DAV-2 (Probs - Stats) Module

Maths (DSML)
- ↳ DAV 2 (PAS)
- ↳ DAV 3 (H.T)
- ↳ Maths for M2

DAV2
↓
DAV3
↓
PA
} DA

Maths for M2

Group A:

$P(\text{click on UI 1}) = \frac{400}{500} = \frac{\#\text{ of folks matching the criteria}}{\text{Total \# of folks}}$

or

Add to cart

Group B:

$$P(\text{Click on UI2}) = \frac{300}{500} = \frac{3}{5}$$

UI 1 > UI 2

Basic Terminologies:

① Experiment : Activity

$a^2 + b^2 + 2ab$

↳ $a = 3, b = 4$

$= 3^2 + 4^2 + 2(3)(4)$

$= 49$

50, 51 ✗

} Deterministic Experiments

Non-deterministic / Probabilistic Exp.

Flip a coin } Exp

Head, Tail } outcomes of the exp

$\left(\frac{1}{2}\right)$

Exp: Rolling a six-sided die / dice

Outcomes: 1, 2, 3, 4, 5, 6.

$\left(\frac{1}{6}\right)$

Exp: Ind vs Aus

Outcomes: Win, Loss, Draw

$= \left(\frac{1}{3}\right)$

↳ Probabilistic Experiments

(2) Outcomes

Experiment: "Rolling a 6 sided die"

Outcome: {1} or {2} or {3} or {4} or {5} or {6}

(3) Sample space: {1, 2, 3, 4, 5, 6}

6

(4) Events :

Even Outcomes : {2, 4, 6}

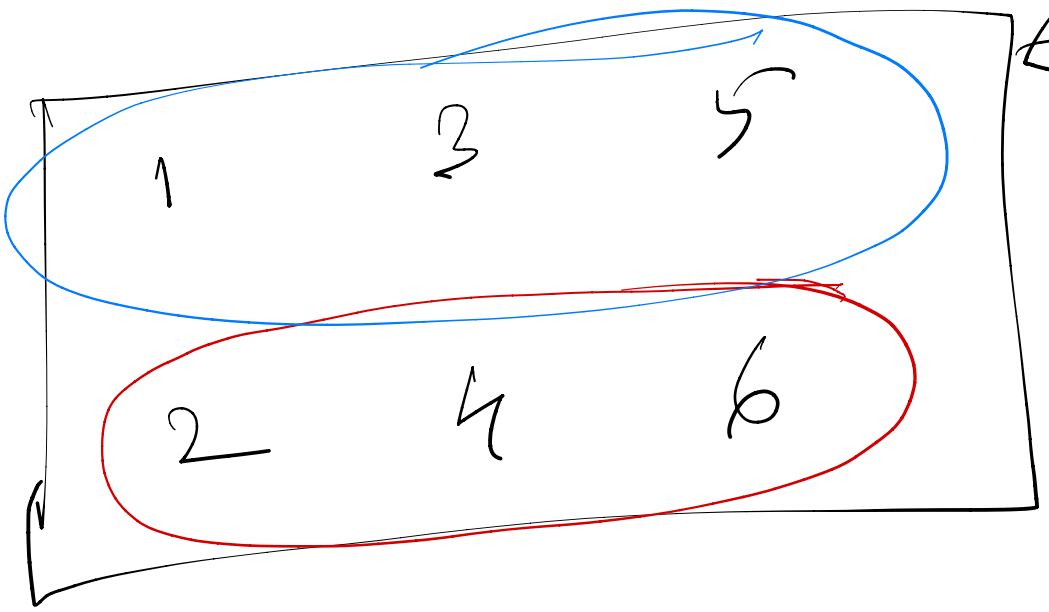
(E)

