1. Array Rotation
2. Positive in Range
3. King and Palindrome

① Revise notes Topic → where

② Read all 3 ques

③ Read ques carefully

Contest
↓
practice Mode

Score ≤ 65

Reattempt → sat sun

23 Sep - 24 Sep

1. Given an integer array A of size N. You've to return same array after rotating it B times towards right

$1 \le N \le 10^5$

$1 \le A[i] \le 10^9$

$1 \le B \le 10^9$

A = [1, 2, 3, 4, 5] N = 5

B = 2

[1, 2, 3, 4, 5]

$\downarrow$ 1

5, 1, 2, 3, 4

$\downarrow$ 2

ans → 4, 5, 1, 2, 3

int

$\downarrow$

$-2 \times 10^9 \rightarrow 2 \times 10^9$

$\underset{10^9}{\overset{B}{\downarrow}} > \underset{10^5}{\overset{N}{\downarrow}}$

[1, 2, 3, 4, 5] B = 2

① $\downarrow$ reverse array (0, N-1)

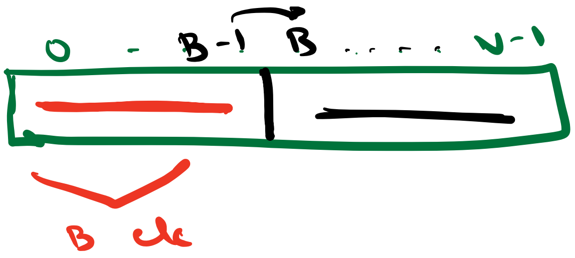
$[\underbrace{5, 4}, 3, 2, 1]$

② $\downarrow$ reverse B elements (0, B-1)

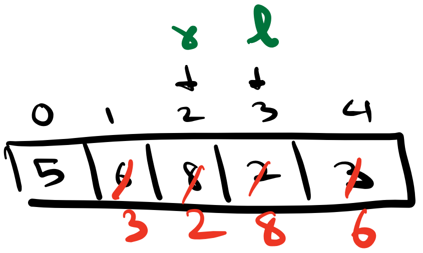
$[4, 5, \underbrace{3, 2, 1}]$ 4, 5, 1, 2, 3

③ $\downarrow$ revere rem elements (B, N-1)

[4, 5, 1, 2, 3]



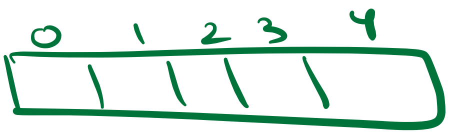
```
void reverse (int ar[], int l,int r){
    int i = l, int j = r
    while (i< j){
        swap (ar[i], ar[j])
        i++      j--
    }
}
```



```
void rotate (int ar[], int N, int B){
        B = B % N
        reverse (ar, 0, N-1)
        reverse (ar, 0, B-1)
        reverse (ar, B, N-1)
}
```

N = 5

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

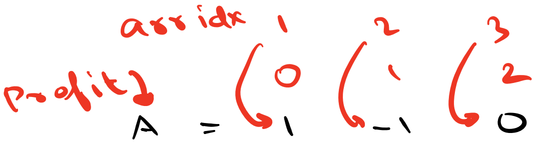


B = 8

2. Given an array A with profit for N days, You've Q queries represented as 2D array B of size Q×2

Find count of non negative profit in range from A[B[i][0]] to A[B[i][1]].

+ve | 0



B = [[0 2], cnt 2

[1 2], 1

[1 1]] 0

non -ve

↓

+ve / 0

B[i][0] B[i][1]

In diff index ranges → cnt of +ve | 0 profit

Q → i j

1 query O(N)

Q queries TC : O(QN)

$10^5 \times 10^5$

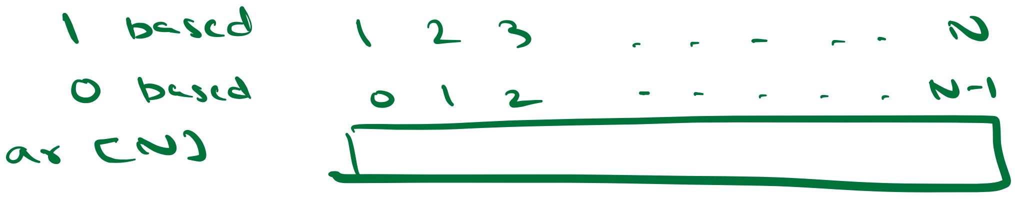
$= 10^{10}$ iter

BF → cause TLE

$1 \leq N, Q \leq 10^5$

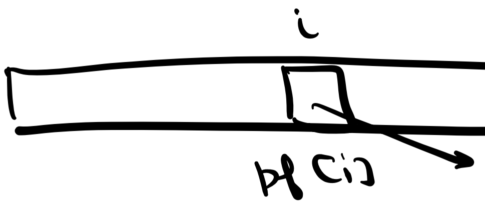
$-10^9 \leq A[i] \leq 10^9$

$0 \leq B[i][0] <= B[i][1] \leq N-1$



1 based idx -1 → 0 based idx

optimized approach : pf [ ]

