



Mega Class: Arrays

Special class

⇒ Hash Maps → aage ache se
padhenge

⇒ we seekhenge
jisko khajna hai

⇒ Tables →

Key	Value
1	Rahul
2	Sai
3	Divya
4	Jatin

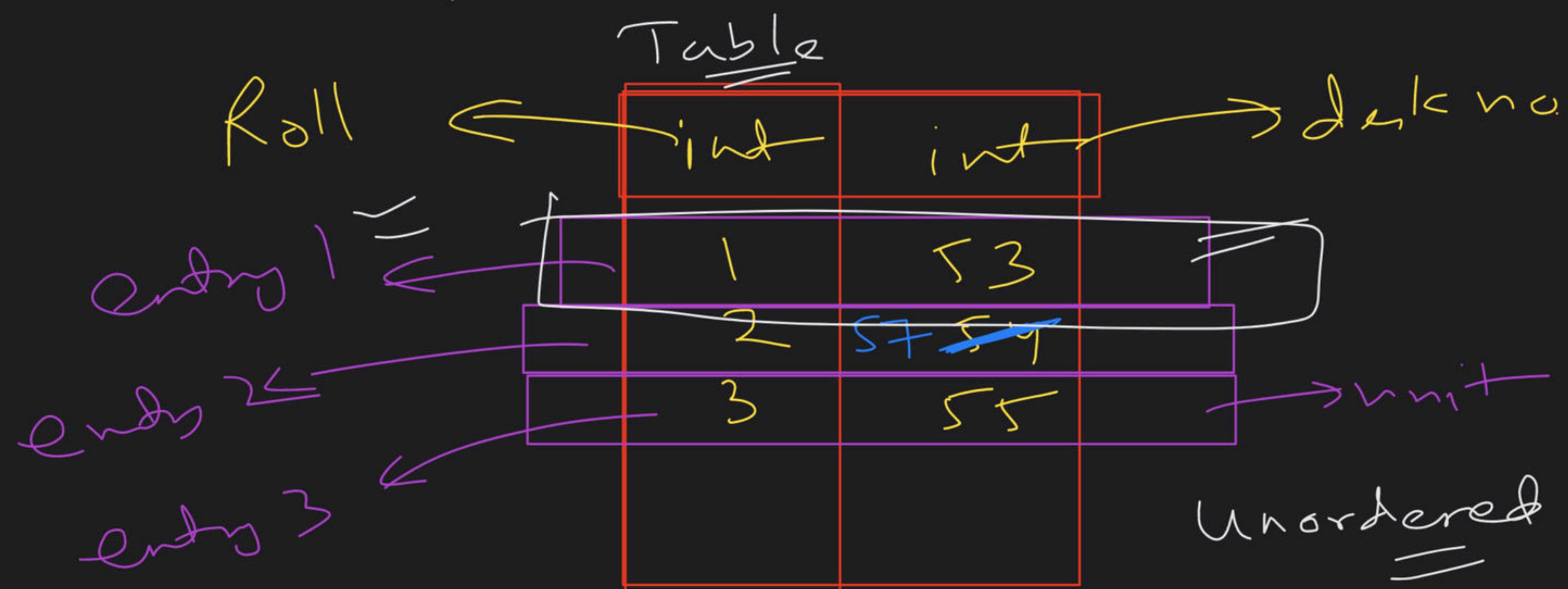
unique

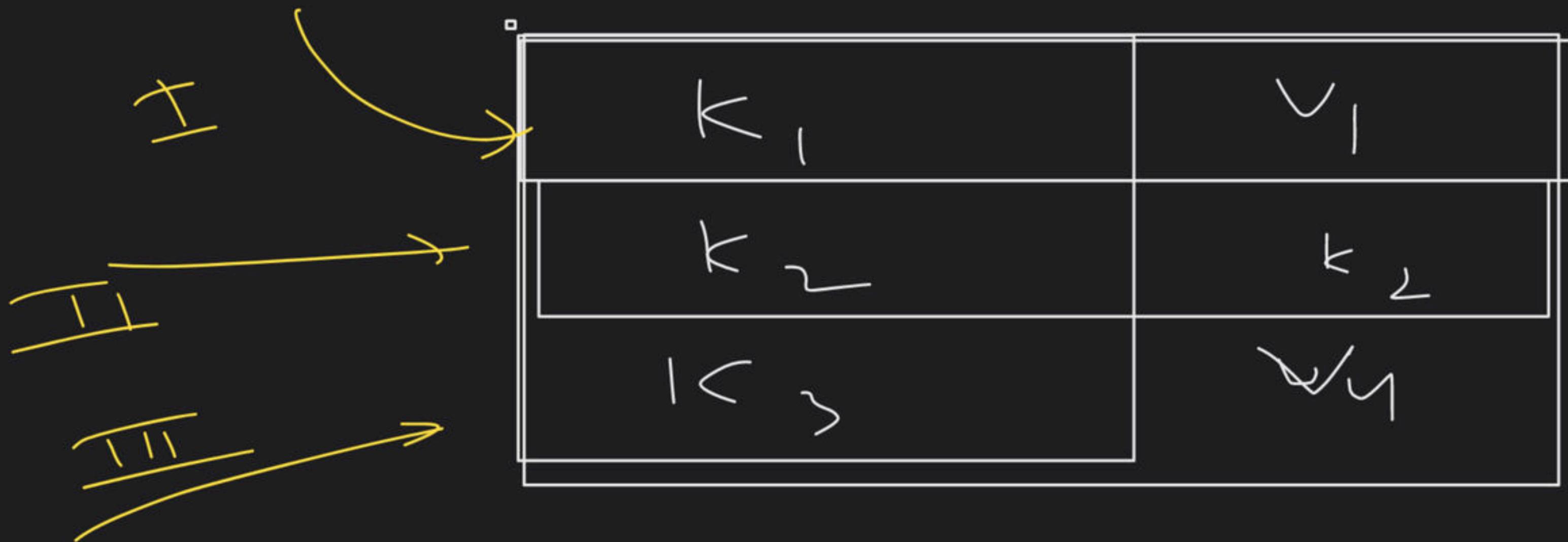
Non-duplicating

English dict

work	Meaning
age	— — —

C++ Table key ↗ value
⇒ unordered_map<int, string>
" " < int, int >





\Rightarrow ek entry $k_i (k, v_i)$ e^k sat
 accen hoti hai

C++
 iterator
 Unordered_map<int, int>::iterator <name>;