↳ = {2, 4, 6}

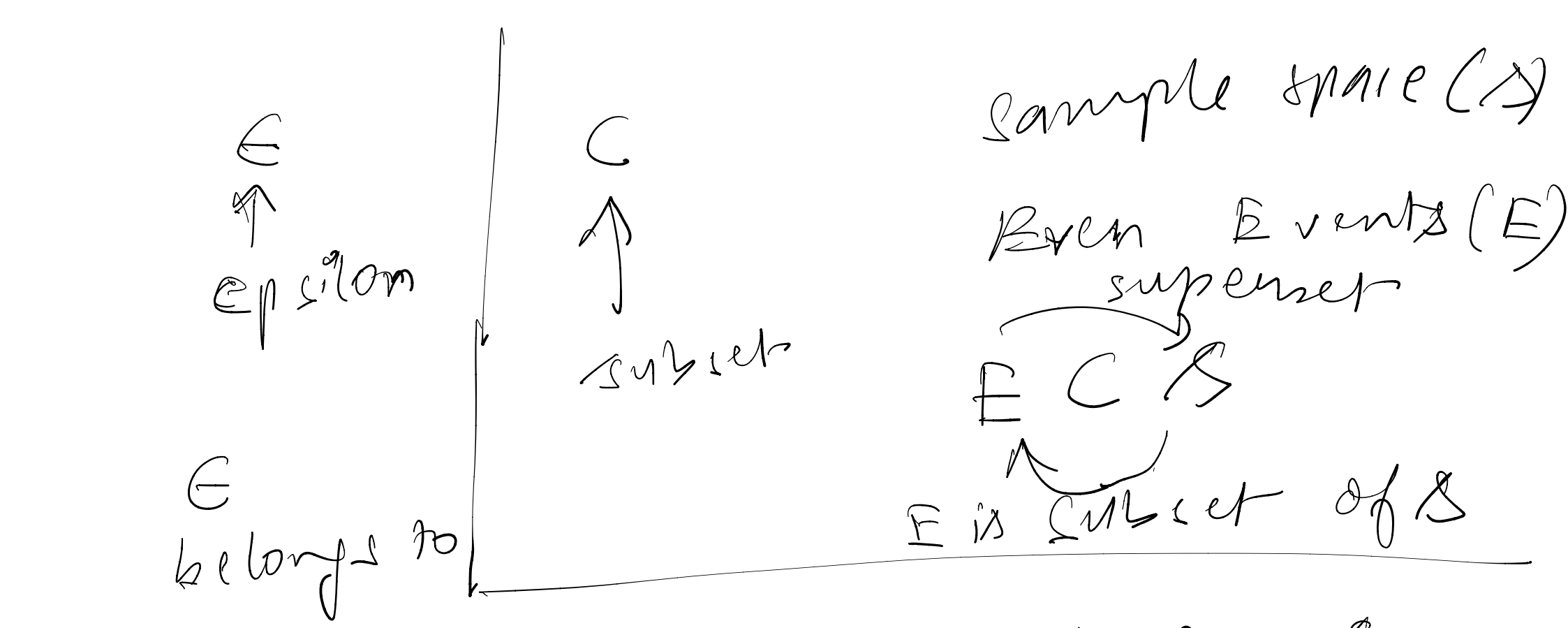
Event

Odd Outcome Event = {1, 3, 5}

Venn diagram (set theory)



← universal set / universe of discourse / sample space



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

Membership notation

Set: $\{1,1,2,3,4,4,5\}$

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

Multi-sets : { 1, 1, 2, 3, 4, 4, 5 }

Exp: Coin Toss
- H
- T

} outcomes = {H}, {T}

S = {H, T} = sample space

$E_1 = \{H\}$

$E_2 = \{T\}$

$E_3 = \{H, T\}$? $\{H\}\{T\}$

outcomes

$S = \{H, T\}$

$E_3 \subset S$ | $E_3 \subseteq S$

$= \text{or} \subset$

E_3 ✗ event (valid)

$E_4 = \{\}$ = neither getting head nor tail.

