Adobe
Goldman Sa

Q There are N (1 to N) doors & a person is standing infront of every door. Initially all doors are closed

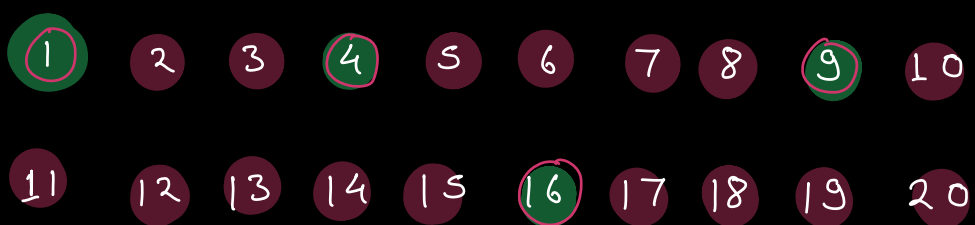
1st person → 1st, 2nd, 3rd ---- Nth (open)

2nd person → 2nd, 4th, 6th, 8th ---- (toggle)

3rd pr → 3rd, 6th, 9th ----

4th pr → 4th, 8th, 12th ----

Return which all doors will be open finally.



9 → 1, 3, 9

15 → 1, 3, 5, 15

18 → 1, 2, 3, 6, 9, 18

O C O C O C

Every door will be toggled by its factor.

C —1st→ O —2nd→ C —3rd→ O —4th→ C —5th→ O

If the no. of factors is odd then the final state ⇒ Open

$24 \Rightarrow 1, 2, 3, 4, 6, 8, 12, 24$

$9 \Rightarrow 1, 3, 9$

$16 \Rightarrow 1, 2, 4, 8, 16$

$25 \Rightarrow 1, 5, 25$

All perfect sq/s will have odd no. of factors.

$i * i == N$

$N = 100$

N

$1 * 1 = 1$

$2 * 2 = 4$

$3 * 3 = 9$

$4 * 4 = 16$

$\vdots$

$9 * 9 = 81$

$10 * 10 = 100$

$\Rightarrow 11 * 11 = 121 > 100$

Amazon

N^{th} Magical No.

Given a no. N. Retur N^{th} magical no.

Magical No.: A no. that can be expressed as a sum of unique power of 5s.

↳ 70

$$5^1 + 5^2 + 5^4 + 5^6$$

$N = 1 \Rightarrow 5^1$

$N = 2 \Rightarrow 10 \Rightarrow 5^1 + 5^1$ ✗

$25 \Rightarrow 5^2$

$N = 3 \Rightarrow 5^1 + 5^2 \Rightarrow 30$ ✓

$30 = 5^2 + 5^1$

5, 25, 30, 125, 130

1 2 3 4 5

$130 = 5^3 + 5^1$

(N)

			3	2	1	
1st	5	5^1	0	0	5^1	0 0 1
2nd	25	5^2	0	5^2	0	0 1 0
3rd	30	$5^2 + 5^1$	0	5^2	5^1	0 1 1
4th	125	5^3	5^3	0	0	1 0 0
5th	130	$5^3 + 5^1$	5^3	0	5^1	1 0 1
6th	150	$5^3 + 5^2$	5^3	5^2	0	1 1 0
7th	155	$5^3 + 5^2 + 5^1$	5^3	5^2	5^1	1 1 1

$N = 11$

$11 \Rightarrow$ $\underset{4}{1}\ \underset{3}{0}\ \underset{2}{1}\ \underset{1}{1}$

$5^4 + 0 + 5^2 + 5^1 \Rightarrow \underline{655}$

Google

Majority Element

Q Given an array of size N, (+ve no)

Return, if there exists a no. with **frequency > N/2**

[Without any extra space SC : O(1)]

A : 1, 6, 1, 1, 2, 1 $\quad N = 6$

$\Rightarrow 1$ $\quad N/2 = 3$

Quiz

3, 4, 3, 6, 1, 3, 2, 5, 3, 3, 3 $\quad N = 11$

$\Rightarrow 3$ $\quad \frac{11}{2} = 5$

(5+1)