e ↗

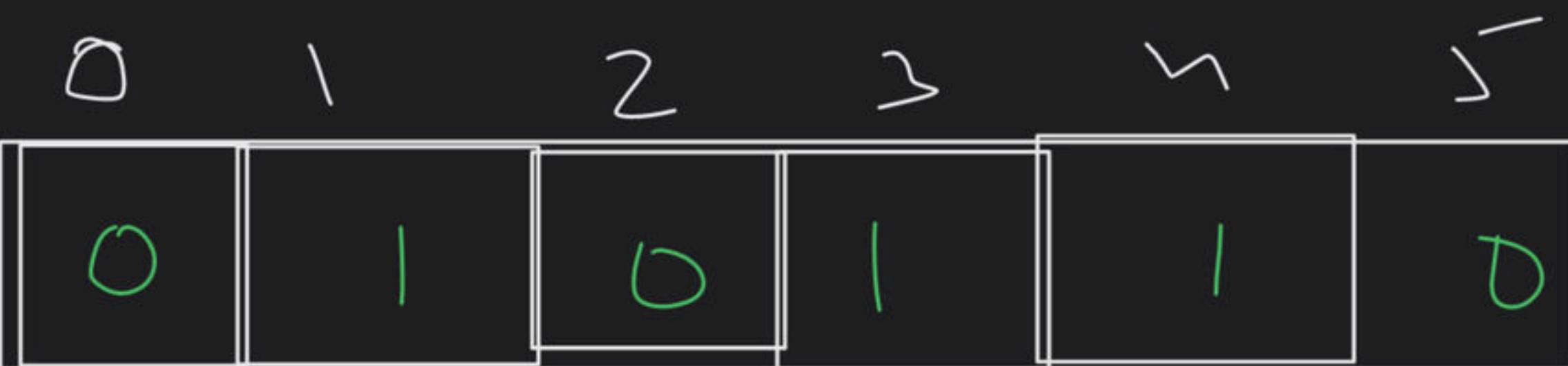
①

2's Complement

\Rightarrow Is Compl. + 1

$\Rightarrow Q \Rightarrow$ Given array of Binary no.

rep. a Binary number



$\text{R} \cdot \text{I}_{0.2}$

=



Step 1 \Rightarrow

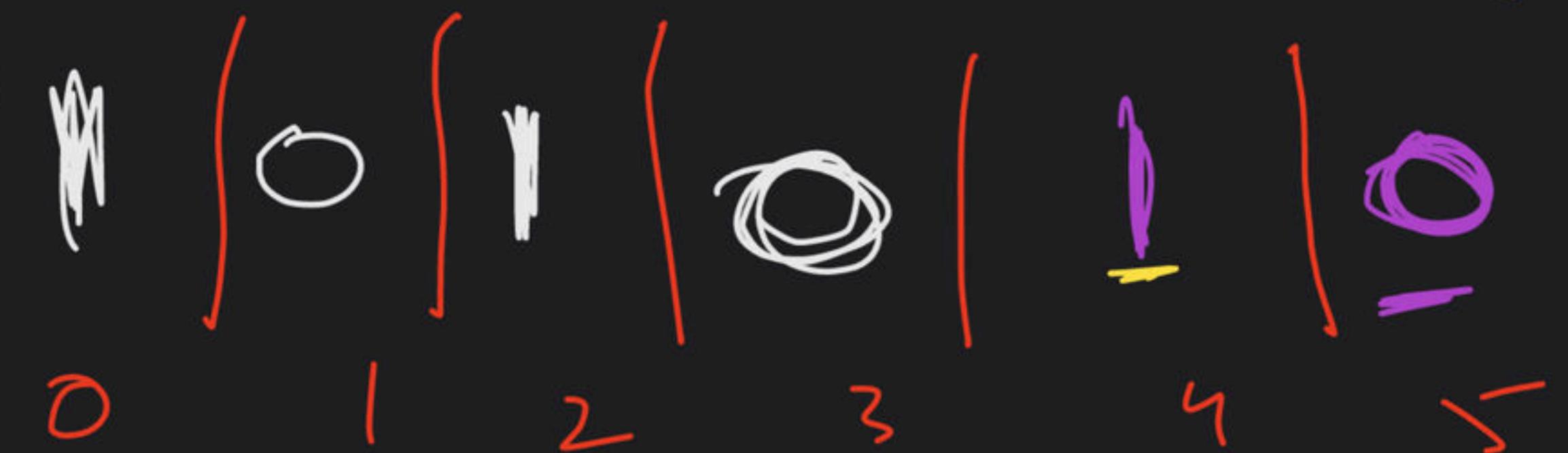
Slip

=

Step 2 \Rightarrow

Add

1



$$\begin{array}{r}
 0 & 0 & 0 & 0 \\
 | & 0 & | & 0 & 0 \\
 + & & & & \\
 \hline
 1 & 0 & 1 & 0 & 0
 \end{array}$$

$$i = n-1 \rightarrow i = 0$$

$$\textcircled{1} \quad \underline{\text{sum}} = a[i] + c$$

$$\textcircled{2} \quad \underline{a[i]} = \underline{\text{sum}} / 2$$

$$\textcircled{3} \quad c = \underline{\text{sum}} / 2;$$

$$\begin{array}{r}
 & 1 & 1 & 0 \\
 \text{a} \rightarrow & \downarrow & \downarrow & | \\
 & 1 & 1 & | \\
 & + 0 & | & | \\
 \hline
 \text{ans} & 1 & 1 & 1 & 0
 \end{array}$$

$$\begin{array}{r}
 3 \\
 \cdot \\
 \cdot \\
 \cdot \\
 3 \% 2
 \end{array}$$

$$\begin{array}{r}
 3 \\
 \underline{\underline{2}} \\
 1 = \underline{\underline{34}} \% 2
 \end{array}$$

$\text{Sum} = \underline{\underline{\text{all}}} + \underline{\underline{\text{left}}} + \underline{\underline{\text{right}}}$
 $\text{ans}[i] = \underline{\underline{\text{Sum}}} \% 2;$
 $C = \underline{\underline{\text{Sum}}} / 2;$

