

You have Return First missing positive from unsorted array.

Approach - (1)

$\rightarrow O(n)$ Find -1 \rightarrow ✓
 $\rightarrow O(n)$ Find -2 \rightarrow ✓
 $\rightarrow O(n)$ Find -3 \rightarrow ✗ } $\textcircled{2}$ is Result
 \vdots
 $\rightarrow O(n)$ Find - m

Total time $\rightarrow O(n^2)$ Space $\rightarrow O(1)$

```
for(int i=1; i <= n; i++){
    if(set.contains(i) == false)
        return i;
}
```

return $n+1$;

contains - $O(1)$

Approach - (2)

Sort array \rightarrow [increasing order] \rightarrow P.Q. Sorting

Find 1 in array \rightarrow \textcircled{x} \rightarrow Return $\textcircled{1}$.

$O(n \log n)$
 $O(1)$ space.

stop at that index and travel and check if sequence is consecutive or not.

-4 -2 -1 0 $\boxed{1} \boxed{2} \boxed{3} \textcircled{x} 5 6$
 \downarrow \downarrow \downarrow \downarrow $\textcircled{4}$ Ans

length of array

Approach (3)

Hash Set < Element >

Key == values in array.

$\text{1 to 6} \rightarrow$ hashSet
 $\text{1 2 3} \textcircled{4} \rightarrow$ return $\textcircled{4}$
 $\textcircled{5} \textcircled{6}$ $\textcircled{n+1}$

$\textcircled{1}$ Fill hash set from array.

$\textcircled{2}$ Make an Iteration from 1 to \textcircled{n} if any no. is not present in