Quiz

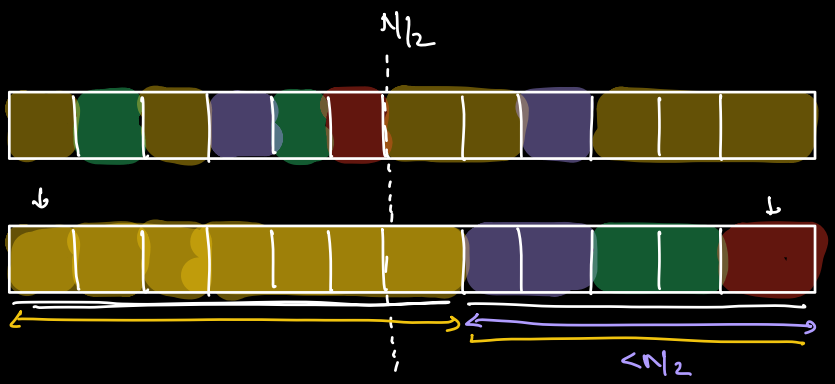
4, 6, 5, 3, 4, 5, 6, 4, 4, 4 $\quad N = 10$

No ME $\quad$ Majq = 6

-1

$O(N^2) \Rightarrow$

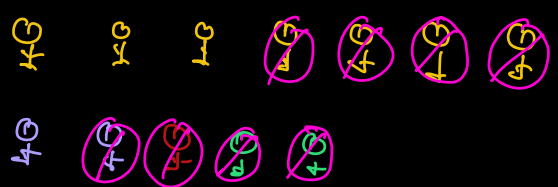
```
for (i = 0 → N) {
    freq = 0;
    for (j = 0 → N) {
        if (a[i] == a[j]) {
            freq ++
        }
    }
    if freq > N/2  return a[i].
```

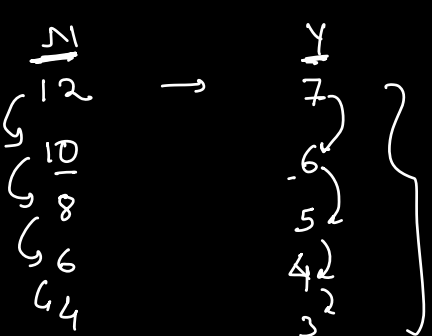


- Only one majority element can be there in an array.
- The count of ME will be greater than the combined counts of all other elements.

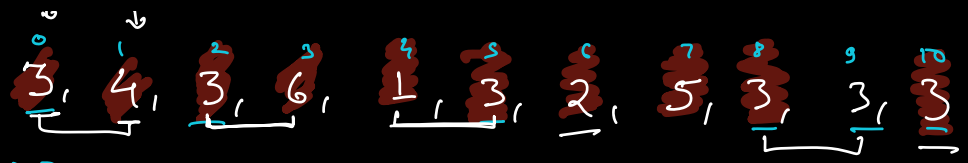
Yellow Party

[Violet, Red, Green] - Mahagathbandhan





If we remove 2 distinct elements from the array ME remains the same



ME : 3

N	|ME|
11	6
9	5
7	4
5	3
3	2
1	1

Moore's Voting Algo

[ME : 3 3 1 2 3 — Can be a ME. Iterate over the array & confirm if it is.
Count : 1 0 1 0 1 0 1 0 1 2 3

N = 13

5, 5, 2, 3, 5, 1, 2, 5, 5, 5, 4, 1, 1

⇒ ME : 5 5 2 5 1 — Iterate over the array & confirm if it is in majority
Count : 1 2 1 0 1 0 1 0 1 2 1 0 1

TC : O(N) (N + N)
SC : O(1) (Extra)

N ↑ finding a ME by Moore Voting
N ↑ Confirm by counting the occurance of ME

Q ME ⇒ Count > N/3

An array can have 2 ME.

[ME1 _ | ME2 _
Count1 _ | Count2 _]

Tricky Code

War - Stories ?

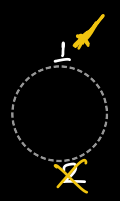
Josephus (Jewish)

If there are N people in the circle, What should be the position where Josephus should stand in order to save his life.

N = 1 .