2^5

1 flip

2 + 1



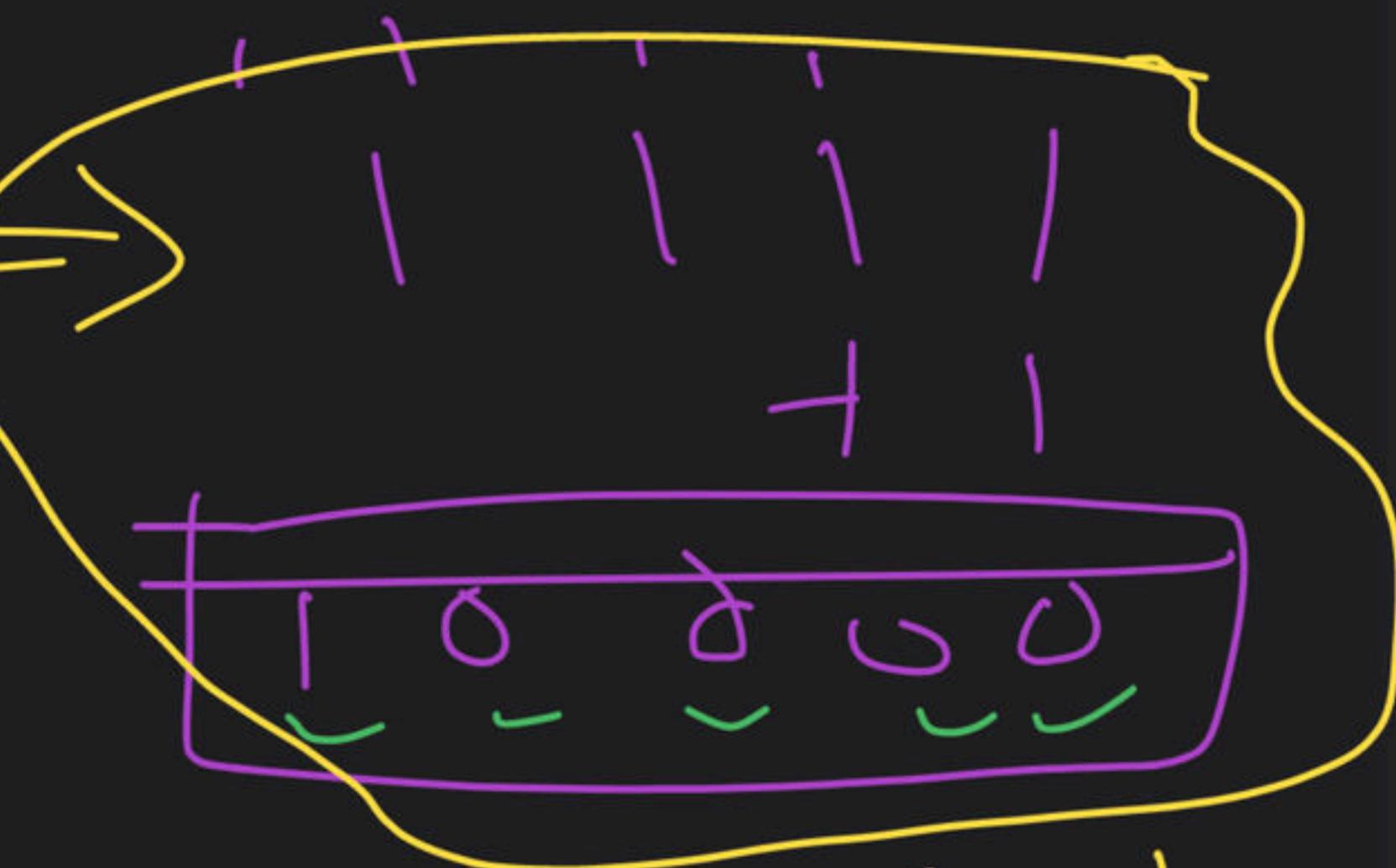
0	0	0	0
0	1	2	3
0	1	2	3
0	1	2	3



i

j

k



$$c = 1$$

~~c = -1~~ $i \rightarrow h-1$ $\rightarrow D$

$$\text{sum} = a[i] + c$$

1

2

3

a[i]

