

CDS-AFCAT 2 2024

SSBCrack
EXAMS

LIVE

MATHS

PROBABILITY



NAVJYOTI SIR



25 June 2024 Live Classes Schedule

8:00AM --- 25 JUNE 2024 DAILY CURRENT AFFAIRS --- RUBY MA'AM

9:00AM --- 25 JUNE 2024 DAILY DEFENCE UPDATES --- DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

9:30AM --- MOCK PERSONAL INTERVIEW --- ANURADHA MA'AM

AFCAT 2 2024 LIVE CLASSES

2:30PM --- STATIC GK - INTERNATIONAL DAYS, SUMMITS & MEETINGS 2023-24 --- DIVYANSHU SIR

4:00PM --- MATHS - PROBABILITY --- NAVJYOTI SIR

5:30PM --- ENGLISH - WORD SUBSTITUTION - CLASS 3 --- ANURADHA MA'AM

NDA 2 2024 LIVE CLASSES

11:30AM --- GK - MEDIEVAL HISTORY - CLASS 1 --- RUBY MA'AM

2:30PM --- GS - CHEMISTRY MCQS - CLASS 2 --- SHIVANGI MA'AM

6:30PM --- MATHS - APPLICATIONS OF DERIVATIVES - CLASS 1 --- NAVJYOTI SIR

CDS 2 2024 LIVE CLASSES

11:30AM --- GK - MEDIEVAL HISTORY - CLASS 1 --- RUBY MA'AM

2:30PM --- GS - CHEMISTRY MCQS - CLASS 2 --- SHIVANGI MA'AM

4:00PM --- MATHS - PROBABILITY --- NAVJYOTI SIR



RANDOM EXPERIMENT

An experiment in which total outcomes are known in advance but occurrence of specific outcome can be told only after completion of the experiment.

e.g., in tossing a coin, we know the total outcomes. It is either a head or a tail.

head tail

SAMPLE SPACE

Set of total possible outcomes in a random experiment is sample space. In tossing of two coins sample space is $\{\underline{HH}, \underline{HT}, \underline{TH}, TT\}$.

$\left. \begin{array}{l} HT \\ HH \\ TH \\ TT \end{array} \right\}$ no. of outcomes = 4

Die
1 2 3 4 5 6

⑥
=

Total no. of possible outcomes,

PROBABILITY

The probability of an event E to occur is the ratio of the number of cases in its favour to the total number of cases.

$$\therefore P(E) = \frac{\text{Number of cases favourable to event } E}{\text{Total number of cases}} \quad \checkmark$$
$$= \frac{n(E)}{n(S)} \quad \checkmark$$

Probability of non-occurrence of event E is

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

and $0 \leq P(E) \leq 1$. If $P(E) = 1$, then event E is known as certain event and if $P(E) = 0$, then E is known as impossible event.

$$\text{Probability, } P = \frac{\text{No. of favourable outcomes}}{\text{Total no. of outcomes}}$$

Getting an even
number in a die

2, 4, 6 — (3)

1, 2, 3, 4, 5, 6 — (6)

$$P(\text{getting an even number}) = \left(\frac{3}{6}\right) = \frac{1}{2}$$

$$0 \leq P(E) \leq 1$$

$P(E) = 0 \Rightarrow$ Event E is called impossible event.

$P(E) = 1 \Rightarrow$ " " " sure event.

2 coins

HH —

TT

HT

TH

$$P(\text{getting 2 heads}) = \frac{1}{4}$$

↑ opposites

$$P(\text{getting less than 2 heads}) = \frac{3}{4}$$

getting not-2 heads

Die

multiple of 3 → 3, 6

$$P(\text{getting a multiple of 3}) = \frac{2}{6} = \frac{1}{3}$$

$$P(\text{getting non-multiples of 3}) = \frac{4}{6} = \frac{2}{3}$$

1, 2, 4, 5

$$P(\text{occurrence of } E) + P(\text{non-occurrence of } E) = 1$$

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

COIN

1 \rightarrow H, T

2 \rightarrow HH, HT, TH, TT

3 \rightarrow HHH
HTH
HTT
HHT
TTH
THT
TTH
TTT

8

HHH
HHH
HTH
HTT
TTH
TTH
THT
TTH
TTT

For 1 \rightarrow (2) possibilities

For n coins \rightarrow (2)ⁿ possibilities

2 coinsProbability

i) getting one head? $\frac{2}{4} = \frac{1}{2}$

ii) getting no heads? $\frac{1}{4}$

3 coins

i) getting 2 heads? $\frac{3}{8}$

ii) no heads? $\frac{1}{8}$

iii) at least 1 head?

$$1 - P(\text{no heads}) = 1 - \frac{1}{8} = \frac{7}{8}$$

iv) at most 2 heads!