set, return that no. Time - $O(n)$ otherwise return $n+1$ space - $O(n)$

$-4 -3 1 2 3 6 \textcircled{10}$
 $\underbrace{\hspace{10em}}$
 $1 2 3 4 5 6$

-4
 -3
 $\textcircled{1}$
 $\textcircled{2}$
 $\textcircled{3}$
 6

Better Approach →

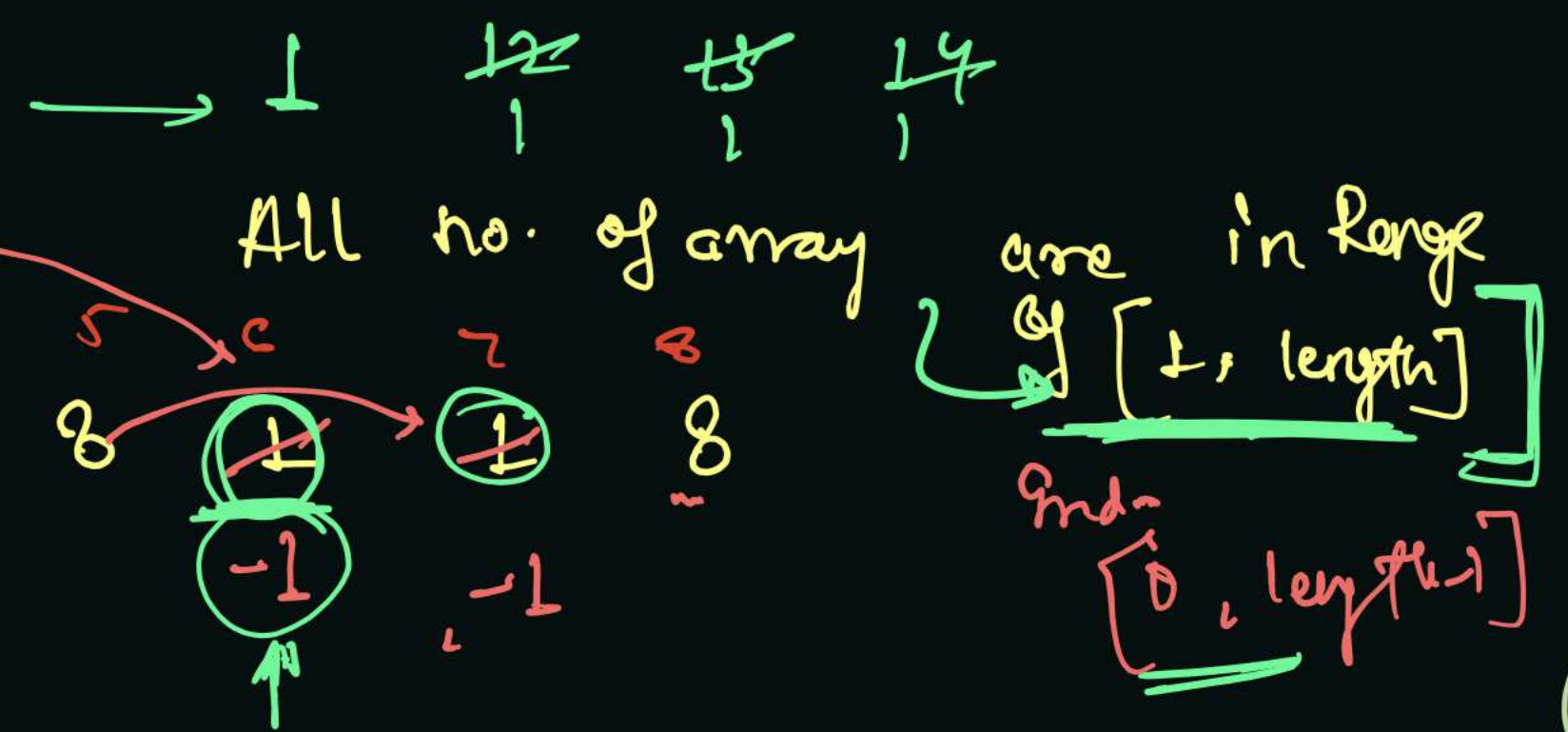
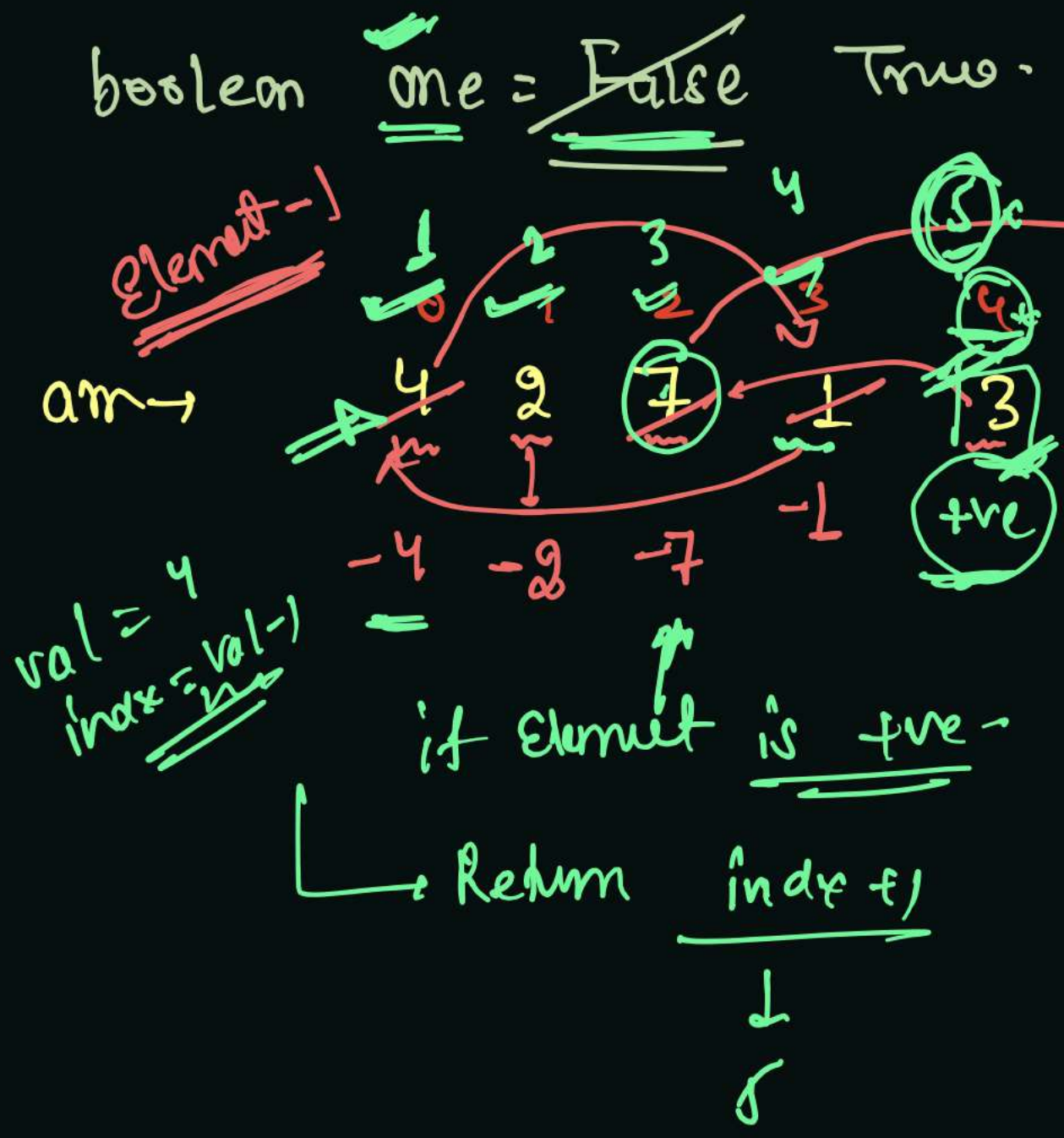
Range: [1, 9]