= sum / 2

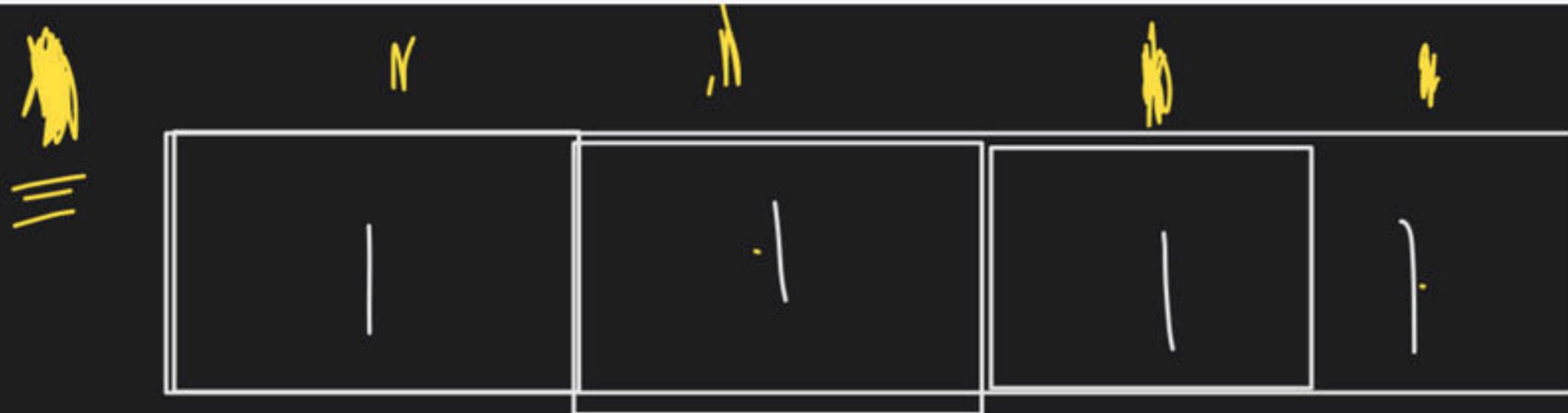
$$c = \text{sum} / 2$$

\Rightarrow i/p \rightarrow Binary array

o/p \Rightarrow Complement array

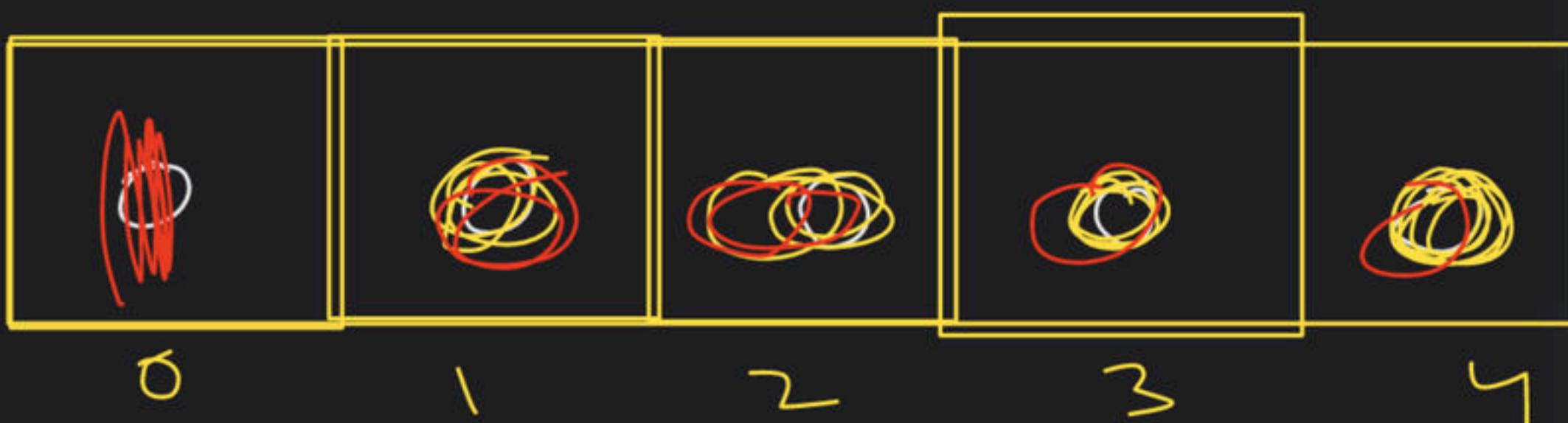
\Rightarrow size \Rightarrow BA size,

Binary arr \rightarrow



slip \Rightarrow

o/p \Rightarrow complement \Rightarrow



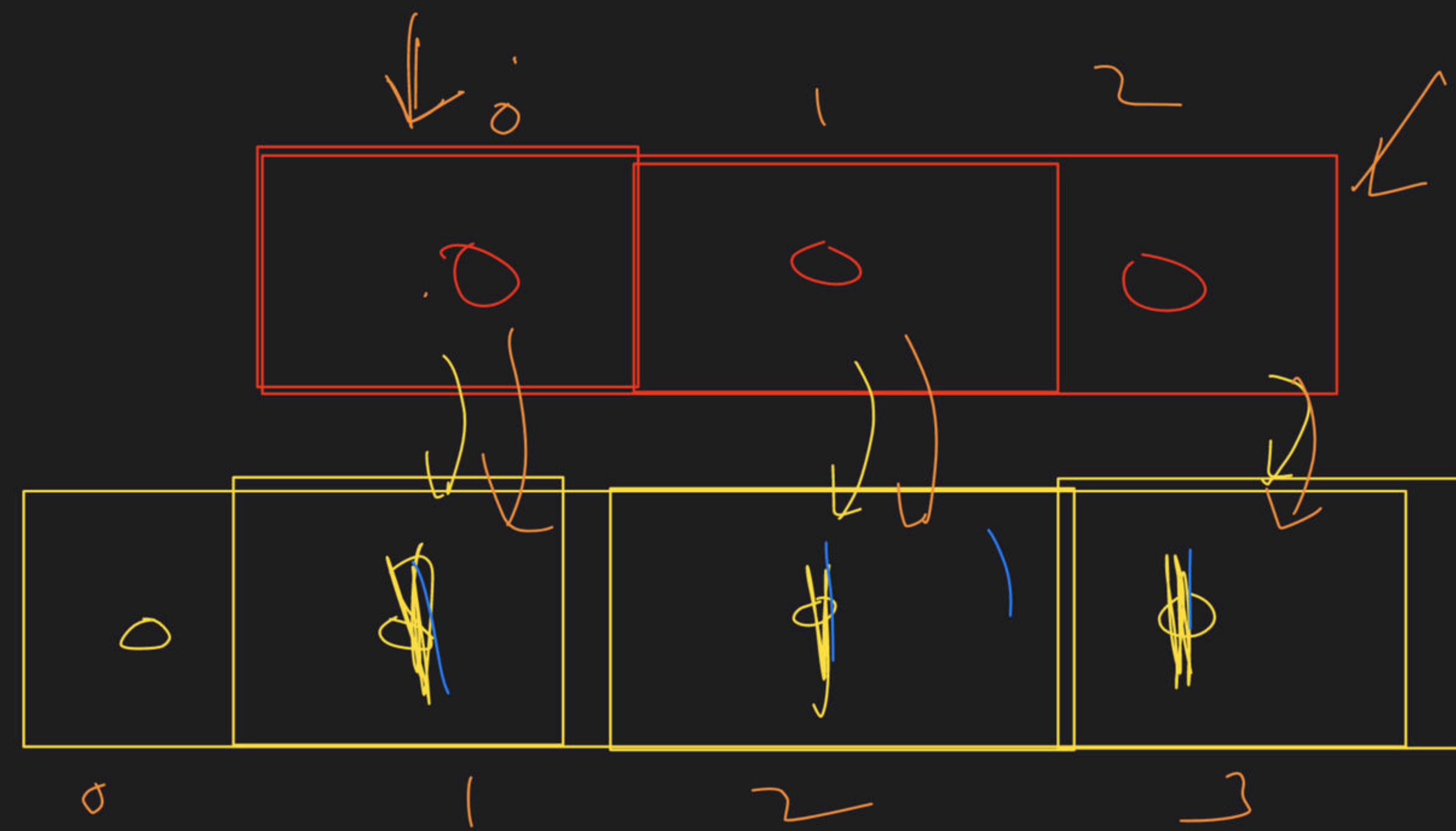
①

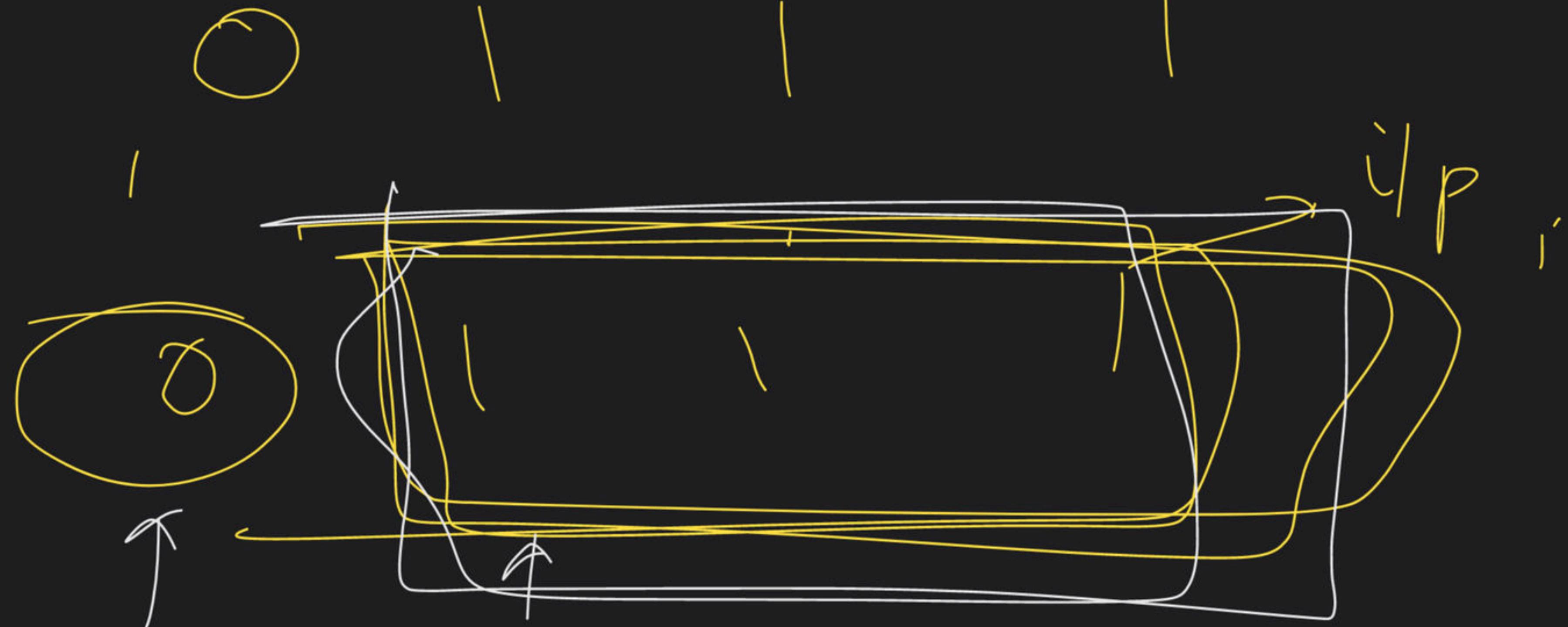
Sum =

after all iterations

if (`carry == 1`)

