RD Sharma Solutions Class 12 Maths Chapter 31 Ex 31.2

Probability Ex 31.2 Q1

A = first card is king

B = second card is also king

Probability of getting two kings (without replacement)

$= P(A)P\left(\frac{B}{A}\right)$

$= \frac{4}{52} \times \frac{3}{51}$ [Since, 4 kings out of 52 cards.]

$= \frac{1}{13} \times \frac{1}{17}$

$= \frac{1}{221}$

Required probability $= \frac{1}{221}$

Probability Ex 31.2 Q2

A = first card Ace

B = second card Ace

C = third card Ace

D = fourth card Ace

P (All four drawn are Ace, without replacement)

$= P(A)P\left(\frac{B}{A}\right)P\left(\frac{C}{A \cap B}\right)P\left(\frac{D}{A \cap B \cap C}\right)$

$= \frac{4}{52} \times \frac{3}{51} \times \frac{2}{50} \times \frac{1}{49}$ [Since, there are four Ace in 52 cards]

$= \frac{1}{270725}$

Required probability $= \frac{1}{270725}$

Probability Ex 31.2 Q3

Bag contains 5 red and 7 white balls

A = first ball white

B = second ball white

P (2 white balls drawn without replacement)

$$= P(A)P\left(\frac{B}{A}\right)$$

$$= \frac{7}{12} \times \frac{6}{11}$$

$$= \frac{7}{22}$$

Required probability $= \frac{7}{22}$

Probability Ex 31.2 Q4

Tickets are numbered from 1 to 25

$\Rightarrow$ Total number of tickets $= 25$

Number of tickets with even numbers on it

$= 12$ $\{2,4,6,8,10,12,14,16,18,20,22,24\}$

A = first ticket with even number

B = second ticket with even number

P (Both tickets will show even number, without replacement)

$$= P(A)P\left(\frac{B}{A}\right)$$

$$= \frac{12}{25} \times \frac{11}{24}$$

$$= \frac{11}{50}$$

Required probability $= \frac{11}{50}$

Probability Ex 31.2 Q5

We know that, Deck of 52 cards contains 13 spades.

A = first card is spade

B = second card spade

C = third card spade

P (3 cards drawn without replacement are spade)

$$= P(A)P\left(\frac{B}{A}\right)P\left(\frac{C}{A \cap B}\right)$$

$$= \frac{13}{52} \times \frac{12}{51} \times \frac{11}{50}$$

$$= \frac{11}{850}$$

Required probability $= \frac{11}{850}$

Probability Ex 31.2 Q6(i)

In a deck of 52 cards, there are 4 kings. Two cards are drawn without replacement

A = first card is king

B = second card is king

P (Both drawn cards are king)

$= P(A) P\left(\frac{B}{A}\right)$

$= \frac{4}{52} \times \frac{3}{51}$

$= \frac{1}{221}$

Required probability $= \frac{1}{221}$

Probability Ex 31.2 Q6(ii)

We know that, there are 4 kings and 4 ace in a pack of 52 cards.

Two cards are drawn without replacement

A = first card is king

B = second card an ace

P (The first card is a king and second is an ace)

$= P(A) P\left(\frac{B}{A}\right)$

$= \frac{4}{52} \times \frac{4}{51}$

$= \frac{4}{663}$

Required probability $= \frac{4}{663}$

Probability Ex 31.2 Q6(iii)

There are 13 heart and 26 red cards

Hearts are also red .

A = first card is heart

B = second card is red

P (first card is heart and second is red)

$= P(A) . P\left(\frac{B}{A}\right)$

$= \frac{13}{52} \times \frac{25}{51}$

$= \frac{25}{204}$

Required probability $= \frac{25}{204}$

Probability Ex 31.2 Q7

Total number of tickets are 20 numbered from 1,2,3,...20.

Number of tickets with even numbers

$= 10$ [Since, even numbers are $2,4,6,8,10,12,14,16,18,20$]

Number of tickets with odd numbers

$= 10$ [Since, odd numbers are $1,3,5,7,9,11,13,15,17,19$]

Two cards are drawn without replacement.

A = tickets with even numbers

B = tickets with odd numbers

P (first ticket has even number and second has odd number)

$= P(A)P\left(\frac{B}{A}\right)$

$= \frac{10}{20}\cdot\frac{10}{19}$

$= \frac{5}{19}$

Required probability $= \frac{5}{19}$

Probability Ex 31.2 Q8

Urn contains 3 white, 4 red and 5 black balls. Total balls $= 12$

Two balls are drawn without replacement

A = first ball is black

B = second ball is black

P (Atleast one ball is black)

$= P(A \cup B)$

$= 1 - P\left(\overline{A \cup B}\right)$

$= 1 - P\left(\overline{A} \cap \overline{B}\right)$

$= 1 - P\left(\overline{A}\right)P\left(\overline{B/A}\right)$

$= 1 - \left(\frac{7}{12} \times \frac{6}{12}\right)$

$= 1 - \frac{7}{22}$

$= \frac{15}{22}$

Required probability $= \frac{15}{22}$

Probability Ex 31.2 Q9

Bag contains 5 white, 7 red and 3 black balls.

