(1) All Repeating three time except one : →

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	4	3	2	1	0 ← bit Index
19 →	1	0	0	1	1
12 →	0	1	1	0	0
14 →	0	1	1	1	0
19 →	1	0	0	1	1
19 →	1	0	0	1	1
12 →	0	1	1	0	0
15 →	0	1	1	1	1
21 →	1	0	1	0	1
15 →	0	1	1	1	1
14 →	0	1	1	1	0
12 →	0	1	1	0	0
15 →	0	1	1	1	1
14 →	0	1	1	1	0
res =	1	0	1	0	1

Complexity ! → 32n

1. ~~All Repeating three time Except one~~
2. ~~Triplet -1~~
3. Reduce N to 1
4. Pepcoder and Bits
5. XOR of Sum of all pairs

NOTE:

If all numbers are present thrice time in an array →

↳ then no. of ON bits must be multiple of '3'

[Not possible] what if 3n+2 ?? is it possible

if one number is extra present then possibility of no. of 1's in i^{th} bit

→ 3n , Results i^{th} bit is 0 ⟸ 3n+1 Results i^{th} bit is 1

Eg.

19 → 1 0 0 1 1
19 → 1 0 0 1 1
19 → 1 0 0 1 1
21 → 1 0 1 0 1

res = 1 0 1 0 1

19 is thrice time present
& 21 is one time.

[32 times] → max no. i.e. lsb

bit similarity → ON

weight

$3n + 1$

↑

total element in array

12 → 1 1 0 0
12 → 1 1 0 0
12 → 1 1 0 0
14 → 1 1 1 0

1 1 1 0

56 → 0 1 1 1 0 0 0
71 → 1 0 0 0 1 1 1
63 → 0 1 1 1 1 1 1
49 → 0 1 1 0 0 0 1
63 → 0 1 1 1 1 1 1
71 → 1 0 0 0 1 1 1
71 → 1 0 0 0 1 1 1
63 → 0 1 1 1 1 1 1
56 → 0 1 1 1 0 0 0
56 → 0 1 1 1 0 0 0

3n	3n+1	3n+2
1 1 1 1 1 1 1	0 0 0 0 0 0 0	0 0 0 0 0 0 0
~~1~~ 0 0 0 ~~1 1 1~~	~~0~~ 1 1 1 ~~0 0 0~~	0 0 0 0 0 0 0
0 0 0 0 0 0 0	1 ~~1 1 1 1 1 1~~	0 ~~0 0 0 0 0 0~~
0 ~~0 0~~ 0 0 0 ~~0~~	1 0 0 0 0 0 0	0 ~~1 1~~ 1 1 1 ~~1~~
0 ~~1 1 0 0~~ 0 ~~1~~	1 ~~0 0~~ 0 0 0 ~~1~~	0 0 0 ~~1 1 1~~ 0
0 0 0 1 ~~1 1~~ 0	~~1~~ 1 1 0 ~~0 0 1~~	~~0~~ 0 0 0 0 ~~0~~
0 0 0 1 0 0 0	0 1 1 0 1 1 0	1 0 0 0 0 0 1

3n: 0 0 0 1 0 0 0
num: 1 0 0 0 1 1 1
0 0 0 0 0 0 0
3np1C =

Sem → 1 off

3np1: 0 1 1 0 1 1 0
num: 1 0 0 0 1 1 1
0 0 0 0 1 1 0
3np2C =
(~3np2C) = 1 1 1 1 0 0 1

3np2: 1 0 0 0 0 0 1
num: 1 0 0 0 1 1 1
1 0 0 0 0 0 1
3np3C =

3n + 1 count

3np1C = 3n & num
3np2C = 3np1 & num
3np3C = 3np2 & num.

OFF in 3np1
3np1 = [3np1 & (~3np2C)]

ON in 3np2
3np2 = (3np2 | 3np2C)

3n

3n+1

3n+2

1 1 1 1 1 1 1 1

0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0

1 0 1 1 0 1 0 1 → 0 1 0 0 1 0 1 0

1 0 1 1 0 1 0 1

0 0 0 0 0 0 0 0

1 0 1 1 0 1 0 1 → 0 1 0 0 1 0 1 0

0 0 0 0 0 0 0 0

1 0 1 1 0 1 0 1

1 0 1 1 0 1 0 1 → 1 1 1 1 1 1 1 1

0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0

1 1 0 0 1 1 0 0 → 0 0 1 1 0 0 1 1

1 1 0 0 1 1 0 0

0 0 0 0 0 0 0 0

1 1 1 1 1 1 1 1 1 1 1

1 1 0 0 1 1 0 0

0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0

1 1 0 0 1 1 0 0

1 1 0 0 1 1 0 0

3n+1 → 1 1 0 0 1 1 0 0

0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0

1 1 0 0 1 1 0 0

Triplet-1 →

$0 <= i < j <= k < arr.length,$

i, j and k → Index

$x = arr[i] \wedge arr[i+1] \wedge arr[i+2] \wedge \dots \wedge arr[j-1]$

$y = arr[j] \wedge arr[j+1] \wedge arr[j+2] \wedge \dots \wedge arr[k]$

no. of triplet of i, j and k where $x == y$

0	1	2	3	4	5	6	7
a	b	c	d	e	f	g	h

b ← i, e ← k

$\boxed{i = 1,\ k = 4}$

	x		y
j=2	b	=	c ∧ d ∧ e
j=3	b ∧ c	=	d ∧ e
j=4	b ∧ c ∧ d	=	e

bruteforce → triplet for, i, j, k

$O(n^3)$

0	1	2	3	4	5	6	7	8	9
1	6	2	3	4	3	2	4	5	7

i ⟶ k

XOR == 0

count = k-i

$i=2, k=7$

all possibility i & k

→ $O(n^3)$

$x == y$??

j	x	y
3	2	$\cancel{3} \wedge \cancel{4} \wedge \cancel{3} \wedge 2 \wedge \cancel{4}$
4	$2 \wedge 3$	$\cancel{4} \wedge 3 \wedge 2 \wedge \cancel{4}$
5	$2 \wedge 3 \wedge 4$	$3 \wedge 2 \wedge 4$
6	$2 \wedge \cancel{3} \wedge 4 \wedge \cancel{3}$	$2 \wedge 4$
7	$\cancel{2} \wedge \cancel{3} \wedge 4 \wedge \cancel{3} \wedge \cancel{2}$	4

all are Equal ??

7 - 2 triplets

2, 3, 7

2, 4, 7

2, 5, 7

$O(n^2)$

XOR between two num:

between i to k

→ XOR of all elements including i & k

is 0, then we can say that there are 'k-i' triplet available