

**DAY 51**



**MCA CET 2025**

**MATHS**

*Basis*



**PROBABILITY**

**INEXORABLE**  
**MAH MCA CET 2025**  
**FREE CRASH COURSE**



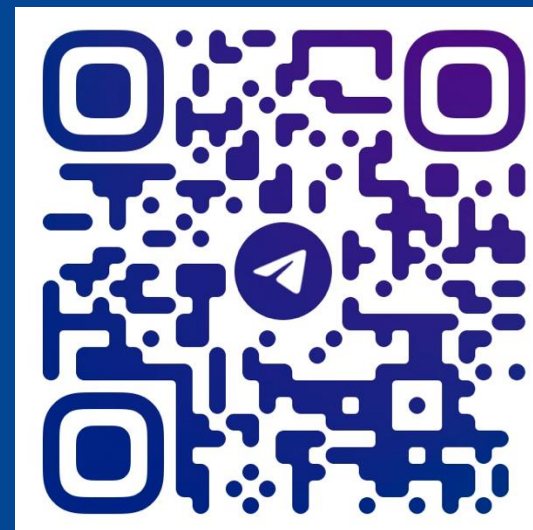


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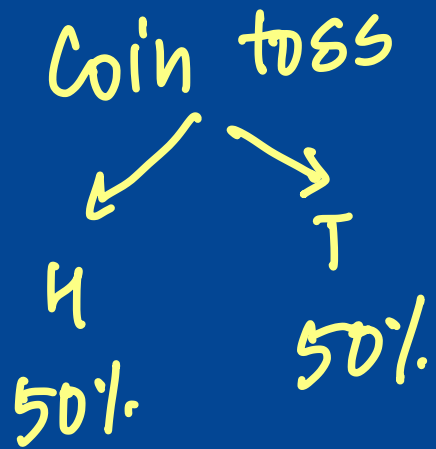
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# Probability

⇓  
experiment

⇓  
outcome chance measure





# 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  
space

sample point.

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 occurrence.

Coin toss

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

$E$  is an event  
so we get  $H$

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

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

$F$  is an event  
so we get  $T$ .

$$F = \{T\}$$

$$n(F) = 1$$

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



# Mutually Exclusive Event

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.

Coin toss

$$S = \{H, T\}$$

$$E_1 = \{H\}$$

$$E_2 = \{T\}$$

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



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

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.

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

$$n(A) = 3$$

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

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

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

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

$$\underline{\underline{P(A) + P(A') = 1/2 + 1/2 = 1}}$$



Replacement

No Replacement

Independent and Dependent Events.

→ 1.  $1 \Rightarrow 1/5$  ✖

2.  $1 \Rightarrow 1/4$

=



You chose box 2.

⇒ Replace box 2 with another box [2]



$$P(W \cdot B \cdot W \cdot B) + P(\underline{B \cdot W \cdot B \cdot W})$$

$$n(S) = 8$$

4

↓  
7

$$nC_1 = n$$

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)  $3/7$

$$\begin{aligned} & \frac{{}^5C_1 \cdot {}^3C_1}{{}^8C_1} \cdot \frac{{}^4C_1 \cdot {}^2C_1}{{}^7C_1} + \frac{{}^3C_1 \cdot {}^5C_1}{{}^8C_1} \cdot \frac{{}^2C_1 \cdot {}^4C_1}{{}^6C_1} \\ &= \frac{\cancel{5} \cdot \cancel{3} \cdot \cancel{4} \cdot \cancel{2}}{\cancel{8} \cdot \cancel{7} \cdot \cancel{6} \cdot \cancel{5}} + \frac{\cancel{3} \cdot \cancel{5} \cdot \cancel{2} \cdot \cancel{4}}{\cancel{8} \cdot \cancel{7} \cdot \cancel{6} \cdot \cancel{5}} = \frac{1}{14} + \frac{1}{14} \\ &= \frac{2}{14} = \frac{1}{7} \end{aligned}$$





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

$$\begin{aligned} 1 &= 2^1 \\ 2 &= 2^2 \\ 3 &= 2^3 \\ \underline{4 &= 2^4} \end{aligned}$$

