Saturday & Sunday — 9th June Contest (3 questions)

Re-attempt — 2or more questions

Revision:

Arrays + TC

pfA[i] = Sum of all elements from [0-i]

pfeven[i] = Sum of all even idx elements from [0-i]

pfodd[i] = Sum of all odd idx elements from [0-i]

sum(A[2:5]) = 17

	0	1	2	3	4	5	6	7
A =	3	2	5	7	-1	6	2	5
pf =	3	5	10	17	16	22	24	29

[0:1] evensum = 3

pfeven[1]

	0	1	2	3	4	5	6	7
A =	3	2	5	7	-1	6	2	5
pfeven =	3	3	8	8	7	7	9	9

	0	1	2	3	4	5	6	7
A =	3	2	5	7	-1	6	2	5
pfodd:	0	2	2	9	9	15	15	20

sum(A[2:5]) = 13

odd index

	0	1	2	3	4
	2	4	3	1	5

pfeven = [2 2 5 5 10]

sum (A[l:r])

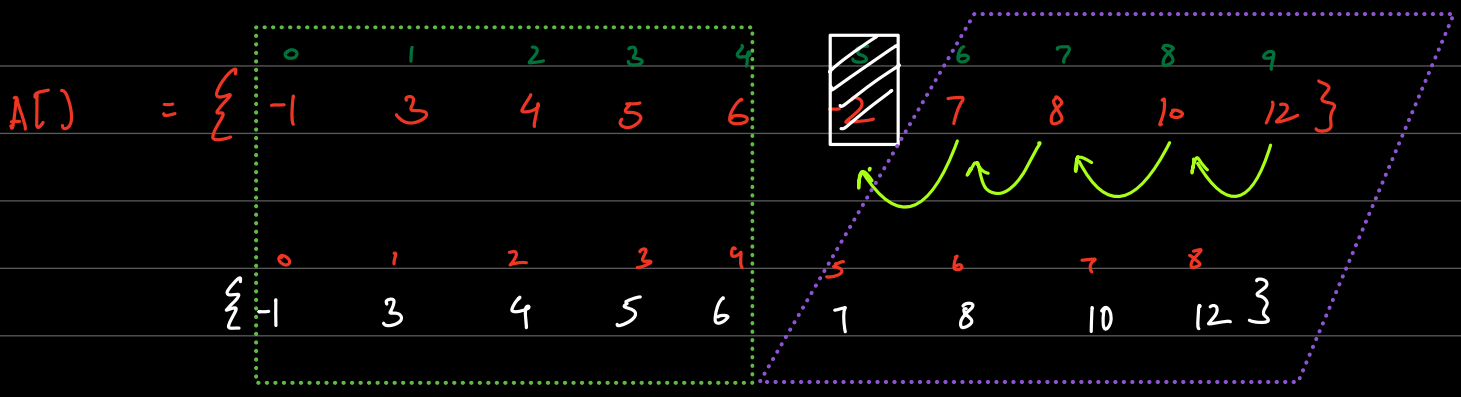
$$\text{sum}(A[l:r]) = \begin{cases} pf[r] - pf[l-1] & l > 0 \\ pf[r] & l = 0 \end{cases}$$

$$\text{sum}(A[l:r]) = \begin{cases} pf_{odd}[r] - pf_{odd}[l-1] & l > 0 \\ pf_{odd}[r] & l = 0 \end{cases}$$

odd index sum

$$\text{sum}(A[l:r]) = \begin{cases} pf_{even}[r] - pf_{even}[l-1] & l > 0 \\ pf_{even}[r] & l = 0 \end{cases}$$

even index sum



After the deleted index point
odd index becomes even
even index becomes odd

odd index sum

Ans : 8

3 + 0 + 2 + 10 = 15

Special Index — HARD — Google / Meta

(Q2) An index is said to be special if after deleting it, Sum of all even index = Sum of all odd index elements.

Count number of special index in the array?

Ans : 2

0	1	2	3	4	5
4	3	2	7	6	-2

Del 0:

0	1	2	3	4
3	2	7	6	-2

even sum : 8

odd sum : 8

Del 1:

0	1	2	3	4
4	2	7	6	-2

even : 9

odd : 8

Del 2:

0	1	2	3	4
4	3	7	6	-2

even : 9

odd : 9

Del 3:

0	1	2	3	4
4	3	2	6	-2

even : 9

sum : 9

Del 4:

0	1	2	3	4
4	3	2	7	-2

even : 4

odd : 10

Del 5:

0	1	2	3	4
4	3	2	7	6

even : 12

odd 10

Approach 1) for every i^{th} index create a new array not including index

→ Calculate even sum & odd sum TC : $O(N^2)$

0	1	2	3	4	5	6	7	8	9	10

After deletion

odd sum = { 1 3 6 8 10 }

even sum = { 0 2 4 7 9 }

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

even: ~~2+3~~ ~~-1~~ ~~-2~~ + 8 = 8

Del i^th

even index sum : sum(A[0:i-1]) + sum(A[i+1:N-1])

even index | odd index

odd index sum : sum(A[0:i-1]) + sum(A[i+1:N-1])

odd index | even index

sum(A[l:r]) = pf[r] - pf[l-1] (l > 0); pf[r] (l = 0)

even index sum : pfeven[i-1] + pfodd[N-1] - pfodd[i+1-1]

pfodd[r] - pfodd[l-1]

even index sum = pfeven[i-1] + pfodd[N-1] - pfodd[i]

odd index sum = pfodd[i-1] + pfeven[N-1] - pfeven[i]

1) Calculate pf even pf odd

TC: O(N)

SC: O(N)

```
count = 0
for (i=0; i<N; i++) {
    if (i==0) { even index sum = pfodd[N-1] - pfodd[i]
                odd index sum = pfeven[N-1] - pfeven[i]
              }
    else {
        even index sum = pfeven[i-1] + pfodd[N-1] - pfodd[i]
    }   odd index sum = pfodd[i-1] + pfeven[N-1] - pfeven[i]
    if ( even index sum == odd index sum)
            count ++
}
```

	0	1	2	3	4	5
	4	3	2	7	6	-2
pfeven : {	4	4	6	6	12	12 }
pfodd : {	0	3	3	10	10	8 }

i = 0

even = 8

odd = 12 - 4 = 8

count = 1

i = 1

even : 4 + 8 - 3 = 9

odd : 0 + 12 - 4 = 8

count = 1

i = 2

even : 4 + 8 - 3 = 9

odd : 3 + 12 - 6 = 9

count = 2

Break (10:30 – 10:40)

(Q3) Given N positive numbers find majority element?

[No extra space]

N → more than $\frac{N}{2}$ times

Ex1) 1 2 1 6 1 1

freq(1) = 4

N = 6

more than 3 times

Ex2) 3 4 4 8 4 9 4 3 4

Ex3) 3 3 4 6 1 3 2 5 3 3 3

Ans: 3

N = 11

more than $\frac{11}{2}$

> 5

6 or more

4 6 5 3 4 5 6 4 4 4

N = 10

freq(4) = 5

more than 5 times

No majority at all

6 or more

5 or more times

There is either 1 majority or no majority