`o/p[0] = N`



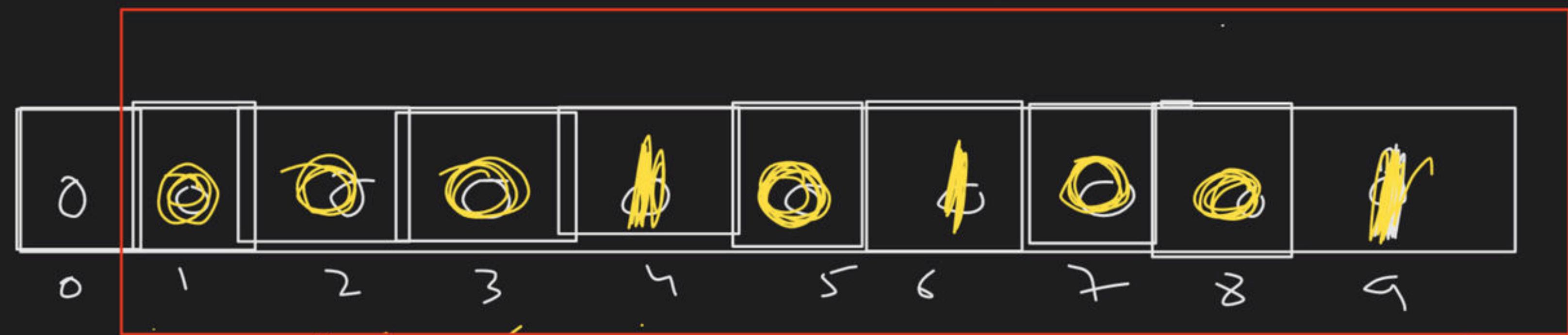


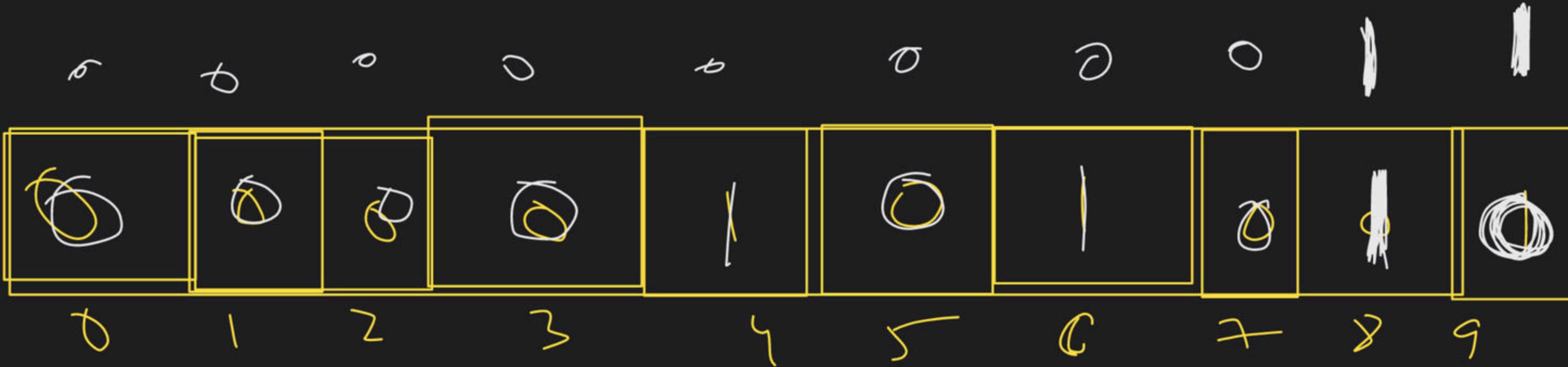
$$\begin{array}{ccccccccc} & | & | & | & 0 & | & 0 & | & | & \vartheta \\ \hline & 0 & 0 & 0 & | & 0 & | & 0 & 0 & | \\ & & & & & & & & & \\ & & & & & & & & + & | \end{array}$$

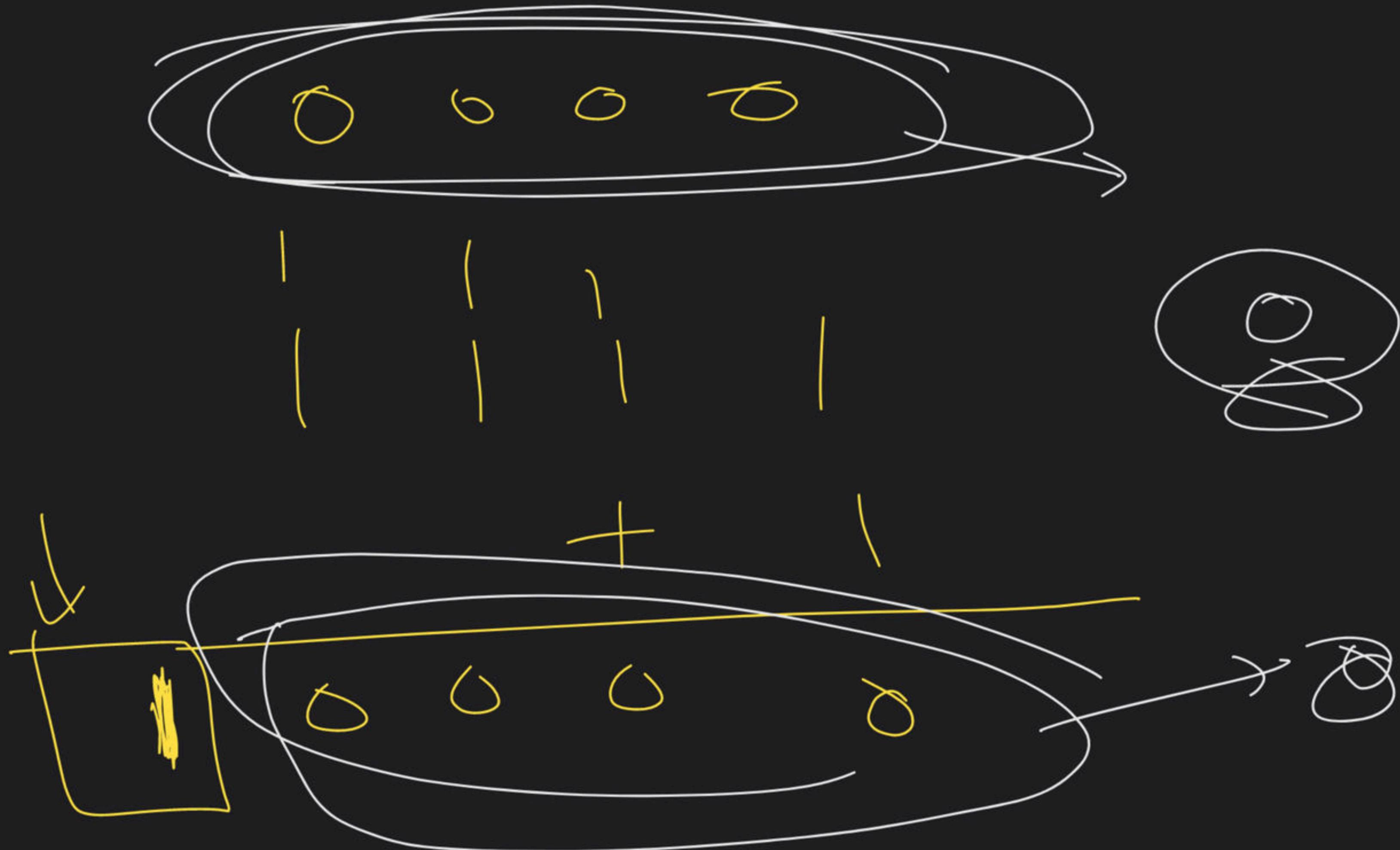
$$\begin{array}{ccccccccc} \vartheta & \vartheta & \vartheta & 0 & | & -\vartheta & | & -\vartheta & | & \vartheta \\ \hline & & & & & & & & & \\ & & & & & & & & & \end{array}$$