(1 or more than 1)

1 head + 2 head + 3 heads

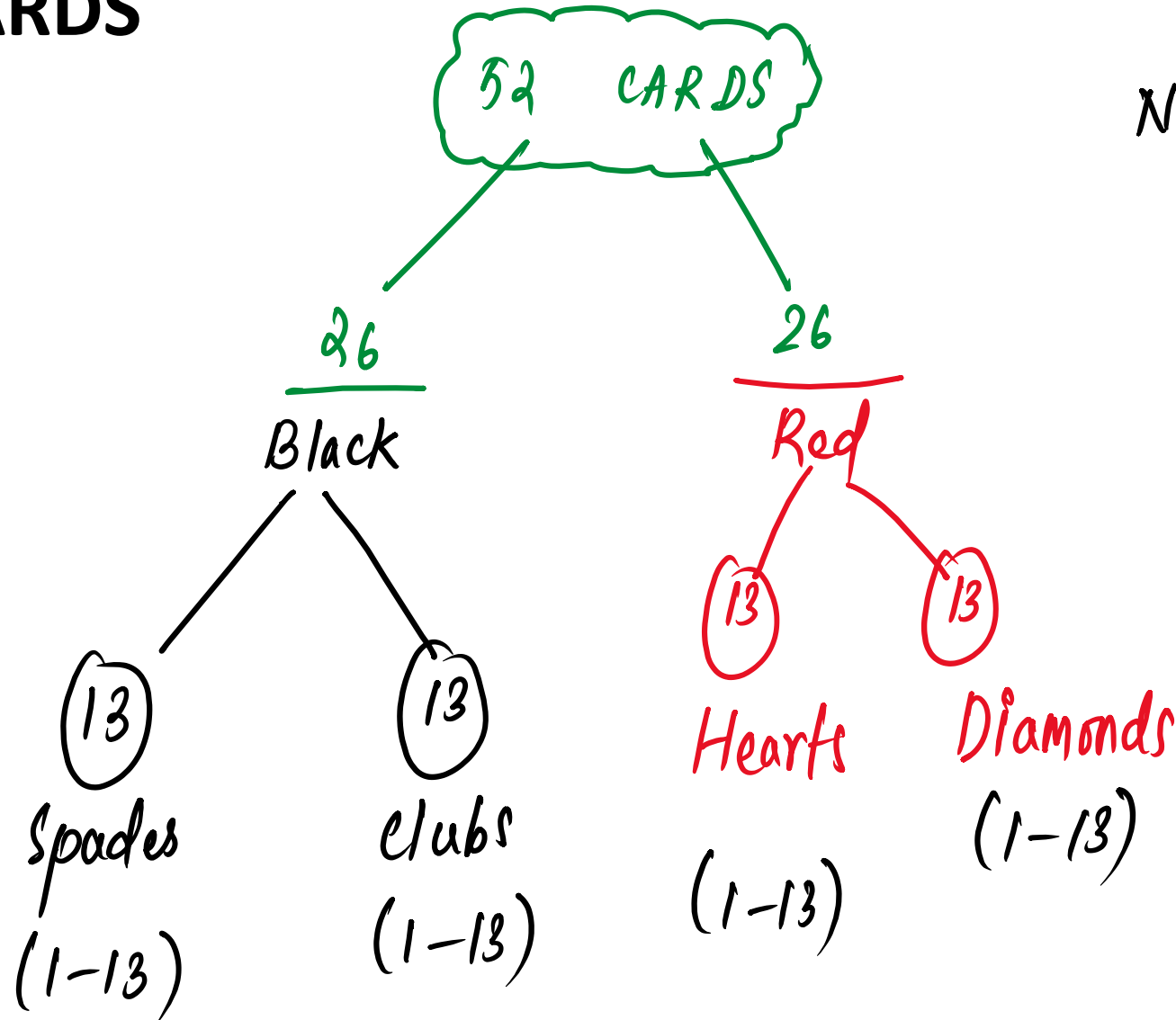
iv) atmost 2 heads ! (2 or less than 2)

max. \rightarrow $\binom{0}{H} + \binom{1}{H} + \binom{2}{H}$

$$1 - P(\text{all heads})$$

$$1 - \frac{1}{8} = \underline{\underline{\left(\frac{7}{8}\right)}}$$

CARDS



Numbers on card

∴ 2 - 10

1 — A — Ace

11 — Jack } Face cards
12 — Queen }

13 — King

(12 face cards in pack of 52 card)

P of getting

i) black card ? $\frac{26}{52} = \frac{1}{2}$

ii) a club ? $\frac{13}{52} = \frac{1}{4}$

iii) An ace of hearts ? $\frac{1}{52}$

iv) A Jack ? $\frac{4}{52} = \frac{1}{13}$

v) A face card ? $\frac{12}{52} = \frac{3}{13}$

DICE

2 dices

(1, 1)	(1, 2),	(1, 3),	(1, 4)	(1, 5)	(1, 6)
(2, 1)	(2, 2),	(2, 3)	- - -		(2, 6)
(3, 1)	(3, 2)	- -			(3, 6)
(4, 1)					(4, 6)
(5, 1)					(5, 6)
(6, 1)	- - -	- - -	- - -	- - -	(6, 6)