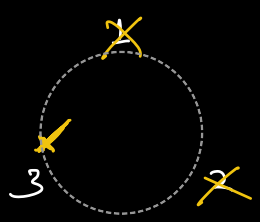
O X

N = 2



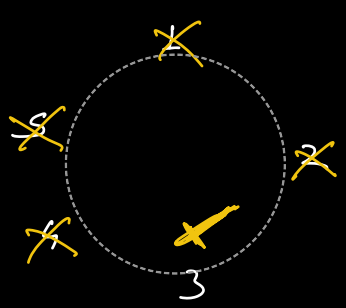
=> 1

N = 3



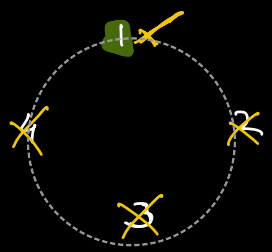
=> 3

N = 5

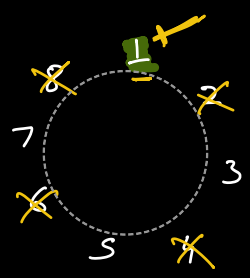


=> 3

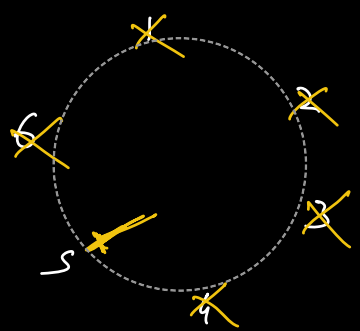
N = 4



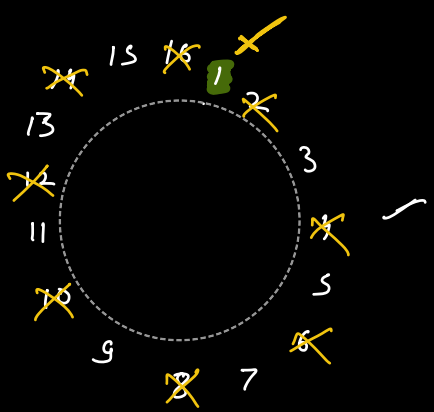
N = 8



N = 6



N = 16



N

- 2 → 1
- 4 → 1
- 8 → 1
- 16 → 1
- 32 → 1
- 64 → 1
- 128 → 1

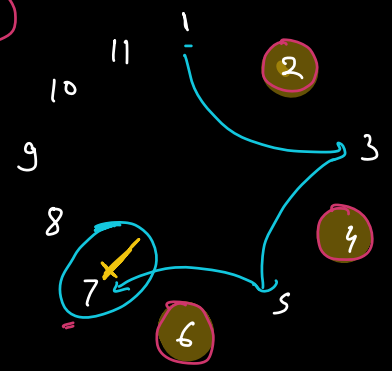
If no. of people is a power of 2

$N = 2^K$

Then, the person who starts the Kitty wins

N = 11 $2^3 \Rightarrow 8$

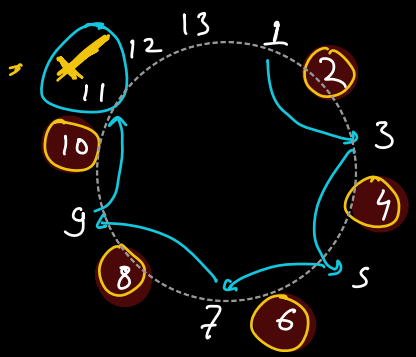
11 − 8 = 3



7

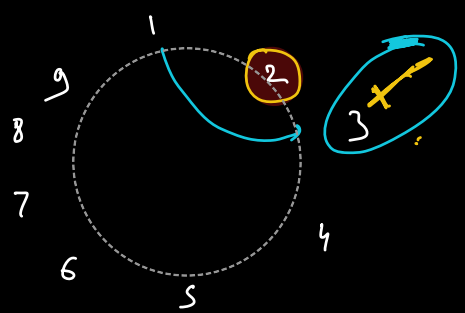
N = 13

13 − 8 = 5



After killing of x people position of sword is $2x+1$

N = 9



N = 100

x ?

x = N − Nearest Power of 2

x = 100 − 64

x = 36

After 36 killings, pos of sword is 73