

EXERCISE: 7.7

(21)

Q1 $S = \{1, 2, 3, \dots, 9\} \Rightarrow n(S) = 9$

$A = \{2, 4, 6, 8\} \Rightarrow n(A) = 4$

$B = \{1, 3, 5\} \Rightarrow n(B) = 3$

$A \cup B = \{1, 2, 3, 4, 5, 6, 8\} \Rightarrow n(A \cup B) = 7$

Now
 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= \frac{n(A)}{n(S)} + \frac{n(B)}{n(S)} - \frac{n(A \cap B)}{n(S)}$
 $= \frac{4}{9} + \frac{3}{9} - \frac{0}{9} \quad \because A \cap B = \emptyset$

$P(A \cup B) = \frac{7}{9}$

Alternatively

$P(A \cup B) = \frac{n(A \cup B)}{n(S)}$

$P(A \cup B) = \frac{7}{9}$

Q3 $S = \{1, 2, 3, \dots, 50\} \Rightarrow n(S) = 50$

Let A be the event that chosen number is multiple of 3 so

$A = \{3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48\}$
 $\Rightarrow n(A) = 16$

B be the event that chosen number is multiple of 5 so

$B = \{5, 10, 15, 20, 25, 30, 35, 40, 45, 50\}$
 $\Rightarrow n(B) = 10$

$A \cap B = \{15, 30, 45\} \Rightarrow n(A \cap B) = 3$

Let AUB be event that chosen number is either multiple of 3 or 5 so

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= \frac{n(A)}{n(S)} + \frac{n(B)}{n(S)} - \frac{n(A \cap B)}{n(S)}$
 $= \frac{16}{50} + \frac{10}{50} - \frac{3}{50} = \frac{23}{50}$

$\Rightarrow P(A \cup B) = \frac{23}{50}$

Q2 $S = \{\text{Red} = 10, \text{White} = 30, \text{Black} = 20\}$

$n(S) = 10 + 30 + 20 = 60$

A be event that drawn marble is red

so $n(A) = 10$

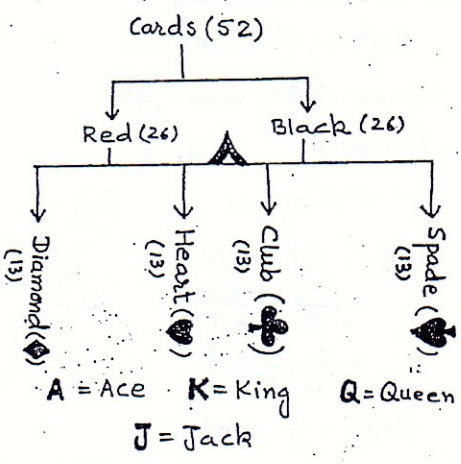
B be event that drawn marble is white

so $n(B) = 30$

so AUB is the event that drawn marble is red or white so

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= \frac{n(A)}{n(S)} + \frac{n(B)}{n(S)} - \frac{n(A \cap B)}{n(S)}$
 $= \frac{10}{60} + \frac{30}{60} - \frac{0}{60} \quad \because A \cap B = \emptyset$
 $= \frac{40}{60} = \frac{2}{3}$

$P(A \cup B) = \frac{2}{3}$



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CH #7 (1st Year)

Q.4

Let S be the Sample Space then

$$n(S) = 52$$

Let A be the event that Card is diamond

$$n(A) = 13$$

B be event that Card is ace

$$n(B) = 4$$

Now $ANB = \{\text{Ace of diamond}\}$

$$n(ANB) = 1$$

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

$$= \frac{n(A)}{n(S)} + \frac{n(B)}{n(S)} - \frac{n(ANB)}{n(S)}$$

$$= \frac{13}{52} + \frac{4}{52} - \frac{1}{52} = \frac{16}{52}$$

$$P(A \cup B) = \frac{4}{13} \text{ Ans.}$$

Q.5

$$S = \left\{ \begin{array}{l} (1,1), (1,2), (1,3), (1,4), (1,5), (1,6) \\ (2,1), (2,2), (2,3), (2,4), (2,5), (2,6) \\ (3,1), (3,2), (3,3), (3,4), (3,5), (3,6) \\ (4,1), (4,2), (4,3), (4,4), (4,5), (4,6) \\ (5,1), (5,2), (5,3), (5,4), (5,5), (5,6) \\ (6,1), (6,2), (6,3), (6,4), (6,5), (6,6) \end{array} \right\}$$

Now

$$n(S) = 36$$

let A be event that Sum is 3

$$A = \{(1,2), (2,1)\} \quad n(A) = 2$$

let B be event that Sum is 11

$$B = \{(5,6), (6,5)\} \quad n(B) = 2$$

$$\text{Now } ANB = \emptyset \text{ so}$$

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

$$= \frac{n(A)}{n(S)} + \frac{n(B)}{n(S)}$$

$$= \frac{2}{36} + \frac{2}{36} = \frac{4}{36}$$

$$P(A \cup B) = \frac{1}{9} \text{ Ans.}$$

$$Q.6 \quad n(S) = 36$$

Let A be the event that Sum is 4

$$A = \{(2,2), (1,3), (3,1)\} \Rightarrow n(A) = 3$$

Let B be event that Sum is 6

$$B = \{(1,5), (2,4), (3,3), (4,2), (5,1)\} \Rightarrow n(B) = 5$$

$$ANB = \emptyset \Rightarrow$$

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

$$= \frac{n(A)}{n(S)} + \frac{n(B)}{n(S)}$$

$$= \frac{3}{36} + \frac{5}{36} = \frac{8}{36}$$

$$P(A \cup B) = \frac{2}{9} \text{ Ans.}$$

Q.7

$$n(S) = 36$$

A be event that Sum is odd

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

$$\Rightarrow n(A) = 18$$

B be event that one of dot is least 3

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

$$n(B) = 11$$

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

$$n(ANB) = 6$$

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

$$= \frac{n(A)}{n(S)} + \frac{n(B)}{n(S)} - \frac{n(ANB)}{n(S)}$$

$$= \frac{18}{36} + \frac{11}{36} - \frac{6}{36} = \frac{23}{36}$$

$$P(A \cup B) = \frac{23}{36} \text{ Ans.}$$

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