(no. of possibilities for 1)^{no. of items}

$$(6)^2 = \underline{36}$$

P of getting

i) same number on both dice? $\rightarrow \frac{6}{36} = \frac{1}{6}$

1,1 2,2 3,3 4,4 5,5 6,6

ii) sum of both numbers be 7? $\frac{6}{36} = \frac{1}{6}$

1,6 2,5 3,4

6,1 5,2 4,3

Q) A dice is thrown. The probability that a number greater than 4 may appear at the dice is

(a) $\frac{1}{3}$

(c) $\frac{1}{2}$

(b) $\frac{1}{4}$

(d) $\frac{1}{5}$

Q) A dice is thrown. The probability that a number greater than 4 may appear at the dice is

(a) $\frac{1}{3}$

(b) $\frac{1}{4}$

(c) $\frac{1}{2}$

(d) $\frac{1}{5}$

Ans: (a)

Q) Three dice are thrown. What is the probability that the same number will appear on each of them?

(a) $\frac{1}{6}$
(c) $\frac{1}{24}$

(b) $\frac{1}{18}$
 (d) $\frac{1}{36}$

Total no. of outcomes = $6 \times 6 \times 6 = 216$

(1, 1, 1) (3, 3, 3) (5, 5, 5)
(2, 2, 2) (4, 4, 4) (6, 6, 6)

$$\frac{6}{216} = \frac{1}{36}$$

Q) Three dice are thrown. What is the probability that the same number will appear on each of them?

(a) $\frac{1}{6}$
(c) $\frac{1}{24}$

(b) $\frac{1}{18}$
(d) $\frac{1}{36}$

Ans: (d)

Q) Three coins are tossed together, then the probability of getting atleast one head is

(a) $\frac{1}{2}$
(c) $\frac{1}{8}$

(b) $\frac{3}{4}$
(d) $\frac{7}{8}$

$$1 - P(\text{getting no head})$$

$$1 - \frac{1}{8} = \frac{7}{8}$$

(OR)

$$P(1) + P(2) + P(3)$$

$$\frac{3}{8} + \frac{3}{8} + \frac{1}{8} = \frac{7}{8}$$

Q) Three coins are tossed together, then the probability of getting atleast one head is

(a) $\frac{1}{2}$

(b) $\frac{3}{4}$

(c) $\frac{1}{8}$

(d) $\frac{7}{8}$

Ans: (d)

Q) One card is drawn randomly from a pack of 52 cards, then the probability that it is a king or spade, is

(a) $1/26$

(b) $3/26$

(c) $4/13$

(d) $3/13$

$$\frac{4}{52} + \frac{12}{52} = \frac{16}{52} = \frac{4}{13}$$

(one less, as 1 card is already counted as king)

Individual probabilities

happening together — (X)

either this or that (cases) — (+)

Q) One card is drawn randomly from a pack of 52 cards, then the probability that it is a king or spade, is

(a) $1/26$

(b) $3/26$

(c) $4/13$

(d) $3/13$

Ans: (c)

Q) From a pack of 52 cards two cards are drawn in succession one by one without replacement. The probability that both are aces is

(a) $\frac{2}{13}$

(b) $\frac{1}{51}$

(c) $\frac{1}{221}$

(d) $\frac{2}{21}$

$$\frac{4}{52} \times \frac{(4-1)}{(52-1)} = \frac{\cancel{4} \times \cancel{3}}{\cancel{52} \times \cancel{51}} = \frac{1}{221}$$

↓

Q) From a pack of 52 cards two cards are drawn in succession one by one without replacement. The probability that both are aces is

(a) $\frac{2}{13}$

(b) $\frac{1}{51}$

(c) $\frac{1}{221}$

(d) $\frac{2}{21}$

Ans: (c)

Q) From a pack of 52 cards, two cards are drawn, the first being replaced before the second is drawn. What is the probability that the first is a diamond and the second is a king ?

(a) $\frac{1}{4}$

(b) $\frac{4}{13}$

✓ (c) $\frac{1}{52}$

(d) $\frac{4}{15}$

$$\frac{\cancel{13}}{52} \times \frac{\cancel{4}}{\cancel{52}} = \frac{1}{52}$$

or \rightarrow (+)
and \rightarrow (x)

Q) From a pack of 52 cards, two cards are drawn, the first being replaced before the second is drawn. What is the probability that the first is a diamond and the second is a king ?

(a) $\frac{1}{4}$

(b) $\frac{4}{13}$

(c) $\frac{1}{52}$

(d) $\frac{4}{15}$

Ans: (c)