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

- (a)  $1/16$
- (b)  $2/16$
- (c)  $14/16$
- ~~(d)  $15/16$~~

$$\{ \underline{\text{T T T T}} \}$$

$$\frac{15}{16}$$



HH HT TH TT

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

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

- (a)  $\frac{1}{4}$
- (b)  $\frac{1}{2}$
- ~~(c)  $\frac{3}{4}$~~
- (d)  $\frac{1}{3}$

$$E \cup F = \{HH, HT, TH\}$$
$$n(E \cup F) = \frac{3}{4}$$

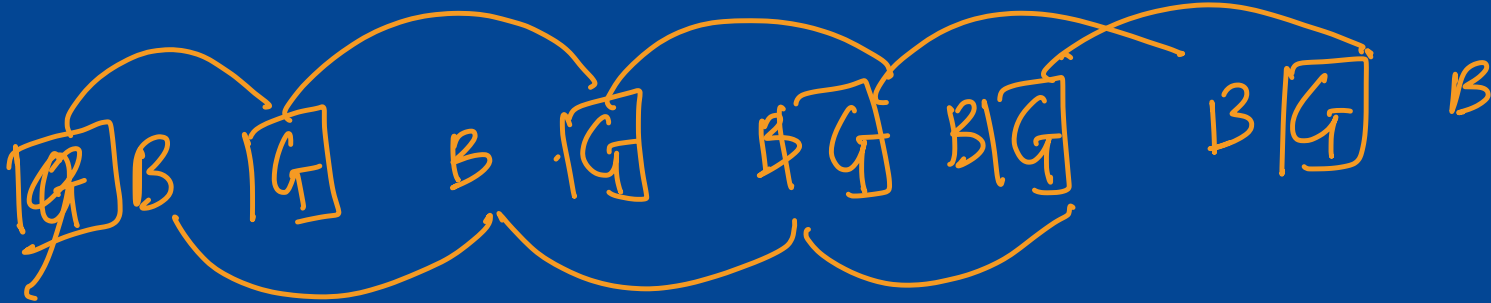


$$A = \{1, 2, 3\} \Rightarrow \{1, 2, 3\} \quad \boxed{A} \cap B = \emptyset$$
$$B = \{2\}$$

If A and B are two events, such that

$P[A \cup B] = P[A]$  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



$$\underline{\underline{n(S) = 10!}}$$

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)  $6/126$

$$\frac{6! \cdot 5!}{10!}$$

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

$$\frac{1}{42}$$





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)  $\frac{1}{2}$
- (d) None of these

$$\frac{{}^4C_2 \cdot {}^4C_2}{{}^8C_4} = \frac{\frac{2 \times 3 \times 2 \times 1}{2! \cdot 2!} \cdot \frac{4 \times 3 \times 2 \times 1}{2! \cdot 2!}}{\frac{8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{4! \cdot 4!}}$$
$$\frac{2 \times 3 \times 2 \times 1}{7 \times 7 \times 5} \cdot \frac{4! \cdot 4!}{4! \cdot 4!} = \frac{18}{35}$$



Handwritten calculations for a probability problem:

132

7

W T F S S

$\frac{7}{7} \times \frac{6}{7} \times \frac{5}{7}$

$\frac{30}{49} = \underline{\underline{0.6}}$

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

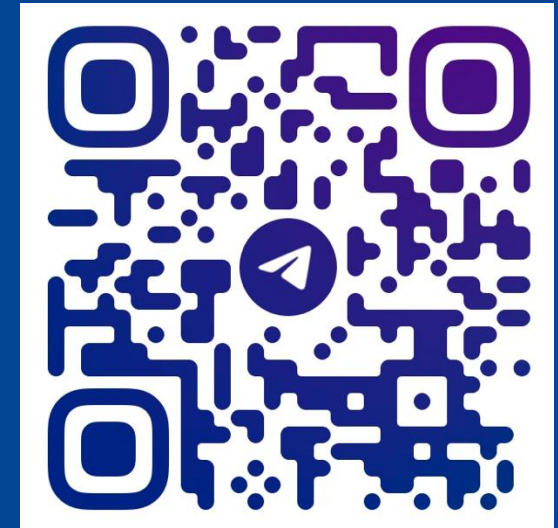


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