Direct I
Code Nation
Google. Amazon
JP Morgan

Q Given an array of size N.

Count the no. of special indexes.

Special Index : An index after removing which.

Sum of all odd indexed elements = sum of all even " " in the resulting array.

	0	1	2	3	4	5	
A:	4,	3,	2,	7,	6,	-2	
i = 0	3,	2,	7,	6,	-2		→ $S_e = 8$, $S_o = 8$ ✓
i = 1	4,	2,	7,	6,	-2		$S_e = 9$, $S_o = 8$ ✗
i = 2	4,	3,	7,	6,	-2		$S_e = 9$, $S_o = 9$ ✓

1 2

	0	1	2	3	4	5	6	7	8	9
Eg:	2,	3,	1,	4	0,	-1,	2,	-2,	10,	8

i

$S_e = S_e[0, i-1]$ 4 → 3

5 → 4

6 → 5

7 → 6

index i ⇒ after i, all odd indexes becomes even

even becomes odd.

After removal of index i

Before i   After i

$S_e = S_e[0, i-1] + S_o[i+1, N-1]$

$S_o = S_o[0, i-1] + S_e[i+1, N-1]$

$PS_e[N-1] - PS_e[i]$

Q Given an array of size N.

Build an array leftMax. where

leftMax[i] → the maximum value in the array from index 0 to i

	0	1	2	3	4	5	6	7	8	9
A:	-3,	6,	2,	4,	5,	2,	8,	-9,	3,	1
LM:	-3,	6,	6,	6,	6,	6,	8			

i-1   i

$LM[0] = A[0];$

$LM[1] \Rightarrow \text{Max}[0,1] \Rightarrow \text{Max}(\overset{-3}{LM[0]}, \overset{6}{A[1]})$

$LM[2] \Rightarrow \text{Max}[0,2] \Rightarrow \text{Max}(LM[1], A[2])$

$LM[5] \Rightarrow \text{Max}[0,5]$

$LM[6] \Rightarrow \text{Max}[0,6] \Rightarrow \text{Max}(\overset{6}{LM[5]}, \overset{8}{A[6]})$

$LM[i-1]$

$LM[i] \Rightarrow \max(LM[i-1], A[i]))$

$i=0$

Code

```
LM[0] = A[0];   // Necessary ??

for (i=1; i<N; i++) {
        LM[i] = max(LM[i-1], A[i]);
}
```

T.C. = O(N)

S.C. = O(N)

RightMax[i] $\Rightarrow$ Max of all elements from

i to N-1

	0	1	2	3	4	5	6	7	8	9
A:	-3,	6,	2,	4,	5,	2,	8	-9,	3,	1

RM : 8 8 8 8 8 8 8, 3, 3, 1

$RM[N-1] = A[N-1]$

$RM[N-2]$
$(RM[8]) = max[N-2, N-1] \Rightarrow max(RM[N-1], A[N-2])$

$RM[i] \Rightarrow max[i, N-1]$

$\Rightarrow max(RM[i+1], A[i])$

i ??

N-1

i+1 = N

Code

```
RM[N-1] = A[N-1]
for (i = N-2 ; i >= 0 ; i--) {
        RM[i] = max(RM[i+1], A[i]);
}
```

Google

Q Given a string of lowercase alphabet

Return the count of pairs (i, j). s.t.

$i < j$

$s[i] = $ 'a'
$s[j] = $ 'g'   'ag'

	0	1	2	3	4	5
S:	a	b	e	g	a	g

(0, 3)   (4, 5)   ⇒ 3
(0, 5)

Quiz

	0	1	2	3	4	5	6
s:	a	c	g	d	g	a	g

(0, 2)   (5, 6)
(0, 4)   ⇒ 4
(0, 6)

Quiz

0	1	2	3	4	5	6	7
b	c	a	g	g	a	a	g

i

(2, 3)   (5, 7)
(2, 4)   ⇒ 5
(2, 7)   (6, 7)

1) Brute force

a b c d e f g h $N-2$ $N-1$

Code

$N-1$ $\quad s[N-1] = a$ $\quad i = N-2$

```
ans = 0;
for (i=0; i<N; i++) {
    if (s[i] == 'a') {
        for (j = i+1; j<N; j++) {
            if (s[j] == 'g') {
                ans++;
            }
        }
    }
}
```

$j = N$

T.C. = $O(N^2)$

S.C. = $O(1)$

0	1	2	3	4	5	6	7
b,	c,	a,	g,	g,	a,	a,	g

→ Every 'g' will make a valid pair with all the 'a' on the left of it

	0	1	2	3	4	5	6	7	8
~~g~~	a	c	b	a	g	k	a	g	g
Count(a)	1	1	1	2	2	2	3	3	3
ans	0	0	0	0	2	2	2	5	8

variables

2 3

T.C. = O(N)

S.C. = ~~O(N)~~ O(1)

Code

```
ans = 0;
Counta = 0;

for (i=0; i<N; i++) {
        if (s[i] == 'a') {
                counta++;
        }
        else if (s[i] == 'g') {
                ans = ans + Counta;
        }
}
return ans;
```

Amazon

Q Given an array of size N.
Return the length of the smallest subarray which contains both the min & the max of the array.

