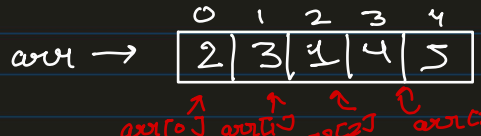
define Array

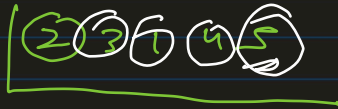
<data_type> <var_name> [<size>];

- int arr[20]
- string arr[5]
- float arr[5]

Searching in an array

```
int N = 5
int arr[N];
```

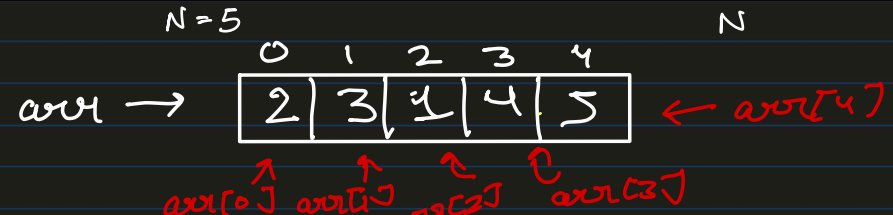




Data Insert :-

```
for(int i=0; i<N; i++) {
        cin >> arr[i];
}
```

i	arr[i]
0	arr[0]
1	arr[1]
2	arr[2]
3	arr[3]
4	arr[4]



searching

```
int x = 4;
```

```
int key = -1;
for(int i=0; i<N; i++){
    if(arr[i] == x){
        cout<<"Present at "<<i<<
        x<<endl;
        break;
    }
}
```

X = 4

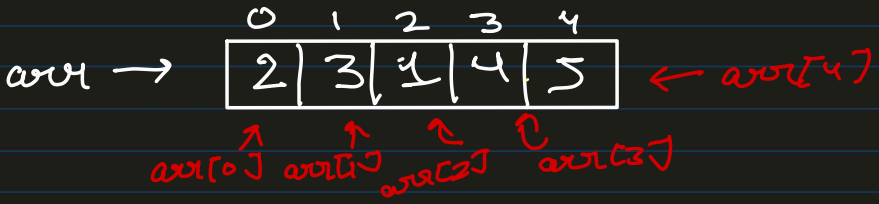
```
for (int i = 0; i < N; i++) {
    if (arr[i] == X) {
        cout << X << " is Present at " << i << endl;
        break;
    }
    else {
        cout << X << "is not present" << endl;
    }
}
```

i

X << "is not present" << endl;

N = 5

N



```
// X: element to be searched for
int search(int arr[], int N, int X)
{

    for(int i = 0; i < N; i++) {
        if(arr[i] == X) {
            return i;
        }
    }

    return -1;

}
```

X = 3 N = 4

0 1 2 3

1	2	3	4

i == -1

i = 0 1 2

To Implement Program from scratch

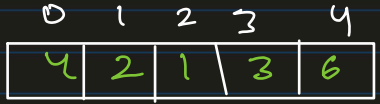
Input

Process

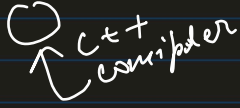
output

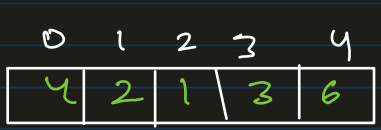
Sum of Array

Hint



$$sum = arr[0] + arr[1] + \cdots arr[4]$$

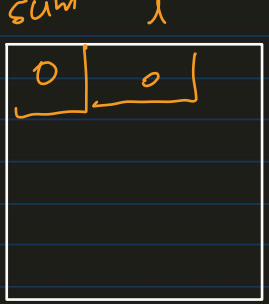




N = 5

coding Env. (usually)

left → right




```
int sum = 0;
for( i = 0; i < n; i++){
    sum = sum + arr[i]
}
```

Parhna kya ha → Memory Allocation in C++

```
{
    //block of Memory.
}
```

eg:-

```
for(int i=0; i<n; i++){
    //Block
}
if (condition) {
    //Block
}
while(cndn){
    //block
}
```

Variables defined inside a block will be destroyed from the memory when the block ends.

