



Beyond the Basics

ARRAYS & IT'S PROBLEMS



Always remember, beginning is the hardest part.

We go to the GYM because we are weak & we wanted to be strong. We go to Library, because we dont have knowledge & we wanted to gain some. Hence, process of discomfort is part of

Arrays:

- Why we need array
- What is array
- How array is Represent
- 3 / 4 problems

Why we need Array

siddharth

1	2	3
4	5	6
7	8	9
16		

class

$$x_1 = 10$$

$$x_4 = 60$$

$$x_2 = 30$$

$$x_5 = 70$$

$a[3]$

$$x_3 = 40$$

$$x_6 = 80$$

$a[5]$

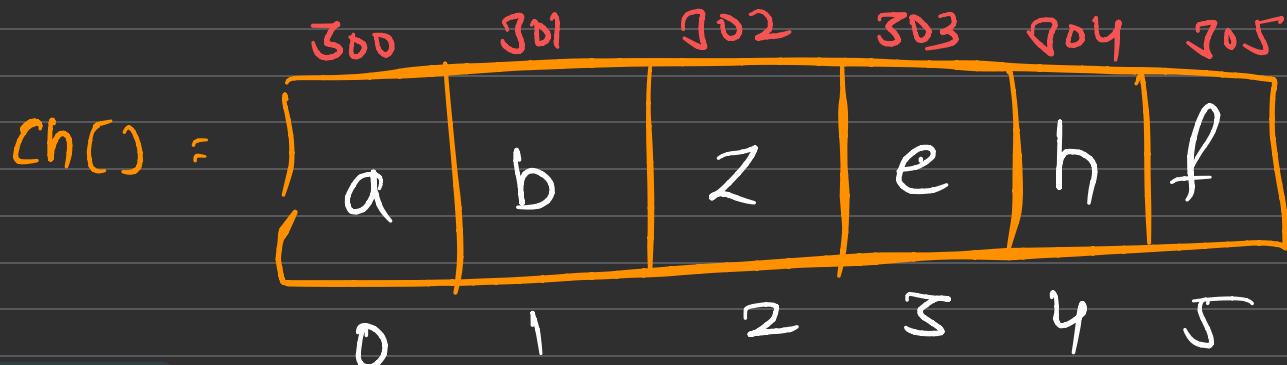
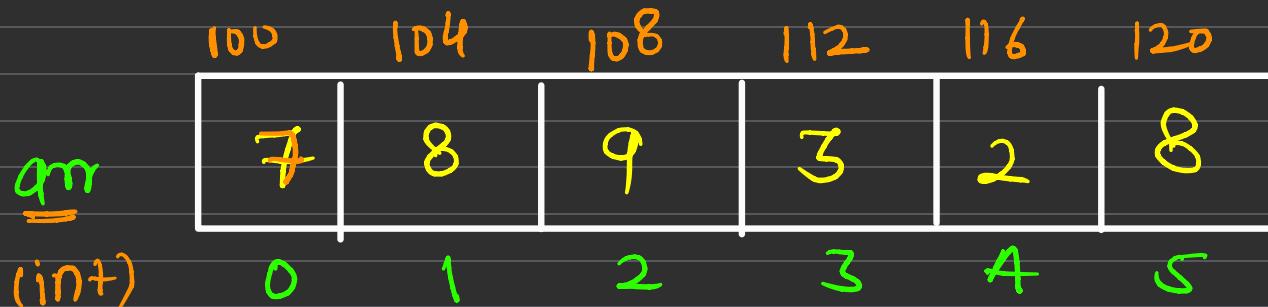
$$\underline{a} = \{x_0, x_1, x_2, x_3, x_4, x_5, x_6\}$$

- group of Element

- Similar types

,

Array: collection of elements of similar type
contiguous memory allocation.



find largest element from array ?

10	7	1	4	9	14	16	8
0	1	2	3	4	5	6	7

Sort: $O(N \cdot \log N)$

1	4	7	8	9	10	14	16
0	1	2	3	4	5	6	7

(largest)

10	7	1	4	9	14	16	8
0	1	2	3	4	5	6	7

int temp = a(0)

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

} if (a(i) > temp)

} temp = a(i)

{ }
(temp)

② find second largest element?

