

### Problem:-

1. Two dice are thrown. Let  $X$  assign to each point  $(a, b)$  in  $S$  the maximum of its numbers i.e.  $X(a, b) = \max(a, b)$ . Find the probability distribution.  $X$  is a random variable with  $X(S) = \{1, 2, 3, 4, 5, 6\}$

### Solution:-

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

max 1 is appear =  $\{ (1,1) \}$

$$P(\max 1) = \frac{1}{36}$$

max 2 is appear =  $\{ (1,2) (2,1) (2,2) \}$

$$P(\max 2) = \frac{3}{36}$$

max 3 is appear =  $\left\{ \begin{array}{l} (1,3) (3,1) \\ (2,3) (3,2) (3,3) \end{array} \right\}$

$$P(\max 3) = \frac{5}{36}$$

max 4 is appear =  $\{ (1,4) (4,1) (2,4) (4,2) (3,4) (4,3) (4,4) \}$

$$P(\max 4) = \frac{7}{36}$$

max 5 is appear =  $\{ (1,5) (5,1) (2,5) (5,2) (3,5) (5,3) (4,5) (5,4) (5,5) \}$

$$P(\max 5) = \frac{9}{36}$$

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

$$P(\max 6) = \frac{11}{36}$$

$\therefore$  Probability distribution

X	1	2	3	4	5	6
P(X)	$\frac{1}{36}$	$\frac{3}{36}$	$\frac{5}{36}$	$\frac{7}{36}$	$\frac{9}{36}$	$\frac{11}{36}$

= x =

2. Two dice are thrown. Let X assign to each point  $(a,b)$  in S the minimum of its numbers i.e.  $X(a,b) = \min(a,b)$ . Find the probability distribution. X is a random variable with  $X(S) = \{1, 2, 3, 4, 5, 6\}$

3. Two dice are thrown & assign to each point if  $S$  the sum of the variables on the faces. Find Probability distribution.

Solution :

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

$$X(S) = \{ 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 \}.$$

$\therefore$  Sum of the variables  $\geq 2$  to  $12$ .

$$P(\text{sum } 2) = P(X=2)$$

$$= P(\{ (1,1) \}) = \frac{1}{36}$$

$$P(\text{sum } 3) = P(X=3)$$

$$P(\{ (1,2) (2,1) \}) = \frac{2}{36}$$

By

$$P(\text{sum } 4) = \frac{3}{36}$$

$$P(\text{sum } 6) = \frac{5}{36}$$

$$P(\text{sum } 7) = \frac{6}{36}$$

$$P(\text{sum } 5) = \frac{4}{36}$$

$$P(\text{sum } 8) = \frac{5}{36}$$

$$P(\text{Sum } 9) = \frac{4}{36}$$

$$P(\text{Sum } 11) = \frac{2}{36}$$

$$P(\text{Sum } 10) = \frac{3}{36}$$

$$P(\text{Sum } 12) = \frac{1}{36}$$

$\therefore$  Probability distribution

X	2	3	4	5	6	7	8	9	10	11	12
P(x)	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

$$\Sigma x =$$