

1. All Repeating Except one! → All numbers are present twice except one.

Date: 22nd Jan 22

Find that one number →

array → $\begin{matrix} 6 & 1 & 3 & 7 & 2 & 4 & 3 & 2 & 7 \\ 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \end{matrix}$

Mon to Fri } 9-12 D.S.

Sat Sun } 9-12 S.D.

XOR

$$\left. \begin{array}{l} a \wedge 1 = \sim a \\ \textcircled{a} \wedge 0 = a \end{array} \right\}$$

$$\text{Num1} = x$$

$$\text{Num2} = x$$

$$\text{num1} \wedge \text{num2} = x \wedge x = \underline{0}$$

Associative

$$\left\{ \begin{array}{l} x \wedge y \wedge z = x \wedge (y \wedge z) \\ = (x \wedge y) \wedge z \end{array} \right.$$

Commutative

$$x \wedge y = y \wedge x$$

$$\textcircled{x} \wedge \underline{0} = x$$

↳ all bit are 0

1. All Repeating Except One

2. All Repeating Except Two

3. One Repeating And One Missing

4. All Repeating Three Times Except One

A	B	A ∧ B
0	0	0
0	1	0
1	0	0
1	1	1

array →

6	1	3	7	2	4	3	2	7	6	1
0	1	2	3	4	5	6	7	8	9	10
↓	↓	↓	↓	↓	↑	↓	↓	↓	↓	↓
x	z	m	y	a	single number	m	a	y	x	z

$$y \wedge y = 0$$

$$m \wedge m \geq 0$$

$$Z \wedge Z \approx 0$$

$$a \wedge a \geq 0$$

6	→	x_1	1	1	0	← $x_2 = 0$
1	→	x_2	0	0	1	
3	→	x_3	0	1	1	
7	→		1	1	1	
2	→		0	1	0	
4	→		1	0	0	
3	→		0	1	1	
2	→		0	1	0	
7	→		1	1	1	
6	→		1	1	0	
1	→	x_n	0	0	1	

Even
no seg
1's

Even
no say
his

Handwritten notes on a blackboard:

Left side (vertical list):

- 1
- 0
- 1
- 1
- 0
- 1
- 1
- 1

Right side (vertical list):

- 1
- 1
- 0
- 1
- 1
- 0
- 1
- 1

Below the lists, a horizontal line is drawn. Below the line, the number 0 is written inside a square box, which is underlined.

XOR \rightarrow if no. of 1 is odd then Result is 1

if no. of L is Even

Result is 0

odd
no. of
15

odd no. of 1's

(1)

{
1
0
1
1
0
1
0
0
1
}

(1)

$$x_1 \wedge x_2 \wedge x_3 \dots \wedge x_n =$$

$$\Rightarrow g = 4$$

All Repeating Except two Number:

array \rightarrow (36), (50), (24), 56, (36), (24), 42, (50)

36 \rightarrow	1 0 0 1 0 0 $x_1 \rightarrow$	1 0 0 1 <u>0</u> 0
50 \rightarrow	1 1 0 0 1 0 $x_2 \rightarrow$	1 1 0 0 <u>1</u> 0
24 \rightarrow	0 1 1 0 0 0 $x_3 \rightarrow$	0 1 1 0 <u>0</u> 0
56 \rightarrow	1 1 1 0 0 0 \rightarrow	1 1 1 0 <u>0</u> 0
36 \rightarrow	1 0 0 1 0 0 \rightarrow	1 0 0 1 <u>0</u> 0
24 \rightarrow	0 1 1 0 0 0 \rightarrow	0 1 1 0 <u>0</u> 0
42 \rightarrow	1 0 1 0 1 0 \rightarrow	1 0 1 0 <u>1</u> 0
50 \rightarrow	1 1 0 0 1 0 $x_n \rightarrow$	1 1 0 0 <u>1</u> 0

$x_1 \wedge x_2 \wedge x_3 \dots \wedge x_n =$ 0 1 0 0 1 0

$x_1 \wedge x_2 \wedge \dots \wedge x_n$

0 1 0 0 1 0

~~P1~~ *

no. of 1s in second bit

bit is Guaranteed odd.