Maximum element in array

Or

```
int largest(vector<int> &arr, int n)
{
    int max =arr[0];
    for(int i=0;i<n;i++){
        if(max<arr[i]){
        max=arr[i];
        }

    }
    return max;
}
```

Logical operator

0 / 1

update

	0	1	2	3
arr	3	2	7	5

Dry Run

Memory

max 7

i 3

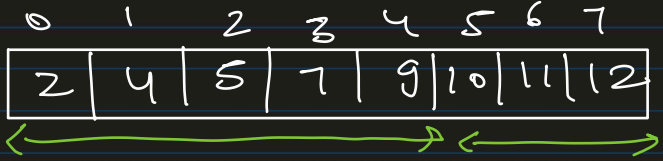
Input
* n ← size of array
* Int arr[n]

Process
* max ← arr[0]
* Find maximum

Output
* maximum element print karo

Count of smaller elements → gfg.

$x = 9$



count
0
1
2
3
4
5

```
if(x>=arr[i]){
        countt++;
}
else{
        break;
}
```

This can be used because of sorted property of array

Q Find minimum & maximum in array → gfg

int → -10^9 to 10^9

long long → -10^{18} to 10^{18}

max → largest

min → smallest

{ इनमें }

```
if (min > arr[i]){
    min = arr[i];
}
if (max < arr[i]){
    max = arr[i];
}
```

assignment operator

Utility

pair < dt , dt >

data type

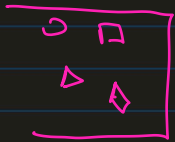
pair<int, int>

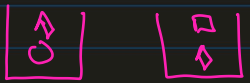
pair<string, int>

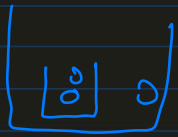
:

:

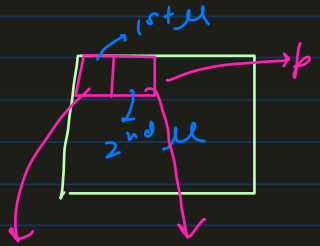
pair < pair<int,int> , int>



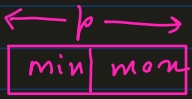




pair < ll , ll > p ;



p.first = min
p.second = max
or
p = {min, max}



Error :-

(1) Redeclaration of long long int min & max

↳ You have redefined the same variable more than once

ll → long long

Constraints:

$1 <= N <= 10^5$

$1 <= A_i <= 10^{12}$

n → size of array

int ≈ 10^5 ll ≈ 10^{18}

$1 <= arr[i] <= 10^{12}$

int ≈ 10^5 ll ≈ 10^{18}

TC - O(n) - O(10^5)

1 sec ≈ 10^8 op.

N ≈ 10^5 ~~O(10^{12})~~

This will not pass in 1 sec

```
long long min, max;
min = max = arr[0];

for (int i = 0; i < n; i++) {

    if (min > arr[i]) {
        min = arr[i];
    }

    if (max < arr[i]) {
        max = arr[i];
    }
}
```

logical 1 ∘

	0	1	2	3
arr	2	1	4	7

n = 4

i	min	max
	2	2
0	1	2
1	1	4
2	1	7
3		
4		

remember this

Print alternate elements of an array :-

loop → continue;

```
for(      ) {
    if(i%2==0){
    }
}
```

Hint → Indexing पे ध्यान दीजिए

```
int a = 4;
a = a/3;
```

Math → $\frac{4}{3} = 1.333\ldots$

Comp

float, double } decimal

int, long, long long } decimal <

a = a%3

```
3 | 4 | 1
  -3
  ---
   1
```

0%.2 = 0

```
2 | 0 | 0
  -0
  ---
   0
```

2 x 0 = 0
2 x 1 = 2

1%.2 = 1

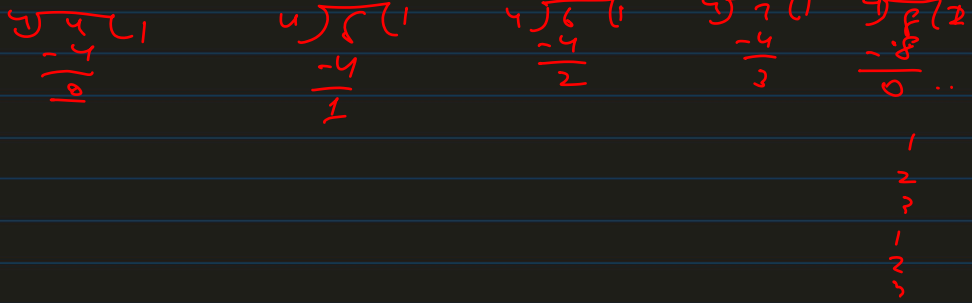
```
2 | 1 | 0
  -0
  ---
   1
```

2%.2 = 0

3%.2 = 1

⋮

$x \% n = [0 \cdots n-1]$ ★★



1 machine → website

Check if two arrays are equal or not

Check if two arrays are equal or not

Basic Accuracy: 50.0% Submissions: 63279 Points: 1

Given two arrays **A** and **B** of equal size **N**, the task is to find if given arrays are equal or not. Two arrays are said to be equal if both of them contain same set of elements, arrangements (or permutation) of elements may be different though.
Note : If there are repetitions, then counts of repeated elements must also be same for two array to be equal.

