually exhaustive

$\therefore \quad A \cup B \cup C = S$

$\Rightarrow \quad P(A \cup B \cup C) = P(S)$

$\Rightarrow \quad P(A) + P(B) + P(C) = 1$

$P(C) = 1 - \{P(A) + P(B)\}$

$= 1 - \left(\dfrac{3}{11} + \dfrac{2}{7}\right)$

$= 1 - \dfrac{43}{77}$

$= \dfrac{34}{77}$

$\Rightarrow \quad P(\overline{C}) = 1 - P(C)$

$= 1 - \dfrac{34}{77}$

$= \dfrac{43}{77}$

$\therefore$ Odds against C is

$P(\overline{C}) : P(C) = \dfrac{43}{77} : \dfrac{34}{77}$

$= 43 : 34$

Probability Ex 33.4 Q7

let chance in favour of other be x

So $x + \dfrac{2}{3}x = 1$

$x = \dfrac{3}{5}$

Odds in favour of other $= \dfrac{\frac{3}{5}}{\frac{2}{5}} = \dfrac{3}{2} = 3 : 2$

Probability Ex 33.4 Q8

$\because$ 1 card is drawn from a well shuffled deck of 52 cards

$\therefore \quad S = {}^{52}C_1 = 52$

Now,

The favourable events is that drawn card is either spade or a king

Let A = Event of choosing shade

$\Rightarrow \quad {}^{13}C_1 = 13$

B = Event of choosing a king

$\Rightarrow \quad {}^{4}C_1 = 4$

Also, king can be of spade

$\therefore \quad (A \cap B) = 1$

$$\therefore \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
$$= \frac{13}{52} + \frac{4}{52} - \frac{1}{52}$$
$$= \frac{16}{52}$$
$$= \frac{4}{13}$$

Probability Ex 33.4 Q9

Since two dice is thrown,

$\therefore \quad S = 6^2 = 36$

Let A be the event of choosing doublet

$= \{(1,1), (2,2), (3,3), (4,4), (5,5), (6,6)\}$

$\Rightarrow \quad P(A) = \frac{6}{36} = \frac{1}{6}$

B the event of choosing total of 9.

$\{(3,6), (4,5), (5,4), (6,3)\}$

$= P(B) = \frac{4}{36} = \frac{1}{9}$

$\therefore$ Probability of choosing neither a doublet nor a total of 9.

$$= P(\overline{A \cap B}) = 1 - P(A \cup B) \qquad ---(i)$$

Now,

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
$$= \frac{1}{6} + \frac{1}{9} + 0$$
$$= \frac{3+2}{18}$$
$$= \frac{5}{18}$$

Now,

$$P(A \cup B) = \frac{5}{18}$$

$\therefore$ (i) simplies $P(\overline{A \cap B}) = 1 - \frac{5}{8}$

$$= \frac{13}{18}$$