Up | | | | 0 1 2 3 4 5 6 7 8 9 → Binary

Two =>







32 bit

0 0 0 0 0 0 0 0 0

D () () () () () () () () + ()

() () () () () () () () () ()

() () () () () () () () () ()

$\Rightarrow 0$ 2^s
 \equiv

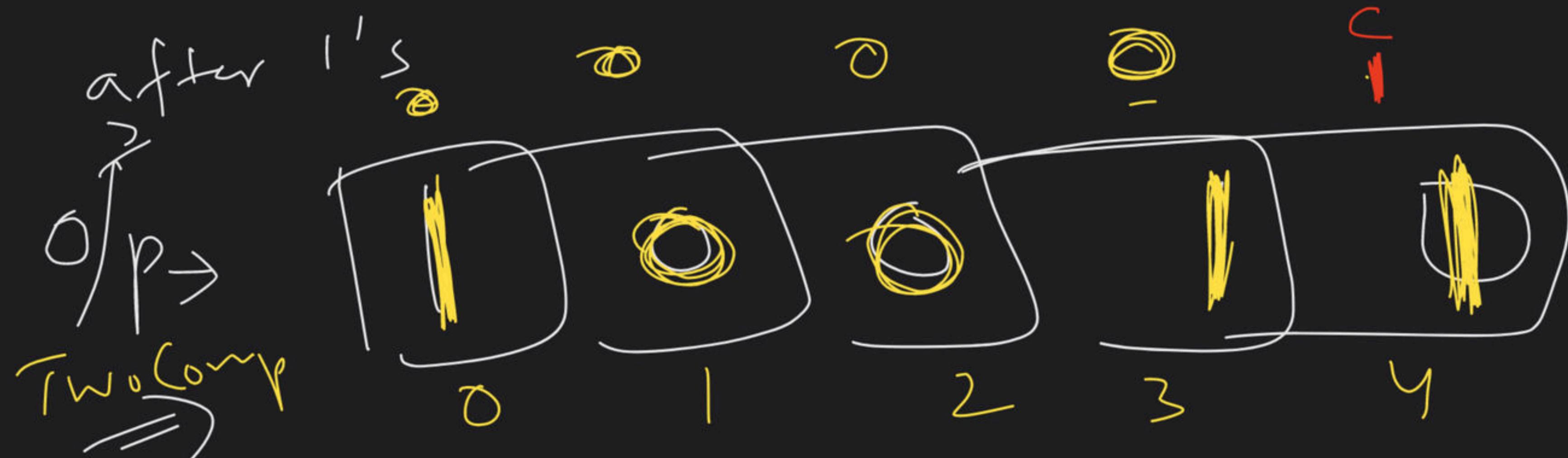
l/p Binary avg

Ques \Rightarrow l/p Bits utni h. o/p Bits

\Rightarrow



l/p



$$① \text{Sum} = -\text{TwoComp}[i] + c$$

$$② \text{TwoComp}[i] = \text{Sum} / 2;$$

$$③ c = \text{Sum} / 2$$

Single Number

0 1 2 3 7
— | | | ② | 0 | ③

Table Map

key ↗ freq ↘

—
—

No.	freq.
4	1
1	2
2	2

③ Rotate image Read

$\Sigma_{\text{min}} \Rightarrow y_0 \approx 1 \text{ pm}$

1	2	3
4	5	6
7	8	9

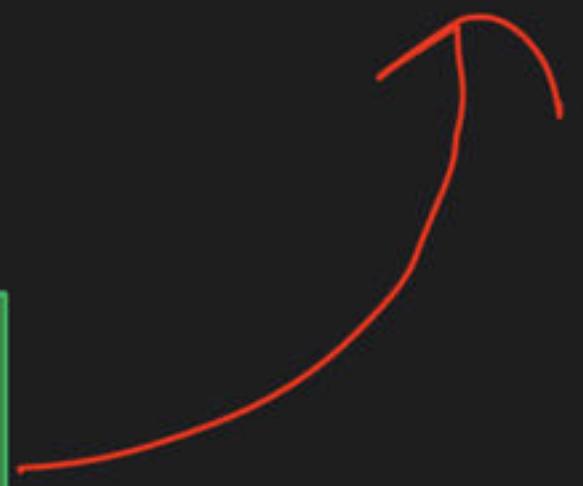


$\stackrel{9_0}{\equiv}$

7	4	1
8	5	2
9	6	3

Transpose

1	4	7
2	5	8
3	6	9



1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16

Trump's



1 5 9 13
2 6 10 14
3 7 11 15
4 8 12 16

now

wise

reverse

RC

13 9 5 1
14 10 6 2

15 11 7 3
16 12 8 4

Red

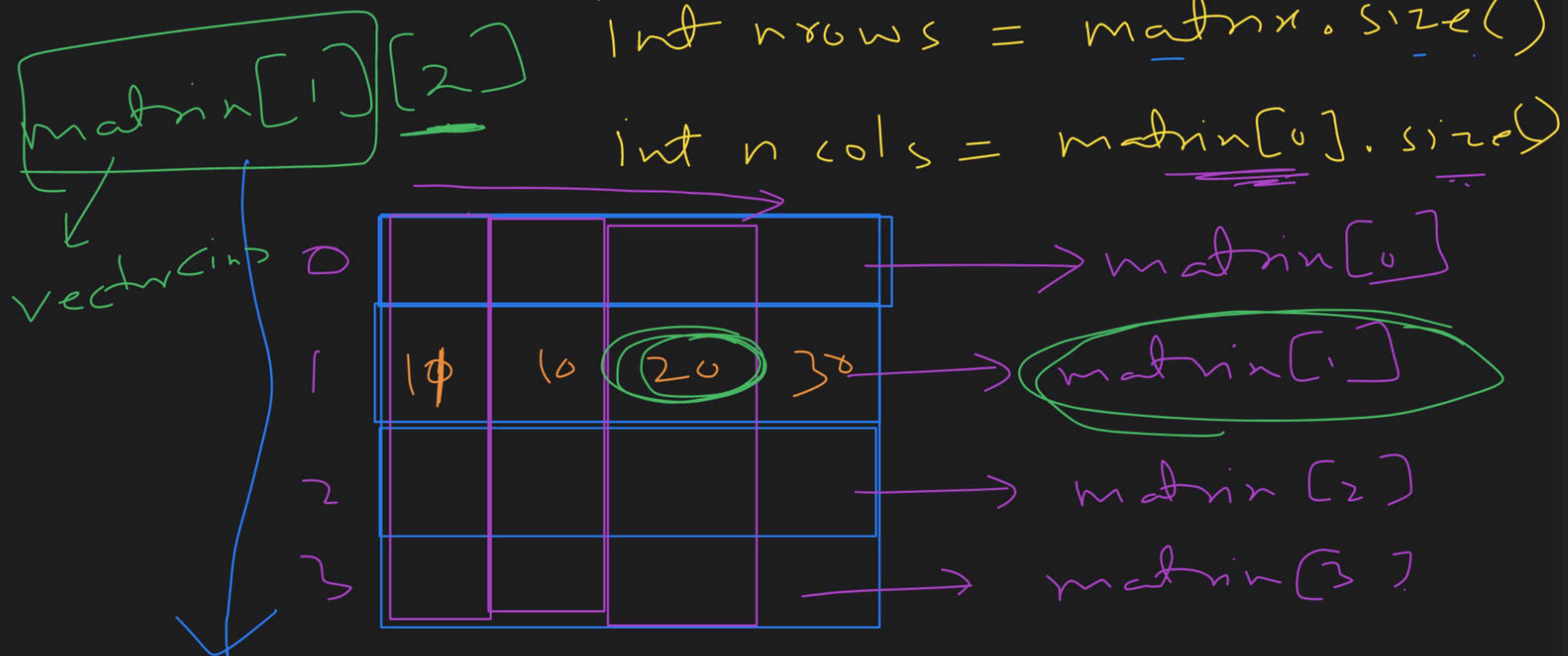
1

Transpose

2

Row wise transpose

`Vector<vector<int>> matrin`



$\cup - \Sigma 3$ Maximum Subarray

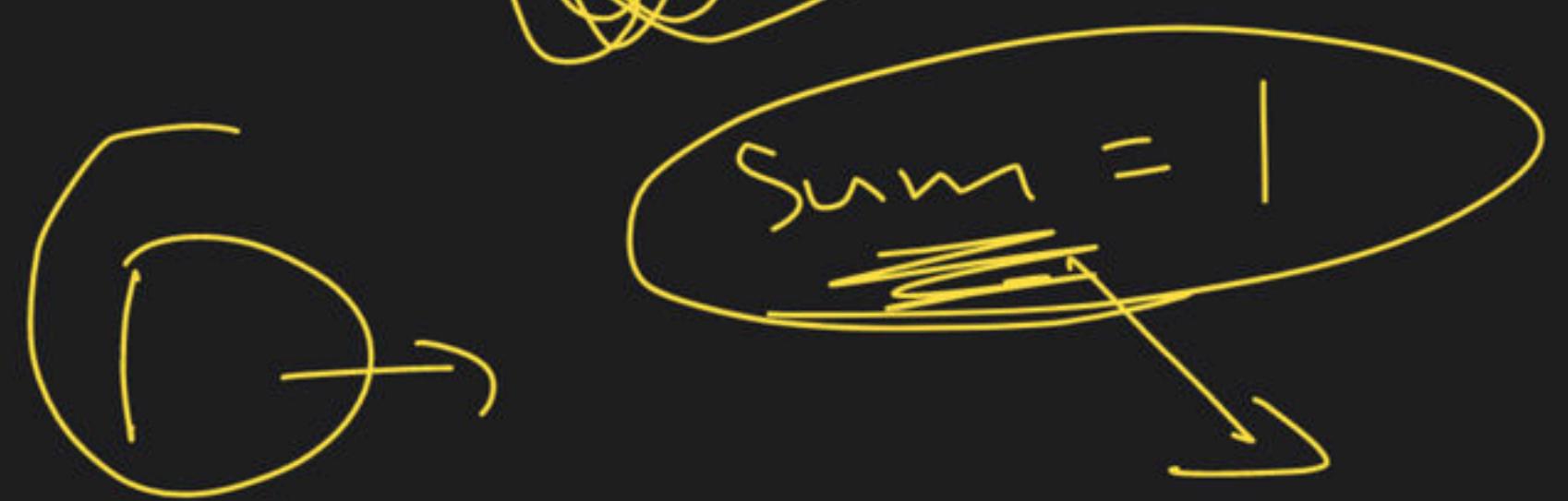
$-2 | 1 | -3 | 4 | -1 | 2 | 1 | -5 | -7$
 0 1 2 3 4 5 6 7 8

① Brute force \rightarrow sum of all subarrays

②

-2 -2 -2	0 1 1	-3 4 -3	1 -1 -1	2 2 -1	1 1 -1	-5 -1 -1	-7 -1 2
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$$-2 \rightarrow | \rightarrow | \rightarrow -1 | 2 | + 5 | 5$$



$$-3 \Rightarrow \underline{\text{Sum}} = \text{Sum} + (-3) \Rightarrow -2$$

$$1, -3, 1 \Rightarrow \text{Sum} = \text{Sum} + 1 = 2$$

$$1, -3, 1, -1 \Rightarrow \text{Sum} = \text{Sum} + (-1) = 1$$



for (
 l = 0; l < n; l++)
 {
 for (
 int j = l; j < n; j++)
 }

3
7