Example 1:

```
Input:
N = 5
A[] = {1,2,5,4,0}
B[] = {2,4,5,0,1}
Output: 1
Explanation: Both the array can be
rearranged to {0,1,2,4,5}
```

Example 2:

```
Input:
N = 3
A[] = {1,2,5}
B[] = {2,4,15}
Output: 0
Explanation: A[] and B[] have only
one common value.
```

Your Task:
Complete **check()** function which takes both the given array and their size as function arguments and returns **true** if the arrays are equal else **returns false**.The 0 and 1 printing is done by the driver code.

Expected Time Complexity : O(N)
Expected Auxilliary Space : O(N)

Khud Karo

Some basic keyboard operations:-

Crtl + X → Cut

crtl + V → Paste

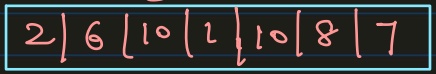
Crtl + S → Save

Crtl + Z → undo

Crtl + shift + Z → Redo

Find 2nd largest

```
int max = arr[0];
for (int i = 0; i < n; i++) {
    if (max < arr[i]) {
        max = arr[i];
    }
}

int max2 = arr[0];
for (int i = 0; i < n; i++) {

    if (max == arr[i]) {
        continue;
    }

    if (max2 < arr[i]) {
        max2 = arr[i];
    }
}

cout << max2 << endl;
```



max = 10

max2 = ~~7~~ ~~6~~ 8

i = ~~0~~ ~~1~~ 2

Why Test case are failing?

debug.

So why test cases are failing ?

0	1	2	3	4	5
10	9	8	10	1	2

max = 10

max2 = 10 → 9

i = ~~0~~ ~~1~~ ~~2~~ ~~3~~ ~~4~~ 5

```java
int max2 = arr[0];
for (int i = 0; i < n; i++) {

    if (max == arr[i]) {
        continue;
    }

    if (max2 < arr[i]) {
        max2 = arr[i];
    }
}
```