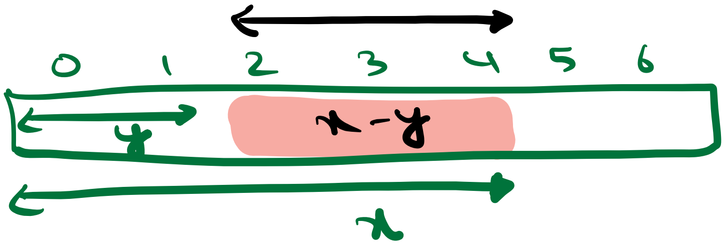


sum from 0 → i

	0	1	2
A =	1	-1	0
pf =	1	1	2

cnt of non - -ve profit

pf [i] = 0 → i cnt of non -ve profit



$$\boxed{cnt\ (i \to j) = pf\,[j] - pf\,[i-1]}$$

cnt (2→4) = cnt (0→4) - cnt (0→1)
= pf [4] - pf [1]

$$\begin{array}{cccc} & 0 & 1 & 2 \\ A = & 1 & -1 & 0 \\ pf = & 1 & 1 & 2 \end{array}$$

$B \to$ 0 2 $\to 2$

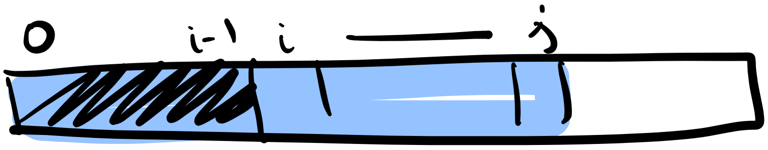
1 2 $pf[2] - pf[1-1]$

$= 2 - 1 = 1$

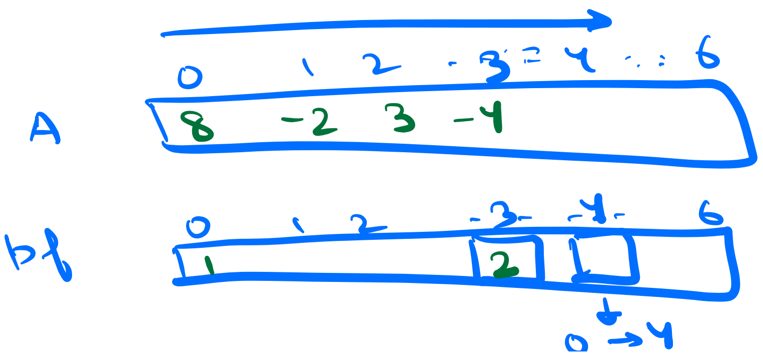
$$\boxed{cnt(i \to j) = pf[j] - pf[i-1]}$$

$cnt(0 \to j) = pf[j]$

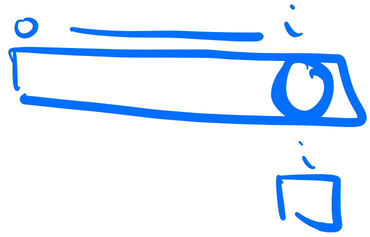
$cnt(0 \to 2) = pf[2]$ - ~~pf[-1]~~

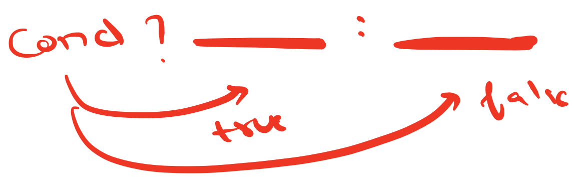


$pf[j] - pf[i-1]$

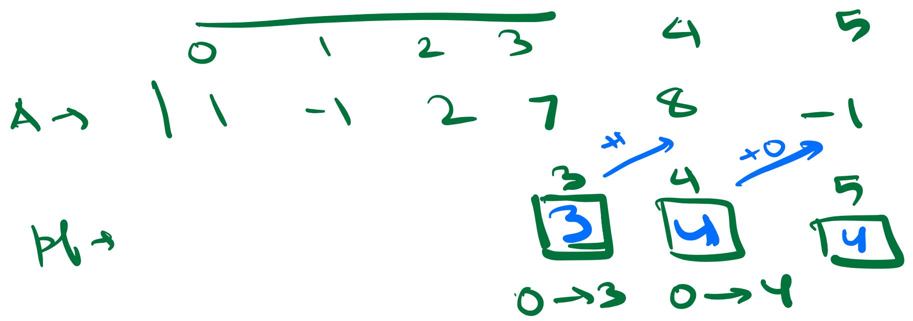


```
solve ( int A[], int B[][] ){

    int  n = A.size()
    int  pf [n]

     if (A[0] ≥ 0)
           pf [0] = 1
     else
           pf [0] = 0
                                                      → N
      for (i=1 ; i< N ; i++) {
          int cnt = A[i] ≥ 0 ? 1 : 0
           pf[i]      = pf[i-1] + cnt
            ↓                ↓
       cnt of (0→i)     cnt of
                        (0→i-1)
      }
                                                          → Q
   for (K=0 ; K<q ; K++) {

         int  i = B[K][0]
         int  j = B[K][1]

          if (i==0)
               print ( pf [j] )
         else
               print ( pf[j] - pf[i-1])
   }
}
```





