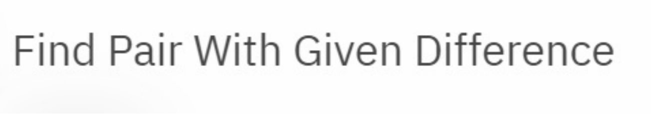
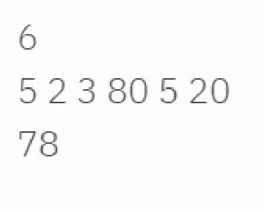


Find Pair With Given Difference

T : nlog n

S : O(1)



```
6
5 2 3 80 5 20
78
```

target = 17

5 2 3 80 5 20

↓ sort

2 3 5 5 20 80

i (under 3), j (under 20)

3 , 20

```
if (arr[j] - arr[i] == target) {
        return true;
}
else if (arr[j] - arr[i] < target) {
        j++;
}
else {
        i++;
}
```

Distinct Absolute Array Elements

-3 -3 -2 -1 0 2 2 3 4 5

T: O(n)

S: O(1)

distinct value: -3, -2, -1, 0, 2, 3, 4, 5

distinct abs values: 3, 2, 1, 0, 4, 5

ans: 6

$-\infty \quad -3 \quad -3 \quad -2 \quad -1 \quad 0 \quad 2 \quad 2 \quad 3 \quad 3 \quad 4 \quad 4 \quad 5 \quad \infty$

prev $= \cancel{-\infty} \; \cancel{-3} \; \cancel{-2} \; -1$

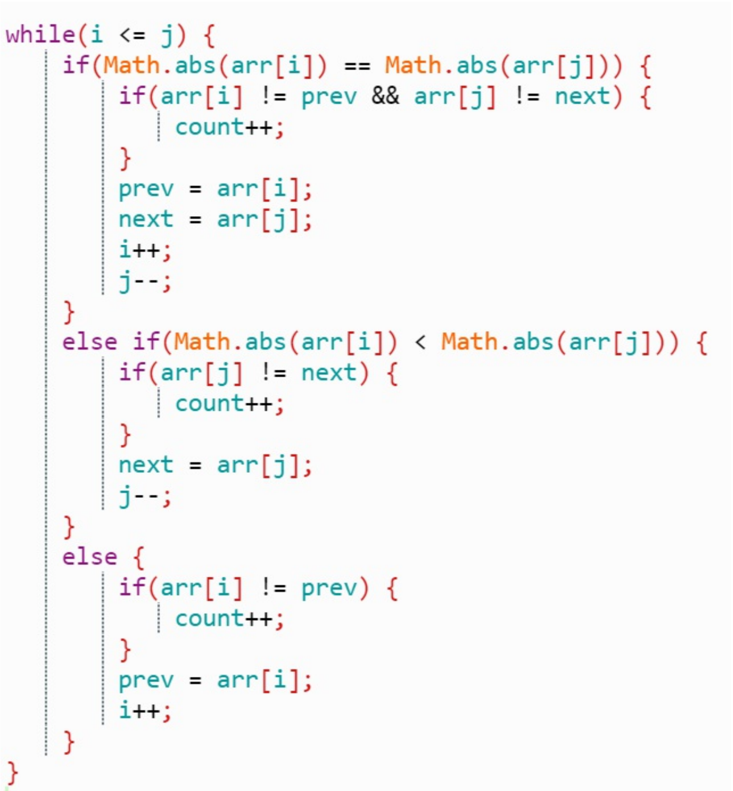
next $= \cancel{\infty} \; \cancel{5} \; \cancel{4} \; \cancel{3} \; 2$

(5) , (4), (3), (2)
(-1), (0)

$c = 1 + 1 + 1 + 1 + 1 + 1$

-3 -3 -2 -1 0 2 2 3 3 4 4 5

j i

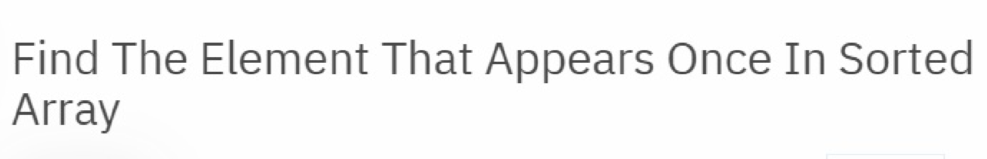


```
while(i <= j) {
    if(Math.abs(arr[i]) == Math.abs(arr[j])) {
        if(arr[i] != prev && arr[j] != next) {
            count++;
        }
        prev = arr[i];
        next = arr[j];
        i++;
        j--;
    }
    else if(Math.abs(arr[i]) < Math.abs(arr[j])) {
        if(arr[j] != next) {
            count++;
        }
        next = arr[j];
        j--;
    }
    else {
        if(arr[i] != prev) {
            count++;
        }
        prev = arr[i];
        i++;
    }
}
```