arr →

0	1	2	3	4	5	6	7	8
4	2	7	-1	3	8	12	1	8
<u>m</u>	<u>m</u>	<u>m</u>	<u>m</u>	<u>m</u>	<u>m</u>	<u>m</u>	<u>m</u>	<u>m</u>
			1			1		

Steps

① Mark the Elements which are out of Range.



Step 2 → mark index woth value.

Step 3 - Travel and check absent number.

Mark → 1 →
NOTE: mark with 1 and also check presence of 1.
After marking, if one is false
→ Return 1.

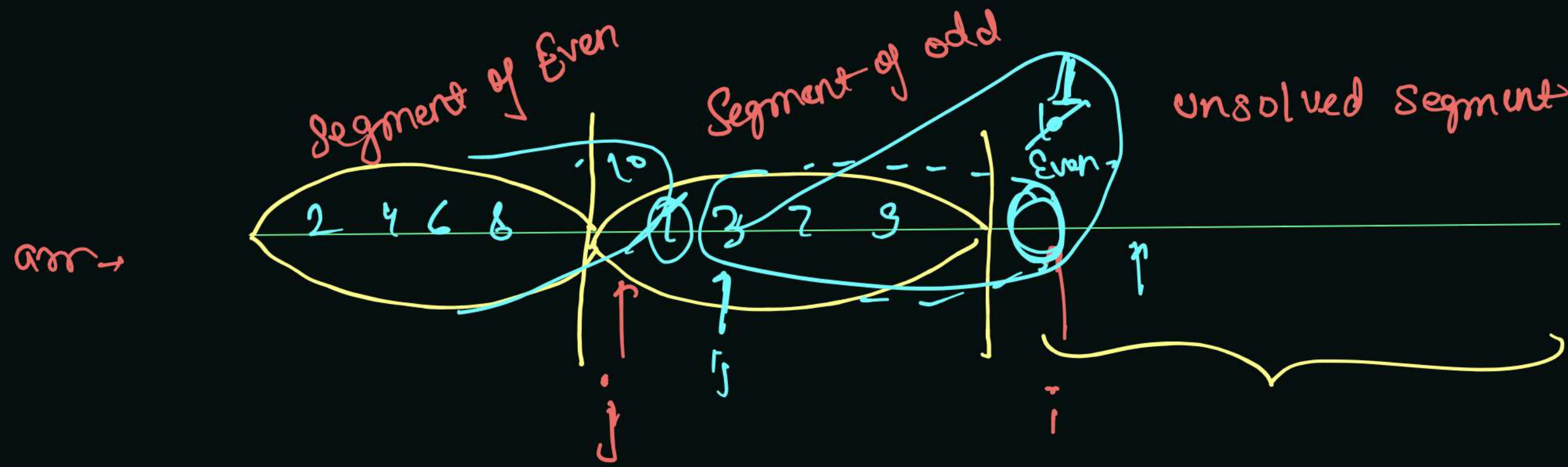
Out of loop → n+1

Sort Array By Parity

Sunday, 5 September 2021 11:16 AM

Sort - 0 1

Segregate odd, even



j → First odd no.

i → First unsolved no.

arr[i] == odd

// Increase segment of odd

i++

arr[i] == even

swap(arr, i, j);

j++

j++

Range Addition

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length $\rightarrow 5$

Brute Force \rightarrow

Time \rightarrow $O(qn)$

Allowed \rightarrow $O(n+q)$

array \rightarrow	0	0	0	0	0
quer(1)		2	2	2	
quer(2)			5	5	
query(3)	-2	0	3		

array \leftarrow -2 0 3 5 3

query \rightarrow

h	1-3	2
1	2-4	2
2	0-2	-2

Range of query is (n)

query [Starting Index Ending Index]

increment

Initially all elements are 0 in

array

Apply query.

