DAY 51

MCA CET 2025

MATHS

Basics

PROBABILITY

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Probability

$\Downarrow$

experiment

$\Downarrow$

outcome chance measure

Coin toss

H — 50%

T — 50%

Random Experiment

Ind vs Aus

Sri Lanka

Experiment in which probable outcomes are known.

Example —

Toss of a coin. → H

→ T

Sample Space & Point

Collection of all possible outcomes.

Coin toss

$S = \{H, T\}$

sample point.

S ↓ sample space

A die is rolled.

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

Sample Point

Equally Likely Event

$$\boxed{P(E) = P(F)}$$

Having same chance of occurance.

Coin toss

$S = \{H, T\}$ $n(S) = 2$

E is an event
so we get H

$E = \{H\}$ $n(E) = 1$

$P(E) = \dfrac{n(E)}{n(S)} = \dfrac{1}{2}$ 50%

F is an event
so we get T.

$F = \{T\}$

$n(F) = 1$

$P(F) = \dfrac{n(F)}{n(S)} = \dfrac{1}{2}$ 50%

Mutually Exclusive Event

Coin toss

$S = \{H, T\}$

$E_1 = \{H\}$

$E_2 = \{T\}$

If E_1 and E_2 are two events and $E_1 \cap E_2 = \phi$ then E_1 and E_2 are Mutually Exclusive Events.

$$E_1 \cap E_2 = \{\} = \phi$$

$$P(A \cdot B) = P(\underline{A \cap B}) = P(\phi)$$
$$= 0$$

If A and B are two mutually exclusive events, what is P(AB)?

(a) 0

(b) P(A) + P(B)

(c) P(A) P(B)

(d) P(A) + P(B / A)

Favourable Events

No. of cases favourable for an event.

A die is rolled.

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

A is an event so that we get a even no.

$A = \{2, 4, 6\}$

Denoted as

Complement of a Event $(\bar{A}, A^c, A')$

$n(S)=6$

A is an event of getting even no. when a die is rolled.

$A=\{2,4,6\}$ $\quad n(A)=3$ $\quad P(A)=3/6=1/2$

$A'=\{1,3,5\}$

$$\boxed{P(E)+P(\bar{E})=1}$$

$P(A')=3/6=1/2$

$P(A)+P(A')=1/2+1/2=1$

Replacement No Replacement

Independent and Dependent Events.

$\rightarrow$ 1. 1 $\Rightarrow$ 1/5

2. 1. $\Rightarrow$ 1/4

1	~~2~~	3	4	5

You chose box 2.

$\Rightarrow$ Replace box 2 with another box $\boxed{2}$

$P(WBWB) + P(BWBW)$

$n(S) = 8$

7

$nC_1 = n$

4

A bag contains 5 white and 3 black balls and 4 balls are successively drawn out and not replaced. The probability that they are alternately of different colours, is

(a) 1/196

(b) 1/7

(c) 13/56

(d) 3/7

$$\frac{5C_1}{8C_1} \cdot \frac{3C_1}{7C_1} \cdot \frac{4C_1}{6C_1} \cdot \frac{2C_1}{5C_1} + \frac{3C_1}{8C_1} \cdot \frac{5C_1}{7C_1} \cdot \frac{2C_1}{6C_1} \cdot \frac{4C_1}{5C_1}$$

$$= \frac{5}{8} \cdot \frac{3}{7} \cdot \frac{4}{6} \cdot \frac{2}{5} + \frac{3}{8} \cdot \frac{5}{7} \cdot \frac{2}{6} \cdot \frac{4}{5} = \frac{1}{14} + \frac{1}{14}$$

2×7

$$= \frac{2}{14} = \frac{1}{7}$$

$\boxed{T}\boxed{T}\boxed{T}\boxed{T} \Rightarrow n(s) = \boxed{16}$

$1 = 2^1$
$2 = 2^2$
$3 = 2^3$
$\boxed{4 = 2^4}$

A coin is tossed 4 times. The probability that atleast one head turns up, is

$\{TTTT\}$

(a) 1/16

(b) 2/16

(c) 14/16

(d) 15/16

15/16

HH HT TH TT

$E = \{HH, HT\}$

$F = \{HH, TH\}$

In tossing a coin twice, let $\boxed{E}$ and $\boxed{F}$ denote occurrence of head on first toss and second toss, respectively. Then, P (E∪F) is equal to

(a) ¼

(b) ½

~~(c)~~ ¾

(d) 1/3

$E \cup F = \{HH, HT, TH\}$

$n(E \cup F) = 3$

$\frac{3}{4}$

$A = \{1, 2, 3\} = \{1, 2, 3\}$ $\quad \boxed{A} \cap B \quad \phi$

$B = \{2\}$

If A and B are two events, such that

P[A U B]= P[A], then

(a) events A and B are mutually exclusive

(b) events A and B are statistically independent

(c) event B is a subset of event A

(d) event A is a subset of event B

G B G B G B G B G B G B

$n(S) = 10!$

5 boys and 5 girls are sitting in a row randomly. The probability that boys and girls sit alternatively, is

(a) 5/126

(b) 1/42

(c) 4/126

(d) 6/126

$$\frac{6! \cdot 5!}{10!} = \frac{\cancel{6!}\ \cancel{5} \times \cancel{4} \times \cancel{3} \times \cancel{2} \times 1}{\cancel{10} \times \cancel{9} \times \cancel{8} \times 7 \times \cancel{6!}} = \frac{1}{42}$$

3 2

RRWW / RRWW

A lot of 4 white and 4 red balls is randomly divided into two halves. What is the probability that there will be 2 red and 2 white balls in each half?

(a) 18/35

(b) 3/35

(c) ½

(d) None of these

$$\frac{{}^4C_2 \cdot {}^4C_2}{{}^8C_4} = \frac{\frac{4\times3\times2!}{2!\,2!}\cdot\frac{4\times3\times2!}{2!\,2!}}{\frac{8\times7\times6\times5\times4!}{4!\,4!}}$$

$4! \;\to\; 4\times3\times2\times1$

$$\frac{2\times3\times2\times3}{7\times2\times5}$$

$$\frac{18}{35}$$

M T W T F S S

$\frac{\cancel{7}}{\cancel{7}} \times \frac{6}{\cancel{7}} \times \frac{5}{7}$ $\frac{30}{49} = 0.6$

Which of the following numbers is nearest to the probability that three randomly selected persons are born on three different days of the week?

(a) 0.7 (b) 0.6 (c) 0.5 (d) 0.4