TC : O(N+Q)
SC : O(N)



3. Given a string A of length N, find length of longest palindrome that could be made from letters.

$1 \le N \le 10^5$

A = "banana"

ans → 5

A = "abcabc"

ans → 6

abccba

Some letter are given, try to form longest palindrome

madam
nitin
abba

a , b, c , a

aba
aca
$\boxed{3}$

a, a, b, a, b, a, a, a

a → 6
b → 2

aaab | baaa

a, a, a, a
b, b
c, c

aa bc | cb aa

acba | ab ca

bc aa | aacb

$\underline{a, a, a, a, a, a}, \boxed{a}$
$\underline{b, b}, \boxed{b}$

7 a → 6 a
3 b → 2 b

baaa | aaab

bb c bb

mad am

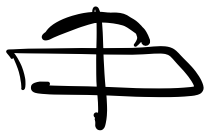
baaaaaaab

baaabaaab

All the chars even cnt can be taken for palindrome

$x \to 5$ $\quad \textcircled{4}$

$x \to 10$ $\quad \textcircled{10}$



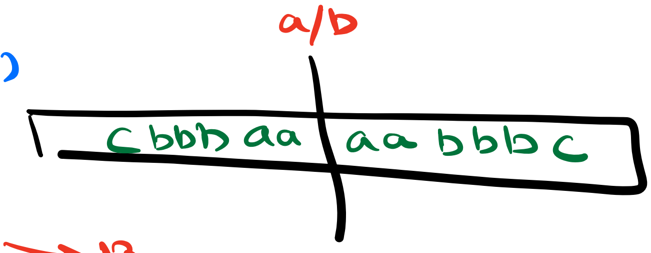
Palindrome = cnt of even chars

5 a → 4 (1a)

7 b → 6 (1b)

2 c → 2

$$\underline{12} + 1 \to 13$$



```
int findlength (string A) {
        hashmap <char, int> freq
        for (i=0 ; i<n ; i++) {
                if (A[i] is in hm)
                  hm [A[i]] ++
                else
                  hm.insert (A[i],1)
        }
}
```

a, 5
b, 7
c, 2

```
int cnt = 0        bool flag = false
for ( <char, value> in HM) {
    if ( value % 2 == 1) {
        cnt += value - 1
        flag = true
    }
    else
        cnt += value
}

if (flag == true)
    return cnt + 1
else
    return cnt
```

TC : O(N)
SC : O(N)

★ Char has odd freq → 1 ch is remaining

---

str → 'a' - 'z' (26 chars)

			ind
'a'	97	$\xrightarrow{-97}$	0
'b'	98	$\xrightarrow{-97}$	1
'c'	99	$\xrightarrow{-97}$	2
⋮	⋮		⋮
'z'	122	$\xrightarrow{-97}$	25

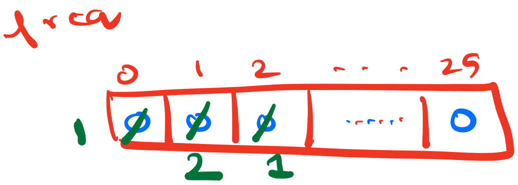
int freq[26]

ind
0 — 25

char → ind ?

char ch

idx = ch-97 / ch - 'a'



$\boxed{abbc}$

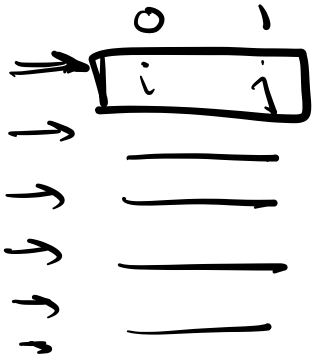
```
int freq [26] = {0}

for (i=0 ; i<n ; i++) {
    char ch = A[i]
    freq [ch-97] ++
}
```

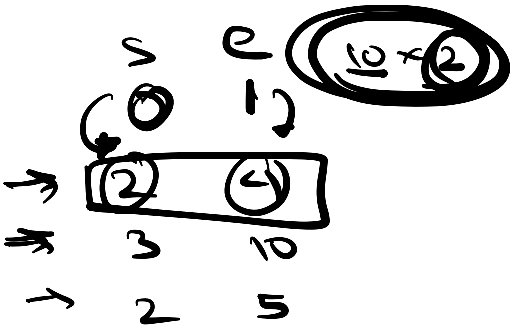
---

1 query → i j

2D array

Q × 2





B [Q][2]

$$\begin{array}{c|cc} & \underline{0} & \underline{1} \\ 0 & 1, & 8 \\ \rightarrow 1 & 2, & 5 \\ 2 & 6, & 7 \end{array}$$

Q c

3 ×2

B[1] [0] ↓ 2

B[1] [1] ↓ 5

i → $\underset{\_}{0}$ $\underset{\_}{1}$

B[i] [0] B[i][1]

6 → 1, 2, 3, 6 (4)

−6 → ±1, ±2, ±3, ±6 (8)

x → cnt

x is −x

↓

2×cnt