Reason = 1st index pe maximum

~~3 1 0 1 2~~ max2 = -1

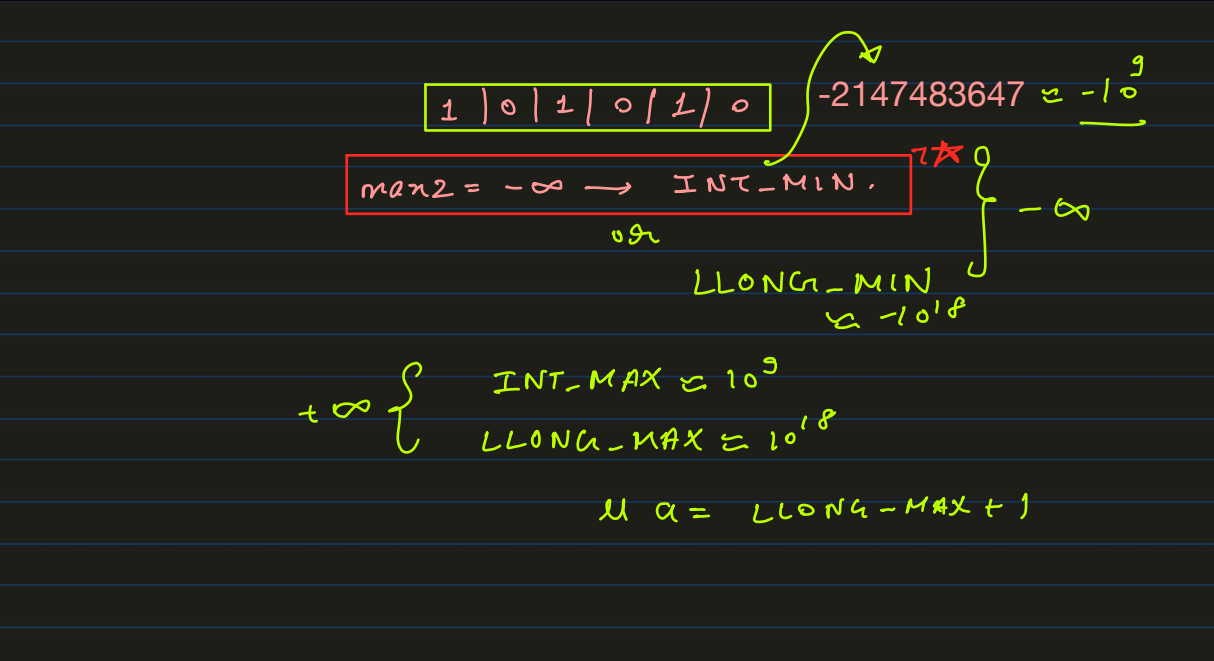
max = -1

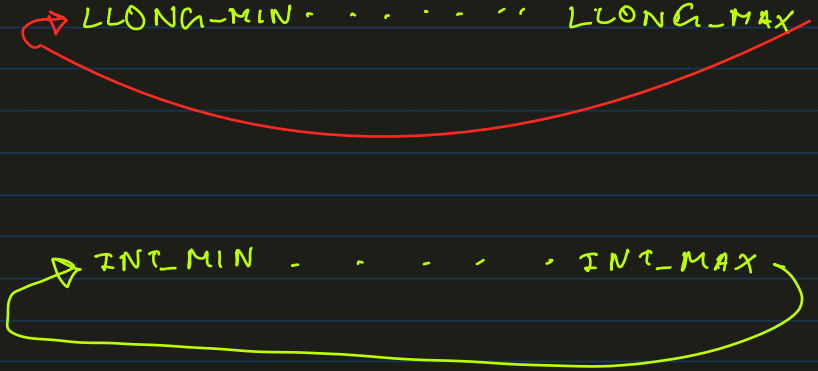
अगर हैं max2 = -1

```
for (int i = 0; i < n; i++) {

    if (max == arr[i]) {
        continue;
    }

    if (max2 < arr[i]) {
        max2 = arr[i];
    }
}
```

-1	-2	-3	-1	-2

किस Number से max2 को initialize karu?


1 | 0 | 1 | 0 | 1 | 0
-2147483647 ≃ -10^9
max2 = -∞ ⟶ INT_MIN.
or
LLONG_MIN
≃ -10^18
-∞
+∞
INT_MAX ≃ 10^9
LLONG_MAX ≃ 10^18
a = LLONG_MAX + 1


LLONG_MIN . . . . . LLONG_MAX
INT_MIN . . . . . INT_MAX

Math Question (Euler project)

If we list all the natural numbers below 10 that are multiples of 3 or 5, we get $3, 5, 6$ and 9. The sum of these multiples is 23.

Find the sum of all the multiples of 3 or 5 below N.

N = 20

N = 10

3 + 6 + 9 + 12 + 15 + 18 = 63

5 + 10 + 20 = 25

88

Hint: Arithematic Progression

$l_1, l_2 \in N$

$3 + 6 + 9 + \cdots$ (4)

$5 + 10 + 15 + \cdots$ (L2)

$L_1 = \left\lfloor \frac{N}{3} \right\rfloor \times 3$ $\quad N = 10$

3 6 9

$5 \quad 10 \quad 15 \cdots L_2$

$L_2 = \left\lfloor \frac{N}{5} \right\rfloor \times 5$

$$S_n = \frac{m}{2}(2a + (n-1)d)$$

$$S_n = \frac{n}{2}(a + l)$$

$N = 29$

5 10 15 20 25

$\frac{29}{5} = [5.8] = 5$

$5 \times 5 = 25$

$Sn = \frac{n}{2}[a + l] = \frac{\left[\frac{N}{5}\right]}{2}\left[5 + \left[\frac{N}{5}\right] \times 5\right]$

$L_1 = \lfloor \frac{N}{3} \rfloor$ 3 6 9 12 15 18 21 24 27 3 · · · L_1

$L_2 = \lfloor \frac{N}{5} \rfloor$ 5 10 15 20 25 30 · · · · L_2

$$3 \longrightarrow Sn = \frac{\lfloor \frac{N}{3} \rfloor}{2} \left[3 + 3 \lfloor \frac{N}{3} \rfloor \right]$$

$$5 \longrightarrow Sn = \lfloor \frac{N}{5} \rfloor / 2 \left[5 + 5 \lfloor \frac{N}{5} \rfloor \right]$$

$$f(n) = \lfloor N/3 \rfloor / 2 \left(3 + 3 \lfloor N/3 \rfloor \right) + \lfloor N/5 \rfloor / 2 \left(5 + 5 \lfloor N/5 \rfloor \right) - \lfloor N/15 \rfloor / 2 \left(15 + 15 \cdot \lfloor N/15 \rfloor \right)$$

https://www.hackerrank.com/
contests/projecteuler/challenges/
euler001/problem