On Saturday

Doubt session

TC discussed on ipad

Assignment

HW Question

Arrays

Jupyter Notebook

Scaler IDE

~ 4-6 pm

Q1 Given an array of size N.

find sum of all elements from index s to e.

$$A = \begin{array}{cccccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ [-3, & 6, & 2, & 4, & 5, & 2, & 8, & -9, & 3, & 1] \end{array}$$

s = 4

e = 8

~~for~~

```
sum = 0
for i in range(s, e+1):
    sum += A[i]
return sum
```

TC = O(N)

SC = O(1)

Q pairs of (s, e)

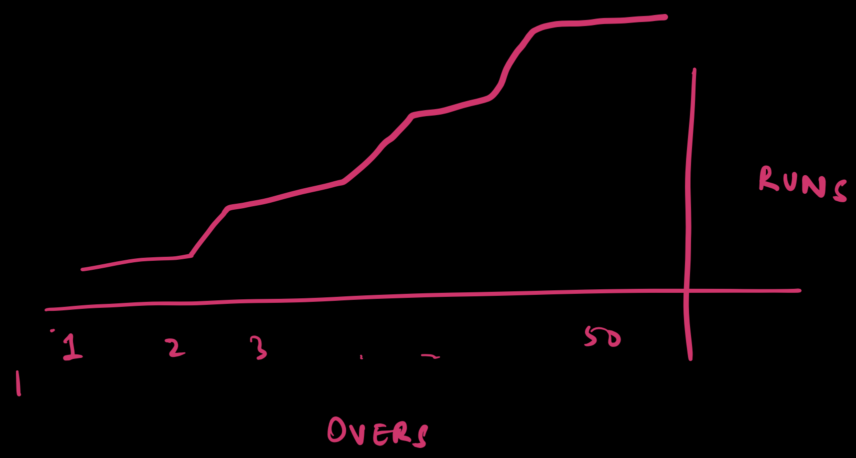
s	e
4	8
2	5
6	7
8	9

$TC \Rightarrow O(N * Q)$

$SC \Rightarrow O(1)$

Q * N

ODI



Runs	288	312	330	349	360	383
Over	41	42	43	44	45	46

42nd start

394	406	436	439
47	48	49	50

439 – 360

Score batsmen scored in last 5 overs ?

$$\begin{array}{r} 360 \\ -288 \\ \hline 72 \end{array}$$

$\boxed{439 - 360} \downarrow \boxed{79}$

$\boxed{439 - 383} \downarrow 56$

46, 47, 48, 49, 50

Prefix Sum = sum of all elements starting from index 0 or beginning of list till the i^{th} index

$a_1 + a_2 \cdot a_7$

1 - 7

$PS[i]$ = sum of all elements till i

$15 = a_0 + a_1 \cdots a_7 - \boxed{a_0} = 10$

i.e. $a_0 + a_1 + a_2 \cdots a_i$

$15 - (-3) = 18$

	0	1	2	3	4	5	6	7	8	9
A =	-3	6	2	4	5	2	8	-9	3	1
PS =	-3	3	5	9	14	16	24	15	18	19

4-8

P[8]-P[4]

P[9]-P[4]

P[8]-P[3]

P[9]-P[3]

Construction of Prefix Sum Array:

* $\boxed{PS[i] = PS[i-1] + A[i]}$

```
PS = [0] * N        ← ?
PS[0] = A[0]

for i in range(1, n):
    PS[i] = PS[i-1] + A[i]
```

creating a new list of size N

TC = ? N

SC = ? N

$\boxed{4-8} \Rightarrow P[8] - P[3]$ ✓

$a_4 + a_5 + a_6 + a_7 + a_8$

$a_0 + a_1 a_2 a_3$

$\boxed{P[3]}$

$\cancel{a_0} + \cancel{a_1} + \cancel{a_2} + \cancel{a_3} + a_4 + a_5 + a_6 + a_7 + a_8$

$- \cancel{a_0} + \cancel{a_1} + \cancel{a_2} + \cancel{a_3}$

$\boxed{P[e] - P[s-1]}$

$\boxed{0-6}$ P6

$P[6] - P[0-1]$ ×

$s == 0 \rightarrow$ ignore subtraction

$\boxed{\text{7 mins}}$

[1, 2, 3]

$\boxed{[1, 3, 6]}$ ✓ O(1)

Q2 Given an array of N elements.