10	7	1	4	9	14	16	8
0	1	2	3	4	5	6	7

1	4	7	8	9	10	14	16
0	1	2	3	4	5	6	7

7	8	9	9	8	9
---	---	---	---	---	---

7	8	8	9	9	9
---	---	---	---	---	---

0 1 2 3 4 5

6	6	6	6	6	6
---	---	---	---	---	---

Second largest
(-1) ~~X~~

1	4	6	7	9	9	9	9
0	1	2	3	4	5	6	7

sort(arr)

```
for (i=N-2 ; i >= 0 : i--)
{
    if (arr[i] != arr[i+1])
        return i / arr[i]
}
return -1
```

7	7	7	7
0	1	2	3
N = 4			

$$l = 2 \times \varnothing - 1$$

* Second Smallest

10	7	1	4	9	14	16	8
0	1	2	3	4	5	6	7

1	4	7	8	9	10	14	16
0	1	2	3	4	5	6	7

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

sort (arr)

```
(for ( i=1 : i < n ; i++ )
```

```
}
```

if (arr(i) != arr(i-1))

return arr(i)

&

return -1

0	1	2	3
7	7	7	7

N = 4

i = 1 2 3 4



Beyond the Basics

ARRAY PROBLEMS



“Either you run the day or the day runs you.” —Jim Rohn

💡 Rotate Array by K position:

arr:

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

$K = 3$

0 1 2 3 4

$K = 1$

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

$K = 2$

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

$K = 3$

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

A	5	1	2	3
0	1	2	3	4
$\cancel{5}$	$\cancel{1}$	$\cancel{2}$	$\cancel{3}$	\cancel{A}

$$K = \cancel{1} \cancel{2} \cancel{3}$$

$$N = \cancel{5}$$

$$\text{temp} = a(n-1)$$

for ($i = n - 2 : i \geq 0 : i--$)

$$\text{temp} = 4$$

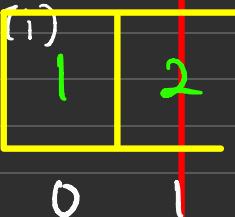
$$\Rightarrow a(i+1) = a(i)$$

$$i = \cancel{3} \cancel{2} \cancel{1} \cancel{0} - 1$$

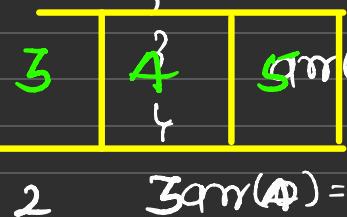
\downarrow

$$a(0) = \text{temp}$$

```
void rotate ( arr, n )
{
    int temp = arr(n-1)
    for ( i=n-2 ; i>=0 ; i-- )
    {
        arr(i+1) = arr(i)
    }
    arr(0) = temp
}
```



```
void rotate ( arr, n, K )
}
while ( K > 0 )
{
    int temp = arr(n-1)
    for ( i=n-2 ; i>=0 ; i-- )
    {
        arr(i+1) = arr(i)
    }
    arr(0) = temp
    K --
}
```



$$K = K \% N$$

~~K = K \% N~~

1	2	3	4	5
0	1	2	3	4

$$N = 5$$

$$(1 \cdot 5) = 1$$

$$K = 1$$

5 1 2 3 4

$$K = 2 = 2$$

4 5 1 2 3

$$K = 3 = 3$$

3 4 5 1 2

$$K = 4 = 4$$

2 3 4 5 1

$$K = 5 = 0$$

1 2 3 4 5

$$K = 6 = 1$$

5 1 2 3 4

$$K = 7 = 2$$

4 5 1 2 3

$$K = 8 = 3$$

3 4 5 1 2

$$K = 9 = 4$$

2 3 4 5 1

$$K = 10 = 0$$

1 2 3 4 5

$$\underbrace{(0 - N-1)}_{\text{N}}$$

$N=5$

arr:

1	2	3	4	5
0	1	2	3	4

$k=3$

$k=3$

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

$k=3$

Reversed
array

5	4	3	2	1
0	1	2	3	4

void reverse (arr, i, j)

}

while (i ≤ j)

{ swap (a(i), a(j))

i ++

j - -

y

y

① Reverse the whole array ($0 \rightarrow N-1$)
 $(0 \rightarrow k-1)$

② Reverse first k elements
 $(k \rightarrow N-1)$

③ Reverse Rem. $(N-k)$ Element

Union of two arrays :

Input: a[] = [1, 2, 3, 4, 5], b[] = [1, 2, 3, 6, 7]

Output: 1 2 3 4 5 6 7

Explanation: Distinct elements including both the arrays are: 1 2 3 4 5 6 7.