$= \phi$ = phi

No. of subsets :-

Sample space $= \{H, T\}$

$\{H\} \subseteq S$

$\{T\} \subseteq S$

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

$\{\} \subseteq S$

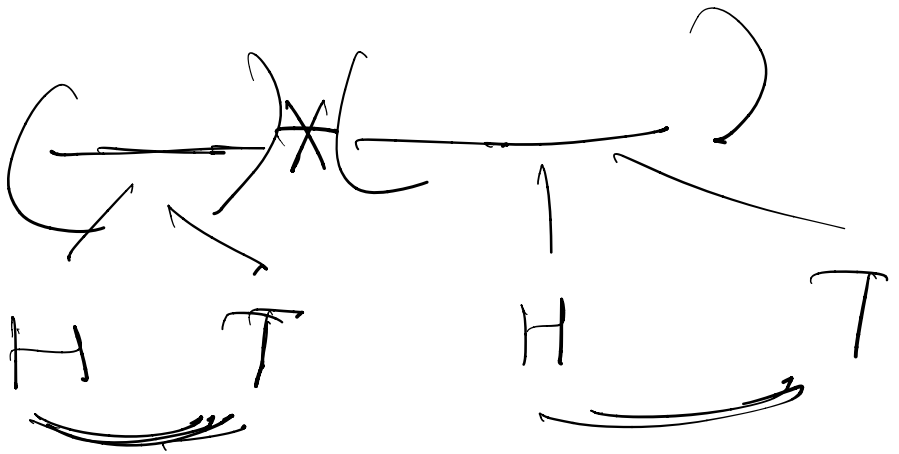
$\{\{H\}, \{T\}, \{H, T\}, \{\}\}$

Sample space of

= Cardinality of set

$= 2$

Total # of subsets of any set (sample space)