prev = ~~-∞~~ ~~-3~~ ~~-2~~ ~~-1~~ 0

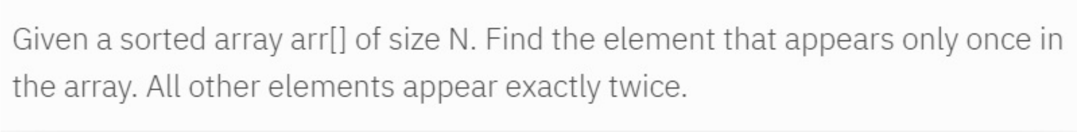
next = ~~∞~~ ~~5~~ ~~4~~ ~~3~~ ~~2~~ 0

count = 1 + 1 + 1 + 1 + 1 + 1



Find The Element That Appears Once In Sorted Array

N -> odd



Given a sorted array arr[] of size N. Find the element that appears only once in the array. All other elements appear exactly twice.

T : log N

S : O(1)

2	2	6	6	8	8	9	9	10	16	16
0	1	2	3	4	5	6	7	8	9	10
						lo		m		hi

Count Zeros Xor Pairs

1. Given an array A[] of size N.
2. Find the number of pairs (i, j) such that A[i] XOR A[j] = 0, and 1 <= i < j <= N.

$n = 12 \rightarrow$

$m = 15$

$$\begin{array}{rr} & 1100 \\ \wedge & 1111 \\ \hline & 0011 \end{array}$$

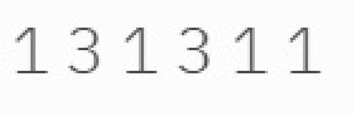
$n = m = 15$

$$\begin{array}{rr} & 1111 \\ \wedge & 1111 \\ \hline & 0000 \end{array}$$

A	B	A ^ B
0	0	0
0	1	1
1	0	1
1	1	0

if A = = B,

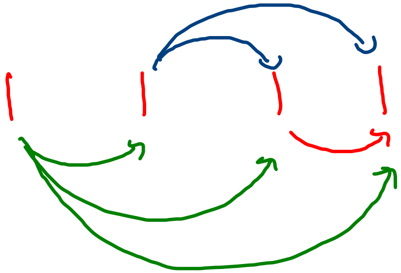
A ^ B = 0


1 3 1 3 1 1

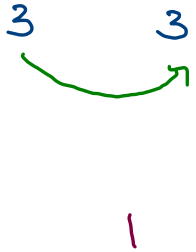
1	3	1	3	1	1
0	1	2	3	4	5

1 -> 4

3 -> 2



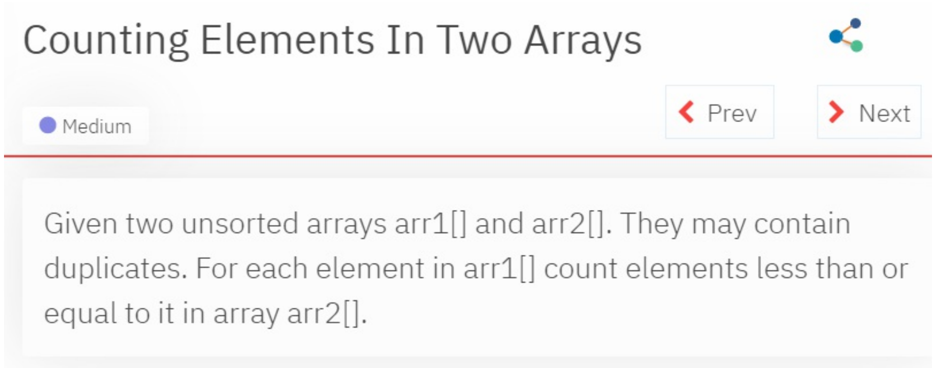
3 + 2 + 1 -> 6



<u>ele -> c</u>

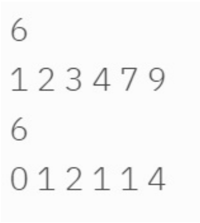
ans += sum of c-1 natural no.

ans = 6 + 1 = 7

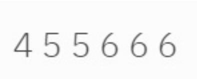


Counting Elements In Two Arrays

Given two unsorted arrays arr1[] and arr2[]. They may contain duplicates. For each element in arr1[] count elements less than or equal to it in array arr2[].



```
6
1 2 3 4 7 9
6
0 1 2 1 1 4
```



```
4 5 5 6 6 6
```

arr1	1	2	3	4	7	9
	0	1	2	3	4	5
arr2	0	1	2	1	1	4
	0	1	2	3	4	5
ans	4	5	5	6	6	6

arr1	1	2	3	4	7	9
	0	1	2	3	4	5

arr2	0	1	1	1	2	4
	0	1	2	3	4	5
				hi	lo	

$c = 3 + 1$

$val = 1$

```
if (arr[mid] <= val) {
        c += (m-lo+1)
        lo = mid+1;
}
else {
        hi = mid-1;
}
```