Total number of balls $= 15$

Three balls are drawn without replacement

A = first ball is red

B = second ball is red

C = Third balls is red

P (Three balls are drawn, non is red)

$= P(\overline{A})\, P\left(\frac{\overline{B}}{A}\right) P\left(\frac{\overline{C}}{A \cap B}\right)$

$= \frac{8}{15} \times \frac{7}{14} \times \frac{6}{13}$ [Since, number of non red balls $= 5 + 3 = 8$]

$= \frac{8}{65}$

Required probability $= \frac{8}{65}$

Probability Ex 31.2 Q10

Two cards are drawn from a pack of 52 cards without replacement.

There are 13 heart and 13 diamond in pack

A = first card is heart

B = second card is diamond

P (first card heart and second diamond)

$= P(A)\, P\left(\frac{B}{A}\right)$

$= \frac{13}{52} \times \frac{13}{51}$

$= \frac{13}{204}$

Required probability $= \frac{13}{204}$

Probability Ex 31.2 Q11

Let E and F denote respectively the events that first and second ball drawn are black.
We have to find $P(E \cap F)$ or $P(EF)$.

Now $P(E) = P$ (black ball in first draw) $= \frac{10}{15}$

Also given that the first ball drawn is black, i.e, event E has occurred, now there are 9 black balls and five white balls left in the urn. Therefore, the probability that the second ball drawn is black, given that the ball in the first draw is black, is nothing but the conditional probability of F given that E has occurred.

i.e., $P(F \mid E) = \frac{9}{14}$

By multiplication rule of probability, we have

$$P(E \cap F) = P(E)\, P(F \mid E)$$
$$= \frac{10}{15} \times \frac{9}{14} = \frac{3}{7}$$

Multiplication rule of probability for more than two events if E.F and G are three events of sample space, we have

$P(E \cap F \cap G) = P(E)\, P(F \mid E)\, P(E)\, P(G \mid) \; (G \cap F) = P(E)\, P(F \mid E)\, P\, (G \mid EF)$

Similarly, the multiplication rule of probability can be extended for four or more events.

The following example illustrates the extension of multiplication rule of probability for three events.

Probability Ex 31.2 Q12

Let K denote the event that the card drawn is king

and A be the event that the card drawn is an ace.

We are to find $P(KKA)$.

Now, $P(K) = \frac{4}{52}$

Also, $P(K/K)$ is the probability of second king with the condition that one king has already been drawn.

Now, there are 3 kings in (52-1) = 51 cards.

$\therefore \quad P(K/K) = \frac{3}{51}$

Lastly, $P(A/KK)$ is the probability of third drawn card to be an ace, with the condition that two kings have already been drawn.

Now, there are four aces in left 50 cards.

$\therefore \quad P(A/KK) = \frac{4}{50}$

By multiplication law of probability, we have

$$P(KKA) = P(K)\, P(K/K)\, P(A/KK)$$
$$= \frac{4}{52} \times \frac{3}{51} \times \frac{4}{50} = \frac{2}{5525}$$

Probability Ex 31.2 Q13

There are 15 oranges out of which 12 are good and 3 are bad.

Three oranges selected without replacement are drawn and if they found good the box is approved for sale.

A = first orange good

B = second orange good

B = third orange good

P (All three oranges are good)

$= P(A)P\left(\frac{B}{A}\right)P\left(\frac{C}{A \cap B}\right)$

$= \frac{12}{15} \times \frac{11}{14} \times \frac{10}{13}$

$= \frac{44}{91}$

Required probability $= \frac{44}{91}$

Probability Ex 31.2 Q14

Given bag contains 4 white, 7 black and 5 red balls.

Total number of balls $= 16$

Three balls are drawn without replacement

A = first ball is white

B = second ball is black

C = Third balls is red

P (Three balls drawn are white, Black, red respectively)

$= P(A)P\left(\frac{B}{A}\right)P\left(\frac{C}{A \cap B}\right)$

$= \frac{4}{16} \times \frac{7}{15} \times \frac{5}{14}$

$= \frac{1}{24}$

Required probability $= \frac{1}{24}$