$= ($  $)$

H T H T

$= (2) * (2) = 4 = 2^{|S|} = 2^2 = 4$

Dice: $|A| = 6 = |N|$

$2^N = 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$= 2^6$

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

$\{1\}$ ✗

$\{1,3\}$ ✗

$\{1,3,5\}$ ✓

$\{1,3,5,7\}$ ✗

Not a valid Event

Qu 32: Coin toss → dice

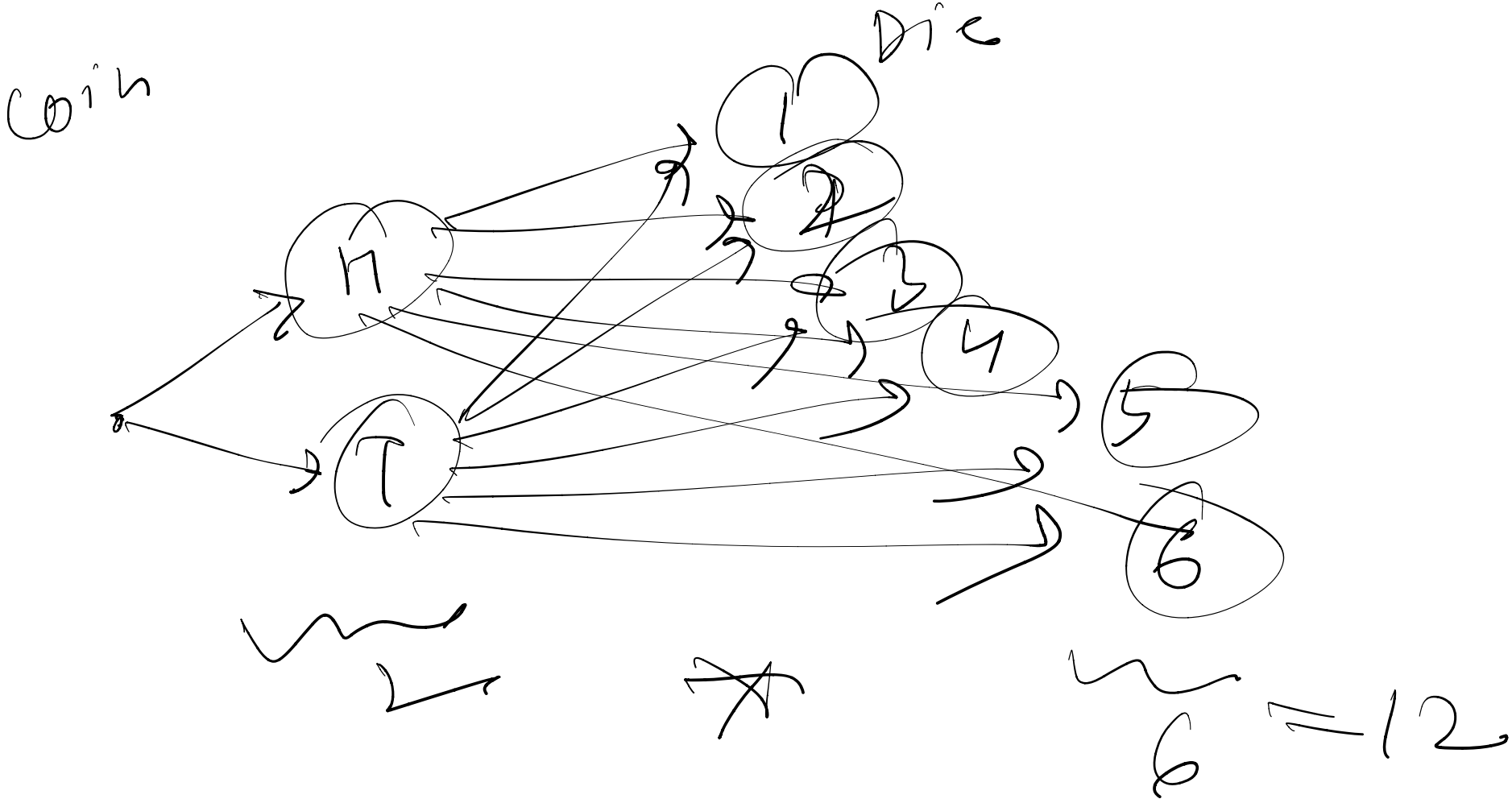
# of possible outcomes in sample space

⇒ $S = \{(H,1), (T,1), (H,2), (T,2), \ldots (H,6), (T,6)\}$

$\phi \subset S$

Coin → H, T

Die → 1, 2, 3, ⋮, 6


Coin
Die
H
T
1
2
3
4
5
6
2
×
6
= 12

Set operations : Exp: Roll a die

Mohit | Rakesh | Akshay

$A = \{1, 3, 5\}$ | $B = \{1, 5, 6\}$ | $C = \{2, 4, 6\}$

Q1.

$\{1, 5\} = A \cap B$ = A AND B

$\cap$ Intersection

Q2. Either Mohit OR Rakesh wins

$\{1, 3, 5, 6\} = A \cup B$

Union

Q3. Mohit loar $\Rightarrow \{1, 3, 5\}$

$\hookrightarrow \{2, 4, 6\}$

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

A complement $A^C / \bar{A} / A'$

$= S - \{1, 3, 5\}$

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

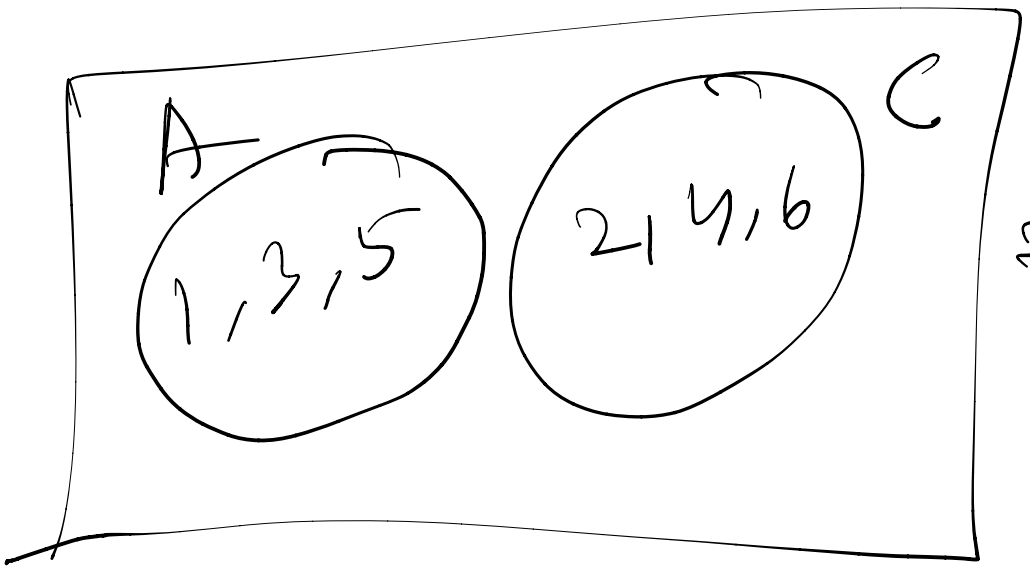
Mutual Exclusive Event :