Input: a[] = [2, 2, 3, 4, 5], b[] = [1, 1, 2, 3, 4]

Output: 1 2 3 4 5

Explanation: Distinct elements including both the arrays are: 1 2 3 4 5.

Input: a[] = [1, 1, 1, 1, 1], b[] = [2, 2, 2, 2, 2]

Output: 1 2

Explanation: Distinct elements including both the arrays are: 1 2.

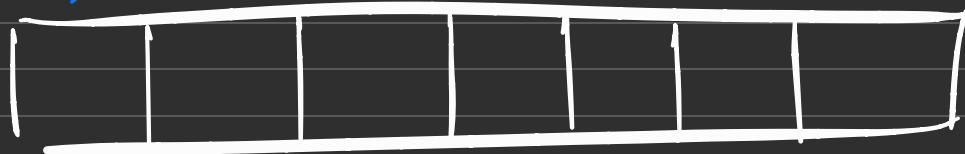
①

1	2	3	4	5
0	1	2	3	4

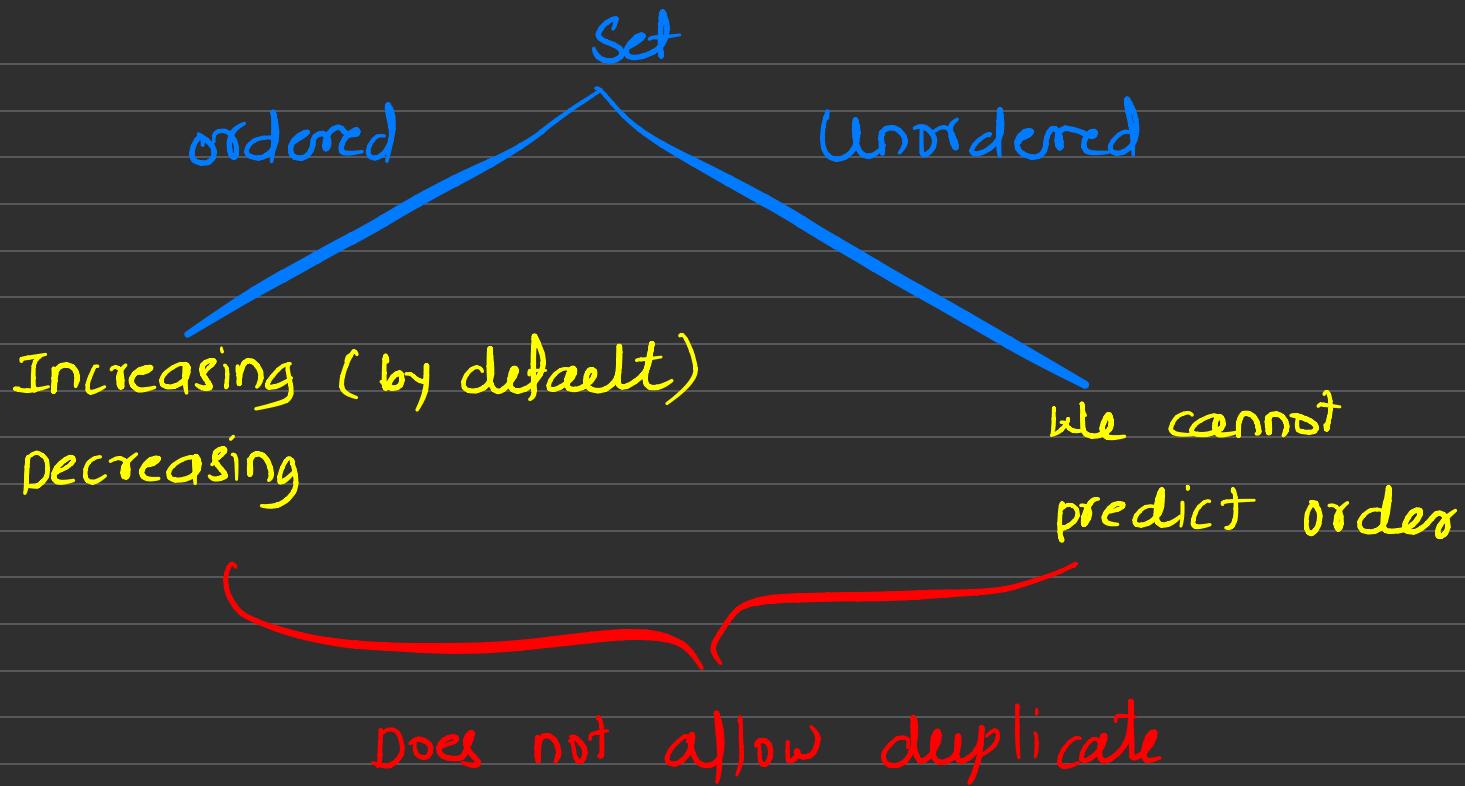
②

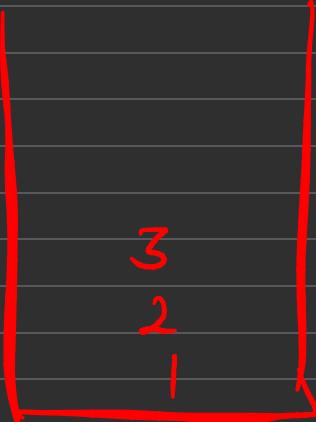
1	2	3	6	7
0	1	2	3	4

find



1	2	3	4	5	6	7
---	---	---	---	---	---	---





① 2 ① ②

Set <int> s

Set <Integer> s = new HashSet



TreeSet<>()

Sorted array

a:	<table border="1"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr></table>	1	2	3	4	7	8	9	10	0	1	2	3	4	5	6	7	$x = 5$	$N = 8$
1	2	3	4	7	8	9	10												
0	1	2	3	4	5	6	7												

b:	<table border="1"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table>	1	2	3	4	5	6	0	1	2	3	4	5	$x = 6$	$N = 6$
1	2	3	4	5	6										
0	1	2	3	4	5										

$N=6$

1	2	3	4	5	6
0	1	2	3	4	5

$x=7$

int ans = n