Return final array.

length = 12

query \rightarrow

$\rightarrow -2 - 6 \quad 4$
 $\rightarrow 0 - 5 \quad 3$
 $\rightarrow 1 - 4 - 2$
 $\rightarrow 6 - 9 \quad 1$
 $10 - 11 \quad 2$

[Starting Index - Ending Index Increment]

array \rightarrow
size = 12

0 1 2 3 4 5 6 7 8 9 10 11
~~0~~ ~~0~~ ~~0~~ 0 0 ~~0~~ ~~0~~ ~~0~~ 0 0 ~~0~~ 0

2 -2 4 2 -2 -4 -1

2 1 5 5 5 7 5 1 1 1 0 0

prefix sum

query $\rightarrow [a, b, val]$

$res[a] = val$

$res[b+1] = -val$

0 1 2 a --- b - n
val val val
val val val 0

Handwritten diagram of a graph with 8 nodes (0 to 7) and various edges. Node 0 is a source node with an arrow pointing to it. Node 7 is a sink node with an arrow pointing away from it. Edges are labeled with expressions like b , $a+b$, $a+c$, $-b$, $-a$, and $-b-c$. Some edges are crossed out with red lines.

	1	2	3	4	5	6	
Order	0	1	2	3	4	5	
	d	$d+b$	$a+b+c$	$a+b+c$	$a+b+c$	$a+b+c$	a

-C
val

tc
- req

travel on
agency and
market

query $\rightarrow 2-6 \rightarrow \underline{\underline{a}}$
~~①~~
 ② $2-7 \rightarrow b$
 $\underline{1-5-6}$
 \rightarrow
~~③~~ $2 \rightarrow 5 \rightarrow c$
~~④~~ $0-1 \rightarrow d$
 $n < 9$
 $\underline{\underline{O(n)}}$
 for
 prefix
 sum
 -c
 val
 ve

Best Meeting Point

Sunday, 5 September 2021

12:41 PM

village →

	0	1	2	3	4
0	1	0	0	0	1
1	0	0	0	0	0
2	0	0	1	0	0

$(d_1 + d_2 + d_3)$ Min

→ What?

→ How?

→ Why?

find coordinate of x-axis →

$x_1, x_2, \boxed{x_3}, x_4, x_5 \rightarrow$ median x_3

$x_1, \boxed{x_2}, \boxed{x_3}, x_4 \rightarrow$ midia x_2 / x_3
any one.

Same for y-axis → "

Find distance of all pt. from meeting point.

Every coordinate is a house

we have p persons initially
 they are at P_1, P_2, P_3

$P_1 \rightarrow (0,0)$

$P_2 \rightarrow (2,2)$

$P_3 \rightarrow (0,4)$

Best Meeting point so
 that total travel of all
 persons is min

Find distance from Best meeting
 point.

dist → $| \text{diff of } x | + | \text{diff of } y\text{-axis} |$

	0	1	2	3	4
0	<u>1</u>	<u>1</u>	0	0	<u>1</u>
1	<u>1</u>	0	<u>1</u>	0	0
2	0	0	<u>1</u>	0	<u>1</u>

(2,4)

Person $P_1 \rightarrow (0,0)$
 Person $P_2 \rightarrow (0,1)$
 Person $P_3 \rightarrow (0,4)$
 Person $P_4 \rightarrow (1,0)$

Person $P_5 \rightarrow \underline{(1,2)}$
 Person $P_6 \rightarrow (2,2)$
 Person $P_7 \rightarrow (2,4)$

Extract x-axis coordinates $\rightarrow [1, 0, 0, 2, 2, 0, 1]$
 (Array) from person's coordinate (Random order)

$\xrightarrow{\text{Sort}}$ $[0, 0, 0, \underline{1}, 1, 2, 2] \rightarrow$ sorted midarray
 median = 1

Extract y-axis coordinate $\rightarrow [0, 1, 4, 0, 2, 2, 4]$
 (Array) from person (Random order)