$A \cap C = \phi = \{\}$

$=$ $=$

↳ Disjoint sets / M.E events

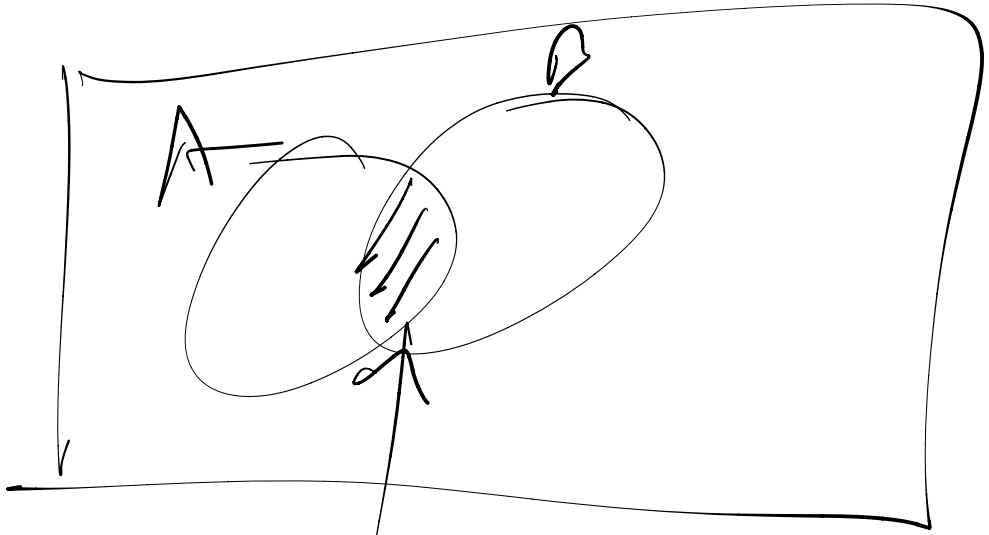
A & C are M.E



$\Rightarrow A \cup C$

$\Rightarrow \{1,2,3,4,5,6\}$

$= S$



$\{1,5\} \subset A \cap B$

$A \cup B \cup C$ } Exhaustive events

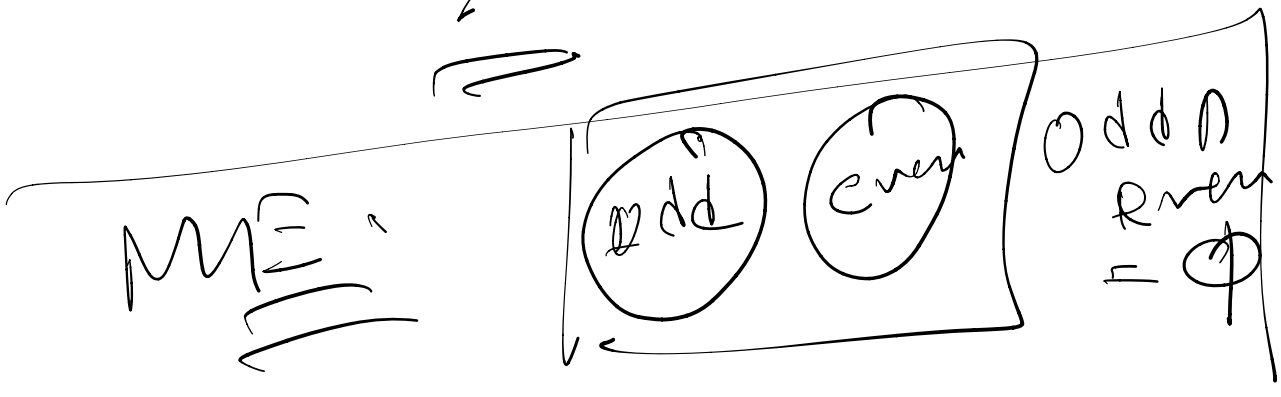
↳ $\{1, 2, 3, 4, 5, 6\} \Leftrightarrow S$