for ($i=0 \rightarrow n$)

} if ($a(i) == x \text{ || } a(i) > x$)

} return i

5

arr:

6	1	3	0	-2	4	3
---	---	---	---	----	---	---

$$x = 2$$

find two No. from array such that,

$$\boxed{\text{num1} + \text{num2} = x}$$

True

False

arr:

6	1	-2	0	3	4	3
---	---	----	---	---	---	---

$$x = 2$$

```
for(i=0 ; i < n ; i++)  
    }  
    for(j = i+1 ; j < n ; j++)  
        }  
        if (a(i) + a(j) == x)  
            return true  
    }  
}
```

return false

am:
$$\begin{array}{|c|c|c|c|c|c|c|} \hline + & + & + & + & + & - & = \\ \hline 6 & 1 & 3 & 0 & -2 & 4 & 3 \\ \hline \end{array} \quad x = 12$$

$$\text{num}_1 + \text{num}_2 = x$$

$$\text{num}_1 = x - \text{num}_2$$

$$2 - 6 = -4 \quad | 2 - 4 = -2$$

$$2 - 1 = 1 \quad | 2 - 3 = 9$$

$$2 - 3 = -1$$

$$2 - 0 = 2$$

$$2 - (-2) = 4$$

1
4
-2

0
3
1

6

set <int> s

for (i=0 ; i<n ; i++)
} int diff = x - a(i)

$$n_1 + n_2 = x$$

$$n_1 = x - n_2$$

if (s.find (diff)) = s.end ())
}
return true

&

s.insert (a(i))

&