Subarray

subarray

0 1 2 3 4 5 6 7 8
3, 2, 4, 5, 7, 6, 1, 4, 9
s e

s 1 e 6 ⇒ 2 variables

[s, e] ⇒ e − s + 1 ⇒ total no. of elements
l r

4

0 1 2 3 4 5 6 7 8 9
A: 1, 2, 3, 1, 3, 4, 6, 4, 6, 3

Max = 6
Min = 1

Quiz

3

0 1 2 3 4 5 6 7 8 9 10
A: 2, 2, 6, 4, 5, 1, 5, 2, 6, 4, 1

max min

max = 6
min = 1

	0	1	2	3	4	5	6	7	8	9	10	11
A:	1,	6,	4,	2,	7,	7,	5,	1,	3,	1,	1,	5

Max = 7
Min = 1 ⇒ 3

1

	0	1	2	3	4	5
A:	[8,	8,	8,	8,	8,	8]

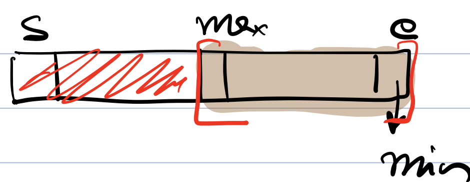
Max = 8 ✓
Min = 8 ✓

s == e

[49, 49] ⇒ 1 element

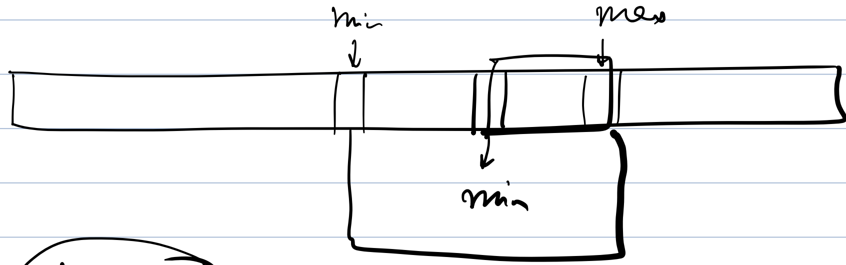
Observations

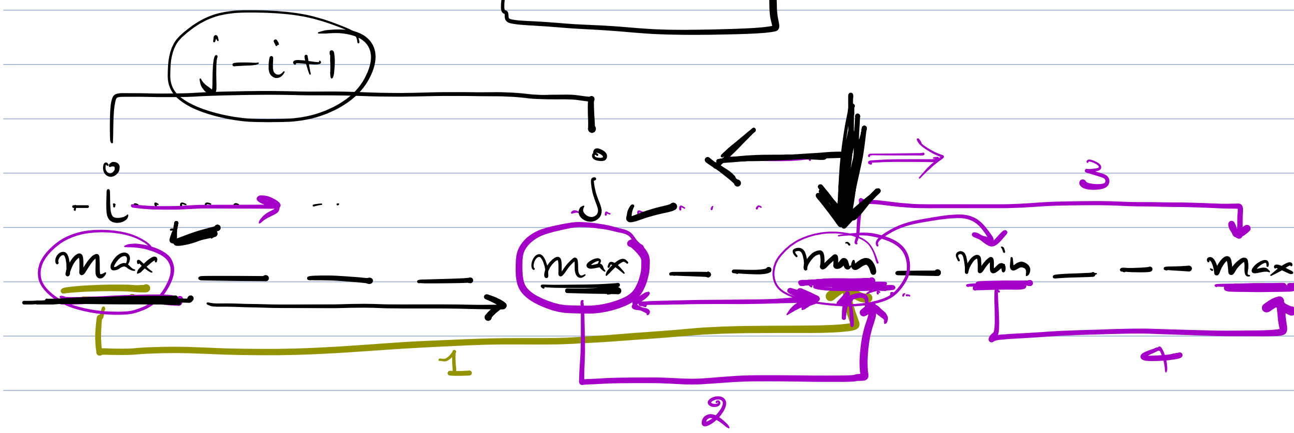
1) Ans subarray will always have max/min in the corner.



2) There will only be one min & one max

present in the ans subarray.





① Brute force $O(n)$

1) find max & min

2) Iterate from L to R

$\forall$ max, find nearest min in right

$\forall$ min find nearest max in right

Code

ans = N

// for every min → find max in the right

// for every max → find nearest min " " " "

```
for (i = 0; i < N; i++) {
    if (A[i] == Amin) {
        for (j = i; j < N; j++) {
            if (A[j] == Amax) {
                ans = min(ans, j-i+1);
                break; }
        }
    }
    else if (A[i] == Amax) {
        for (j = i; j < N; j++) {
            if (A[j] == Amin) {
                ans = min(ans, j-i+1);
                break; }
        }
    }
}
```

$T.C. = O(N^2)$

A : 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 1

Doubts

A → N

B → M×2

[L R]

TA

Edge

Sum of a range

1 → indexed

N

N+1

0 N−1

A: 1, 2, 3, 4, ... , N

N ⇒ N+1

A: ~~0~~ 0 1 N

B

A: 1, 4, 7, 11, 21, 55, 66 ...... N

N ⇒ N+1

B = 3

Bru

5, 4, 2, 3, 6, 4, 7, 1, 2, 3

R

S

5, 4, 2 − 2 + 3

5, 4, 2

5, 4, 3

5, 3, 2

1, 2, 3

Prefix Sum

Sliding Window.

1, 2, 3, 4, 5, 6

1 3 6 10 15 21

21 20 18 15 11 6