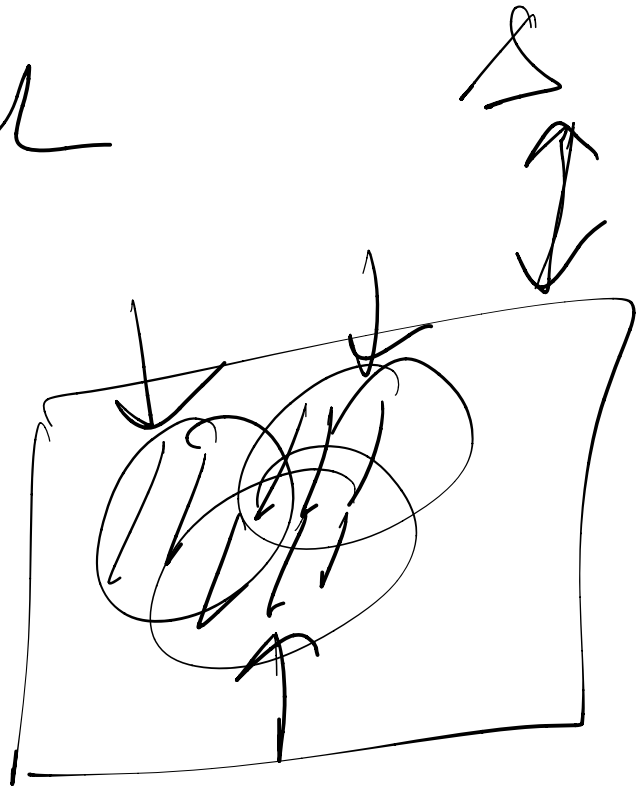
Sample / universal set

space

'S'

'U'





Non - M·E Events (Joint Events)

Sample = {1, ..., 6}

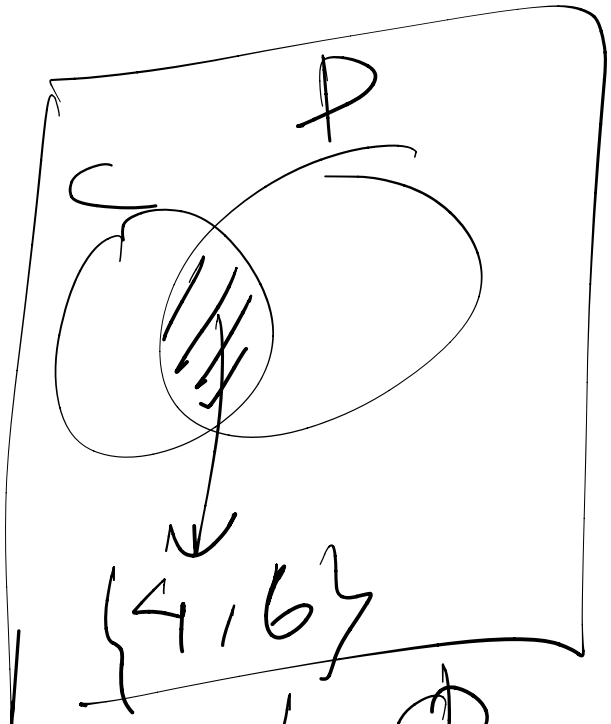
Event D = {4, 5, 6}

(>3)

C = Even #

D = {4, 5, 6}

} M·E?



Joint Events ⇐ C ∩ D ≠ Φ

Independent Events:

- Event A: Rolling of even # $\{2, 4, 6\}$
- Event B: Flip coin and get H.

A & B are Independent

$$P(A \cap B) = P(A) * P(B)$$

$$(A * B)$$

$(A \cup B)$

$\downarrow$

$(A + B)$ Addition Rule

1. $P(A \cup B) = P(A) + P(B) - 0$

2. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

0 → $(A \cap B) = \phi$ [ME]

$(A \cap B) = \{\}$

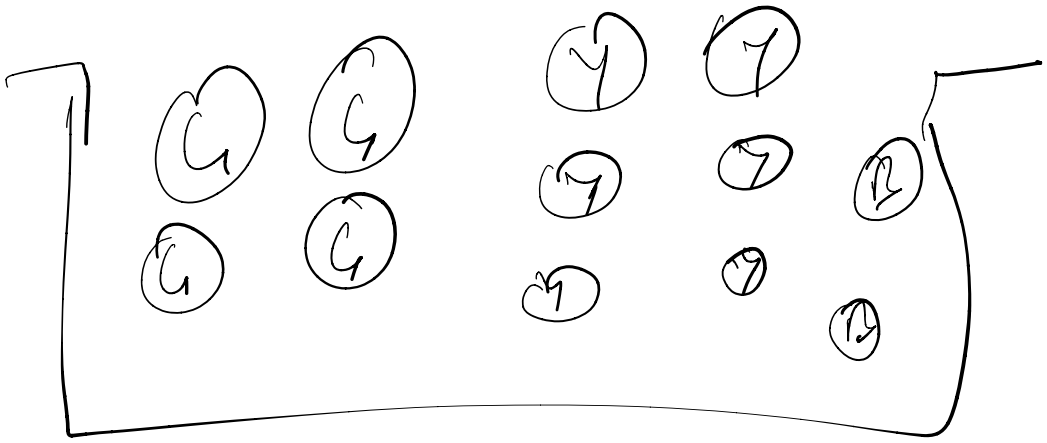
$$P(A \cap B) = \frac{|(A \cap B)|}{S} = \frac{|\{\}|}{S}$$

$$= \frac{|\phi|}{S}$$

$$= \frac{0}{S} = 0$$

Quiz 3.