$$\begin{array}{r|l} 5 & | \quad y \\ \hline 0 & \end{array} \quad \begin{array}{r|l} 1 & | \quad y \\ \hline 1 & \end{array} \quad \begin{array}{r|l} -1 & | \quad x \\ \hline 2 & \end{array} \quad \begin{array}{r|l} 2 & | \quad x \\ \hline 3 & \end{array} \quad \begin{array}{r|l} 3 & | \quad x \\ \hline 5 & \end{array} \quad \begin{array}{r|l} 8 & | \quad x \\ \hline 5 & \end{array}$$

$$\begin{array}{c} 13 \\ 14 \\ 15 \\ 16 \end{array} \quad \begin{array}{c} x \\ +8 \\ +8 \\ 8 \end{array}$$

$$0 \quad 5 \quad \Rightarrow \text{sum}$$

$$\textcircled{2} \quad \textcircled{5} \quad y = \text{sum} + y$$

$$\textcircled{2} \quad \textcircled{5} \quad y - 1 = \text{sum} - 1$$

$$\textcircled{3} \quad \textcircled{5} \quad y - 1 = 7$$

$$\textcircled{5} \quad \textcircled{5} - y - 1 = 7 = 8$$

$$\begin{array}{c} \textcircled{6} \\ \textcircled{7} \\ \textcircled{8} \end{array} \quad \begin{array}{c} y \\ y - 1 \\ y - 1 = 7 \end{array}$$

$$\textcircled{9} \quad y - 1 = 7 = 8$$

$$\textcircled{10} \quad -1$$

$$\begin{array}{c} \textcircled{11} \\ \textcircled{12} \end{array} \quad \begin{array}{c} -1 \\ -1 \end{array} \quad \begin{array}{c} 7 \\ 7 = 8 \end{array}$$

Kadane

$$\Rightarrow \begin{array}{c} -2 | 1 | -3 | 7 | -1 | 2 | 1 | -5 | 7 \\ 0 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \end{array}$$

①

iterate kyo

② sum karo

③

any update kyo

④

sum < 0

sum = 0

A

Subs
-15

$$\text{Sum} = -10$$

-ve
sum
=



-ve aur and &

B

Subs => -5

$$x \leftarrow 1$$

$$-5 \leftarrow$$

$$\text{Sum} = -10$$

$$\text{Sum} = \text{Sum} + (-5) = -15$$

-2			-3	y		-1		2			-5	y
4			6	x		8	x	10	x		12	x
14			16	x		18	x	20	x		22	x

- ① sum = ~~0 4 3 8 6 15~~ ans = ~~4 8 12~~
- ② update = ~~ans~~
- ③ sum Reset if ~~sum < 0~~