$\xrightarrow{\text{Sort}}$ $[0, 0, 1, \underline{2}, 2, 4, 4] \rightarrow$ median = 2

Best meeting point = (1,2)

minimise distance in x-axis and in y-axis, using median

distance b/w two point using

Manhattan Distance b/w two points

$$D_{P_1-P_2} = |P_2.x - P_1.x| + |P_2.y - P_1.y|$$

distance b/w Person_i and meeting point (M.p)

$$|M.p.x - P_i.x| + |M.p.y - P_i.y|$$

$$P_1 - M.p = |1-0| + |2-0| = 3 \checkmark$$

$$P_2 - M.p = |1-0| + |2-1| = 2 \checkmark$$

$$P_3 - M.p = |1-0| + |2-4| = 3 \checkmark$$

$$P_4 - M.p = |1-1| + |2-0| = 2 \checkmark$$

$$P_5 - M.p = |1-1| + |2-2| = 0$$

$$P_6 - M.p = |1-2| + |2-2| = 1 \checkmark$$

$$P_7 - M.p = |1-2| + |2-4| = 3 \checkmark$$

Person $P_1 \rightarrow (0,0)$

Person $P_2 \rightarrow (0,1)$

Person $P_3 \rightarrow (0,4)$

Person $P_4 \rightarrow (1,0)$

Person $P_5 \rightarrow (1,2)$

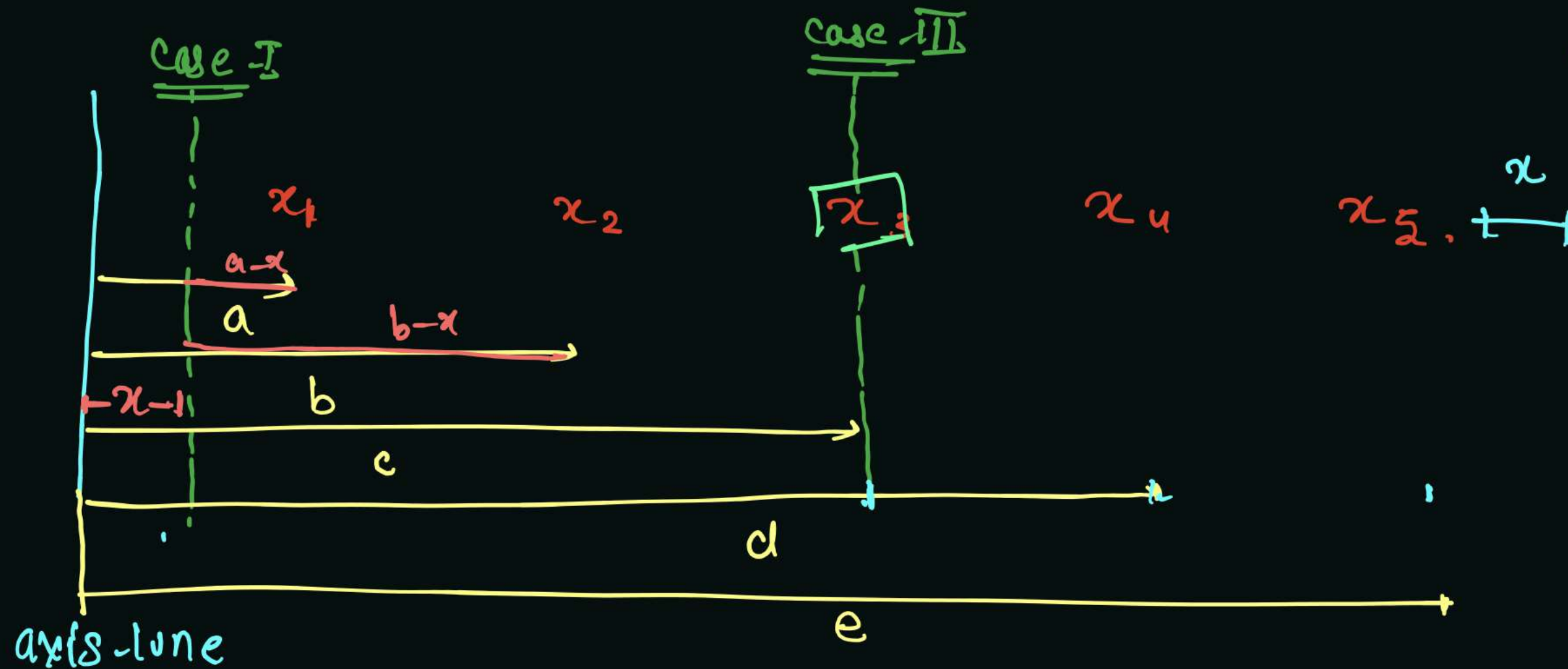
Person $P_6 \rightarrow (2,2)$

Person $P_7 \rightarrow (2,4)$

meeting point = (1,2)