~~P2~~ *

Total no. of element in array is even,

* from P1 and P2, there are two type of number in array,

first which have 1's in second bit

another is which have 0's

second bit

1st bit on the basis of which

Segregate on the basis of

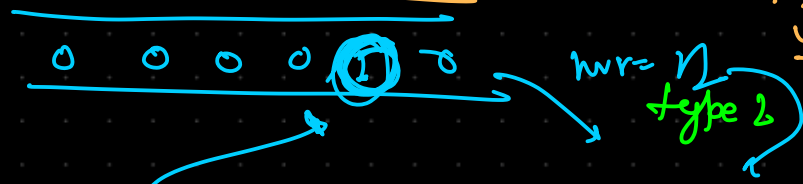
first bit (why only first bit)

XOR → Rightmost LIS is at first bit

Count of one → odd

✓ → XOR = focus + rsbm

36 →	100100	x_1	→	✓	1	0	0	1	0	0	→ T1
→ 80 →	110010	x_2	→	✓	1	1	0	0	1	0	→ T2
24 →	011000	x_3	→	✓	0	1	1	0	0	0	→ T1
56 →	111000		→	✓	1	1	1	0	0	0	→ T1
36 →	100100		→	✓	1	0	0	1	0	0	→ T1
24 →	011000		→	✓	0	1	1	0	0	0	→ T1
42 →	101010		→	✓	1	0	1	0	1	0	→ T2
→ 50 →	110010	x_n	→	✓	1	1	0	0	1	0	→ T2



x_1, x_2, x_3

nm ↓

type 1

36 →	1	0	0	1	0	0
24 →	0	1	1	0	0	0
56 →	1	1	1	0	0	0
36 →	1	0	0	1	0	0
24 →	0	1	1	0	0	0

run 1

XOR						
111000						
56						

50 →	1	1	0	0	1	0
42 →	1	0	1	0	1	0
50 →	1	1	0	0	1	0

run 2

XOR						
101010						
42						

one Repeating and one Missing :- \rightarrow

Tools \rightarrow Conceptual building blocks.

- * bit Manipulation
- * Recursion and backtracking

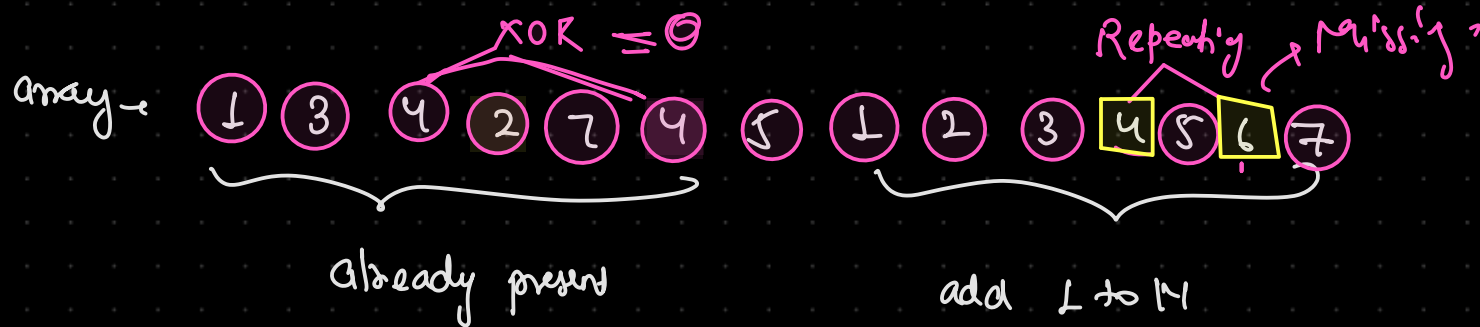
1 to N \rightarrow (1) All numbers are unique except one number.

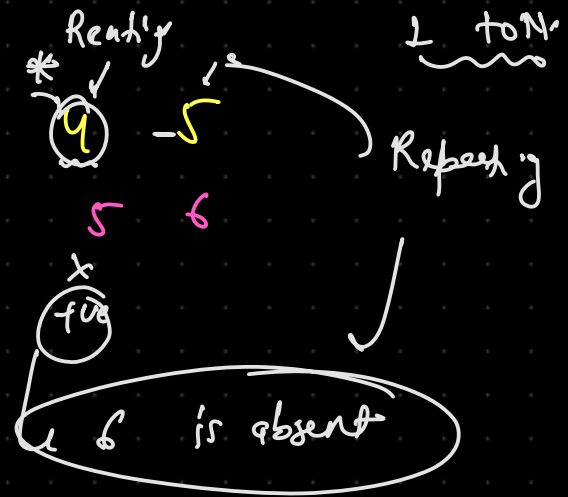
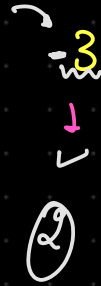
(2) that Number is Repeating.

(3) one number is Missing.

(4) 6 \leftarrow Missing.
 \uparrow
Repeating

array \rightarrow 1 3 4 2 7 4 5





travel and mark