Q. There are 4 green balls, 6 yellow balls, and 2 blue balls in a bag.
A random ball is chosen.
Find the probability that a yellow or blue ball is chosen.



$|S| = n$ (Total # of balls) $= 12$

$$P(A \cup B) = \frac{|(A \cup B)|}{|S|}$$

$$= \frac{|A| + |B|}{|S|} = \frac{6+2}{12}$$

$$= \frac{8}{12}$$

Ques 4 YT pr vs Non pr

YT

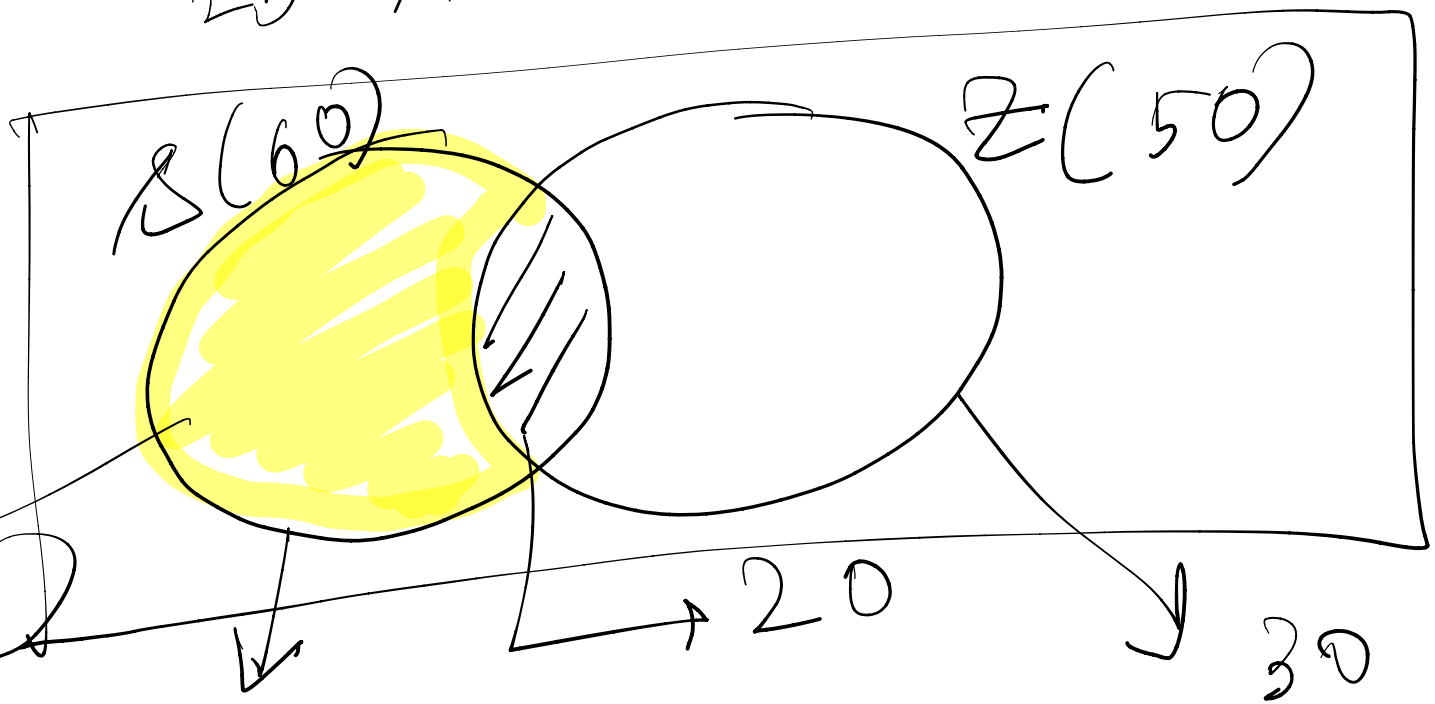
9

Quiz :-

60% → Swiggy

50% → Zomato

20% → both



40