$$\text{Sum} = \underline{\underline{14}} \quad \underline{\underline{\text{Ans}}}$$

Why median is a point from which sum of distance is min \rightarrow



Case-II Case-III
 middle point in meeting point
 $\text{dist} = \cancel{x-a} + \cancel{x-b} + d - \cancel{c} + e - \cancel{x}$
 $\text{dist} = d + e - (a + b)$
Smallest

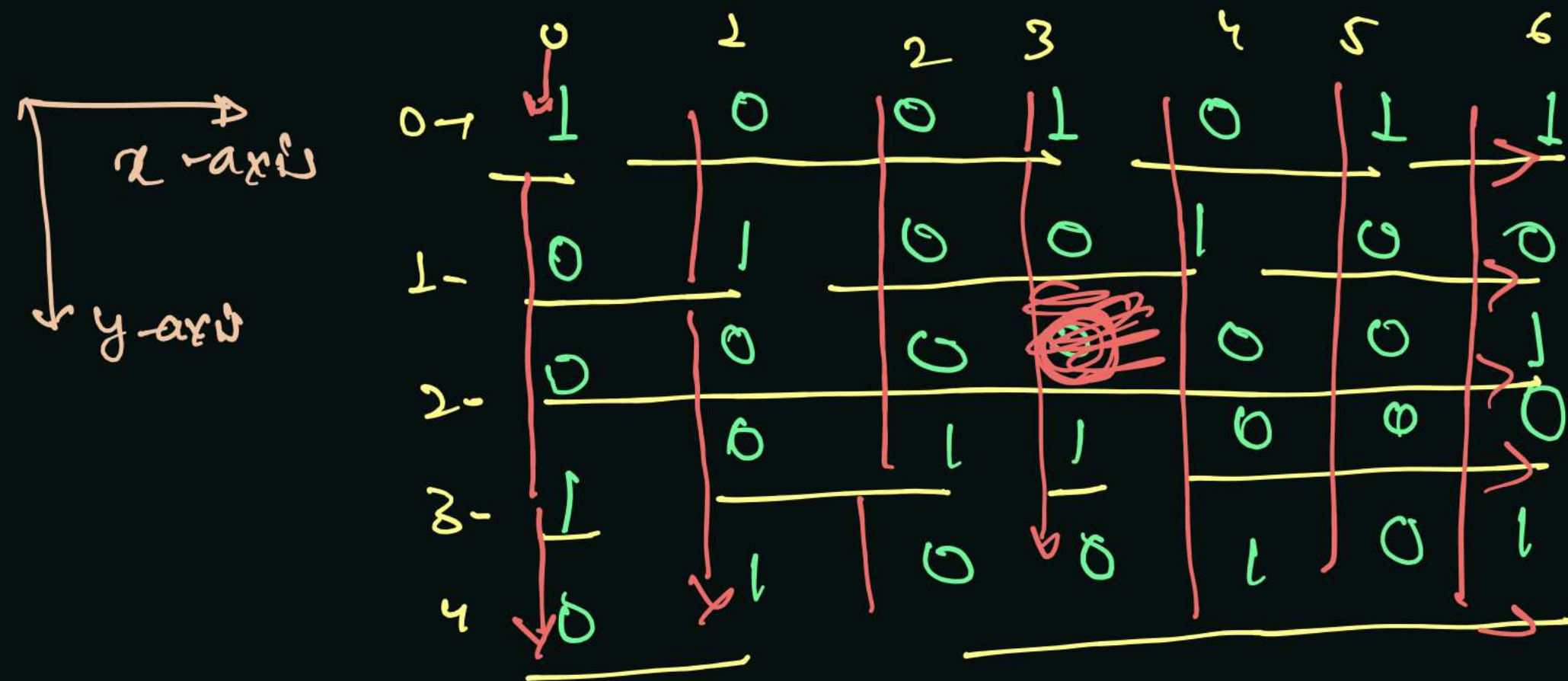
moving toward right
 and sum of distance
 is decreasing.

