

Module probability Distribution

* Sample space :

The set of all possible outcomes of an experiment is called sample space.

It is denoted by 'S'

Note that the element of set S is called sample points.

for example : In a throw of two coins,

The sample space $S = \{(H, H), (H, T), (T, H), (T, T)\}$

* Event : A subset of sample space is called an event.

for example : ① If $S = \{(H, H), (H, T), (T, H), (T, T)\}$

then $A_1 = \{(H, H), (T, H)\}$

$A_2 = \{(H, T), (T, H), (T, T)\}$ are the

events

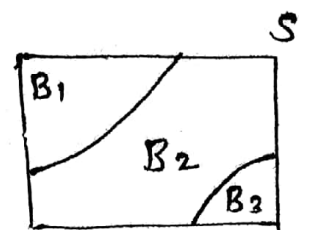
② In a throw of a die,

The sample space $S = \{1, 2, 3, 4, 5, 6\}$

and $B_1 = \{1, 2\}$

$B_2 = \{3, 4, 5\}$

$B_3 = \{6\}$ are events



* probability:

If S is the sample space with n points which are mutually exclusive and A is the event (subset of S) with m points then the ratio $\frac{m}{n}$ is called probability of A and is denoted by ' $P(A)$ '

that is
$$P(A) = \frac{m}{n} = \frac{\text{number of points in } A}{\text{number of points in } S}$$

Important Note: i) $P(A) \geq 0$, for any A

ii) $P(S) = 1$

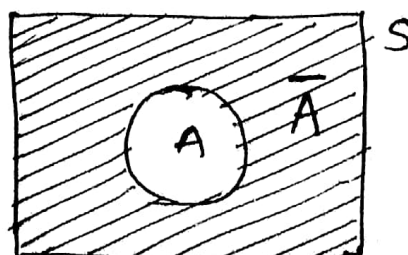
iii) $P(A \cup B) = P(A) + P(B)$,

for any exclusive events A, B

* Complement of the event :

If A be the event of a sample space S then the complement of A is denoted by \bar{A} and is given by

$$\bar{A} = S - A$$



Note: $A \cup \bar{A} = S$

* Random Variables:

The variable which is associated with the outcomes of the sample space of the random experiment is called random variable

for example:

In a throw of three coins

$$\boxed{\text{Sample space}} S' = \{ HHH, HHT, HTH, HTT, THH, THT, TTH, TTT \}$$

$$\therefore n(S) = 8$$

Random experiment : Tossing of three coins

Random variable (r.v) $X = \text{number of heads}$
 $X = 0, 1, 2, 3$

Probability distribution

X	0	1	2	3
$P(X=x_i)$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

* Probability Distribution:-

Let X be the random variable and x_i be the values of X then the set of pairs $\{x_i, P(x_i)\}$ is called as probability distribution, where $p(x_i)$ is probability of x_i