① sum = -1 + 7 + 8
ans = -1 > 7 > 8

② update ans =

③ if sum < 0
update sum = 6

-1 + 7 + 8 \Rightarrow 14

$-15 \mid -2 \mid -1 \mid -10 \mid -15$

Q
~~6~~

x

b

m

i

-1

~~-6~~

① sum = ~~0~~

② update sum

③ sum < 0 \rightarrow set sum = 0

$-15 -2$

-1

⇒ Missing no. from an array

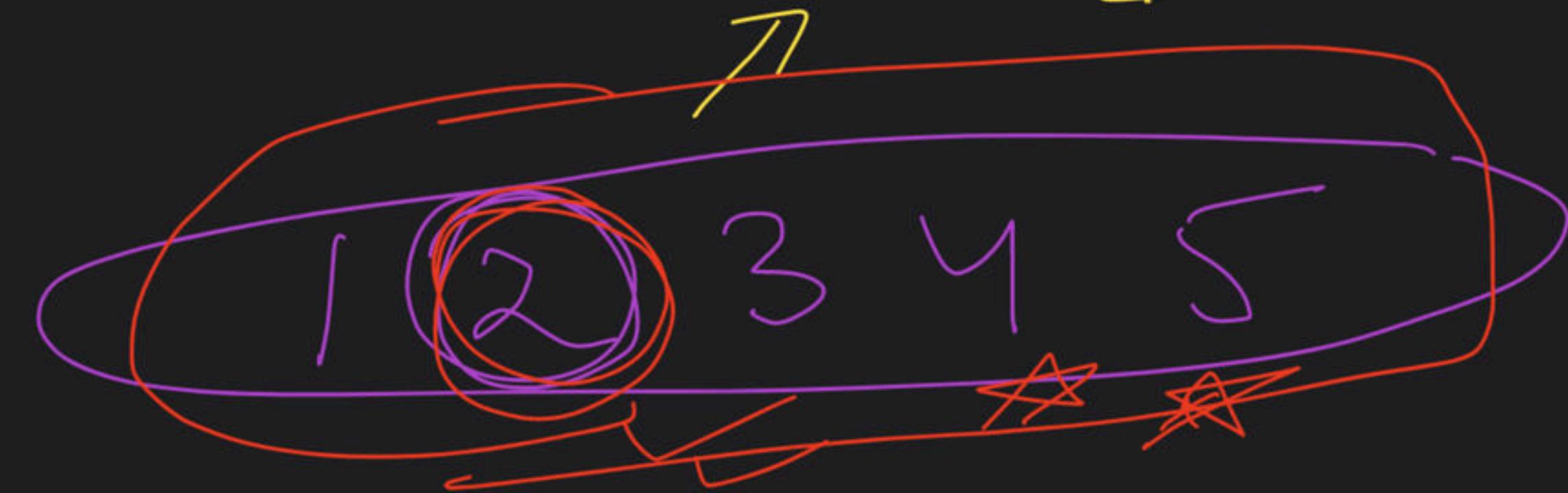
With Duplicates

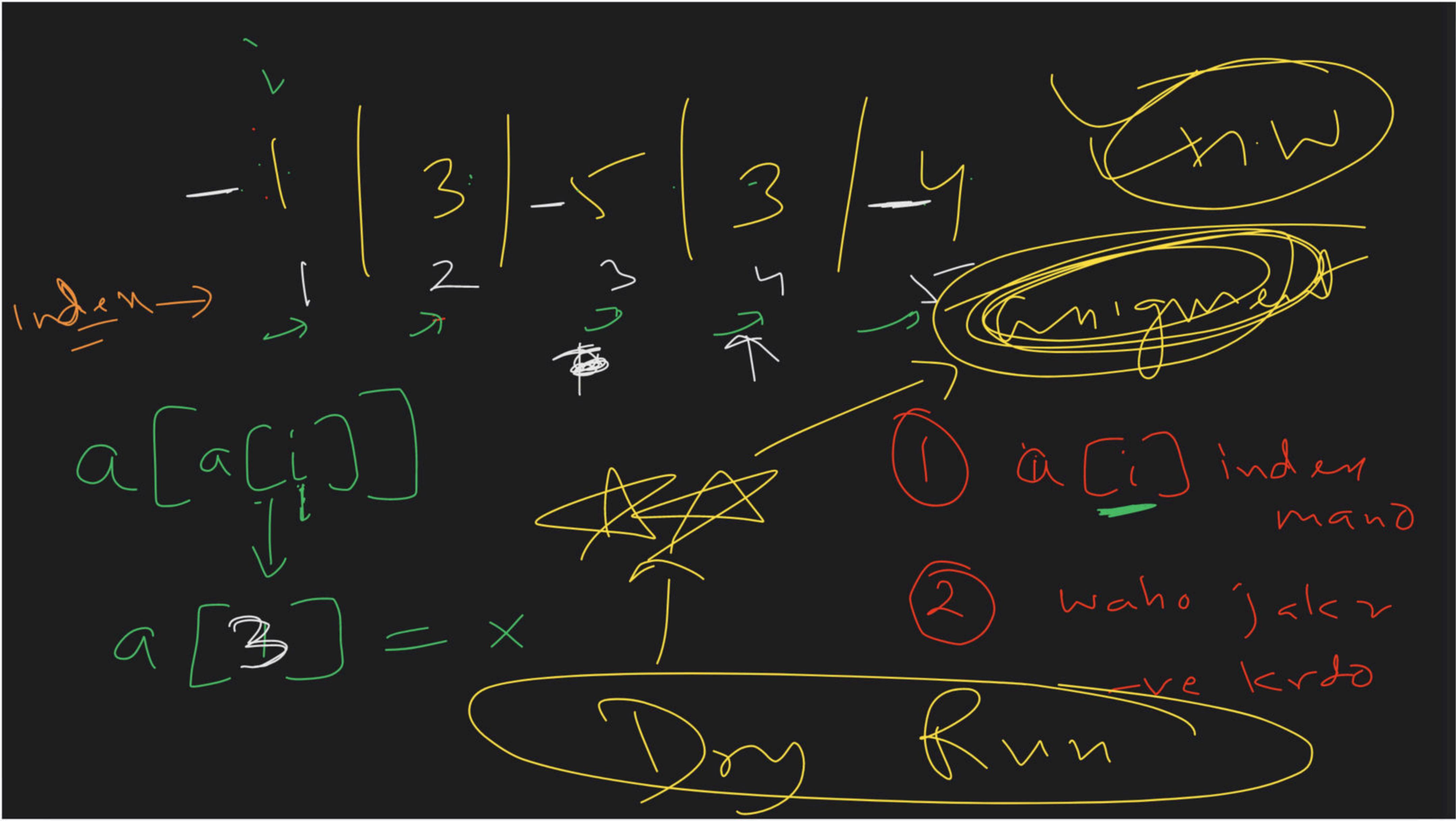
⇒ $0 \mid 3 \mid 2 \mid 3 \mid 4$

$\Rightarrow N = S$

$a[i] \in [1, N]$

Map X
No extra space X







① $a[y]$

missing index
index

also

① Treat ~~$a[i]$~~ as index

② if ($\underline{a[a[i]]} > 0$)
 $a[a[i]] \leftarrow -i$

Mega Amway

Cloud Done