Return True if there exist an $\boxed{\text{equilibrium index}}$ in the array.

↓

Index for which sum of elements on left side == sum of elements on the right side.

1	2	3	4	8	10
0	1	2	3	4	5

True

4+3+2+1 = 10

10

Ans = 3

[-7, 1, 5, 2, -4, 3, 0]

0	7
-7	6
-6	1
-1	-1

$P[n-1] - P[0] == 0$

$P[n-1] == P[0]$

for i in range (0, n):

for j in range (0, i):
[$a_0 + a_1 \ldots a_{i-1}$]

for j in range (i+1, n):
[$a_{i+1} + a_{i+2} \ldots a_{n-1}$]

BF

TODO: handle 0

```
for i in range (1, n)
        if P[i-1] == P[n-1] - P[i]
                return True

return False
```

TC → n

SC → n / 1 → if you use given array as prefix array

if you create a new prefix array

for i in range (1,n)
A[i] = A[i] + A[i-1]

1	3	0	4

H.W
O(1)

Q Given an array of N elements

2 mins

Q

s | e →
s | e →
s | e

1) Sum of all odd index elements
from index s to e

2) Sum of all "even index" elements
from index s to e

N*Q ✓ →

A = 2 3 1 -1 0 8 5 4

0 1 2 3 4 5 6 7

$\boxed{a_5 + a_3 + \cancel{a_1}} - \cancel{a_1}$

O → PFO[6] − PFO[1]

E → PFE[6] − PFE[1]

$\boxed{2 - 6}$ →

Even = ? $a_2 + a_4 + a_6$ ✓

Odd = ? $a_3 + a_5$ ✓

A[4] − A[0]

$\boxed{a_6 + a_4 + a_2 + \cancel{a_0}} - \cancel{a_0}$ = $a_4 + a_3 + a_2 + a_1$

P[6] − P[2]

= $a_6 + a_5 + a_4 + a_3 + \cancel{a_2} + \cancel{a_1}$

$\cancel{- a_0 + a_2}$

i - j

O

E : $a_i \quad a_{i+1} \quad a_{i+2} \quad \ldots \quad a_j$

for q in Q:

BF = N×Q

for i in range (s, e+1):

sum1 = 0

sum2 = 0

for if i % 2 == 0

→ sum1

else

sum2

PF[i] = s

s–e

$a_0 \quad a_1 \quad a_2 \quad a_3 \quad a_4 \quad a_5$

$a_1 + a_3 + a_5$

PF[3] = { $a_1 + a_3$

1 – 5

P[2] = $a_0 + a_2$

P[5] – P[1-2]

P[4] = $\boxed{a_0 + a_2 + a_4}$

→ P[4] – P[0]

→ $a_2 + a_4 + a_0 - a_0$

O(N)

PFE[i] → sum of all even indices till index i

$a_0 + a_2 + a_4$ ...

PFO [i] → sum of all odd indices till index i

$a_1 + a_3$. ___

```
PFE[0] = A[0]    PFO[0] = 0
for i in range(1, n):
    if i % 2 == 0:
        PFE[i] = PFE[i-1] + A[i]
        PFO[i] = PFO[i-1]
    else:
        PFO[i] = PFO[i-1] + A[i]
        PFE[i] = PFE[i-1]
```

	0	1	2	3	4	5	6	7	8
	[1,	3,	5,	4,	2,	6,	1,	-2,	-3]
E:	1	1	6	6					
O:	0	3	3	7					

Odd indexed sum of element till index 2

a_1

l = l[

null = l[1:5] X

O(N)

Rotation

a_2	a_3	a_0	a_1	a_4	a_5	a_6	a_7

$(i+K)\% N$

$K=2$