Sum of distance from axis = $a + b + c + d + e$
 move point of meeting toward right

Case-I $\rightarrow \text{dist} = a - x + b - x + c - x + d - x + e - x$
 $= (a + b + c + d + e) - 5x$

Case-II - Extreme right, $\text{dist} = x + e - d + x + e - c + x + e - b + x + e - a + x$

NOTE: \rightarrow Case I and Case II are equivalent $= 4e - (a + b + c + d) + 5x$ and if we further move right then distance will increase



all coordinates of x-axis in
sorted order →

row wise traversal.

if $(arr[r][c] == 1)$

→ add in list/array.

2.3 → Meeting point

Sum of distance of
every person from
his point

x-coordinate → $[0, 0, 0, 0, 1, 1, \boxed{2}, 3, 3, 3, 4, 4, 4]$
median = 2

y-coordinate → column wise traversal

y-coordinate → $[0, 0, 1, 1, 2, 3, \boxed{3}, 4, 4, 5, 6, 6, 6]$
median = 3

$(0,2)$
 $(0,1)$
 $(0,0)$

	0	1	2	3	4	5
0	1	0	1	0	0	0
1	0	0	0	0	0	0
2	0	1	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0

$(0,0)$ $(0,1)$ $(0,2)$

$x \rightarrow$ $(0,0)$ $(0,1)$ $(0,2)$ \Rightarrow $(0,2)$
 $y \rightarrow$ $(0,0)$ $(0,1)$ $(0,2)$ \Rightarrow $(0,1)$

meeting at $(0,1)$

distance = 2

$x \rightarrow 2$

$y \rightarrow 2$

$(2,2)$

$2 + 3 + 4 = 9$

$(0,0)$

$(0,1)$

$(2,1)$

$x \rightarrow$ cover \rightarrow $0, 0, 2$
 $y \rightarrow$ cover \rightarrow $0, 1, 2$

condition $\rightarrow (0,1)$

(4)

Min transfer of Apples

Logic

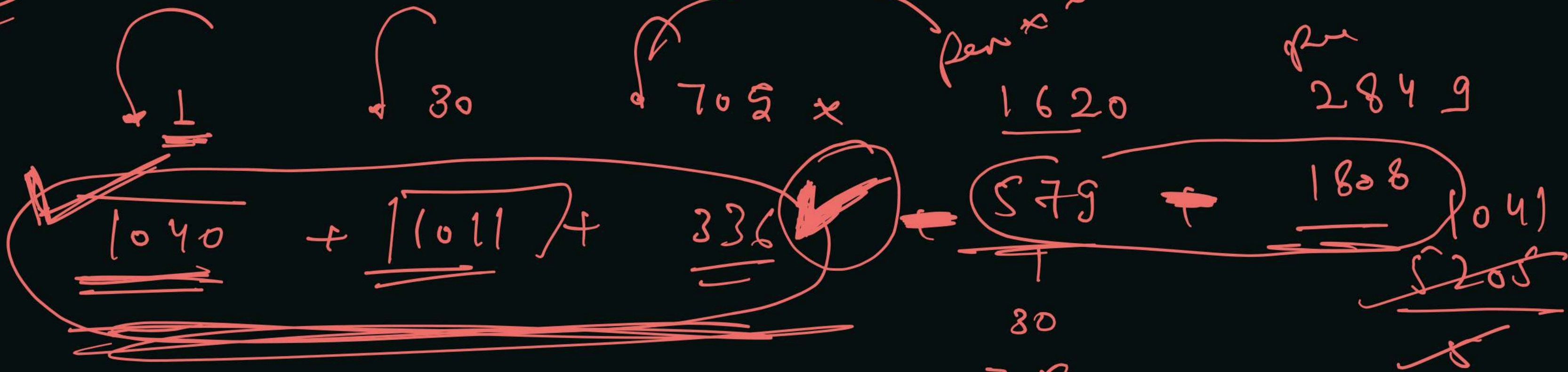
tested

question

Extract logic

2387

Removal of 100 → 200



1040
1011
336

80
205
1620
2849
5205

2849
1041
1620
1041
575

Reverse

Prefer

1041
205