



# Cyclic Sort

# When and where to apply?



given an array  $\rightarrow$  length  $n$



1 to  $n$ , 0 to  $n$ , 0 to  $n-1$

Duplicate, missing no.

# When and where to apply?

Algorithm :

$n$ -length  $\rightarrow 0$  to  $n-1$   $\rightarrow$  each ele appearing once

$n=5$

arr =

0	1	2	3	4
4	1	2	0	3

sort  $\rightarrow O(n)$  T.C.

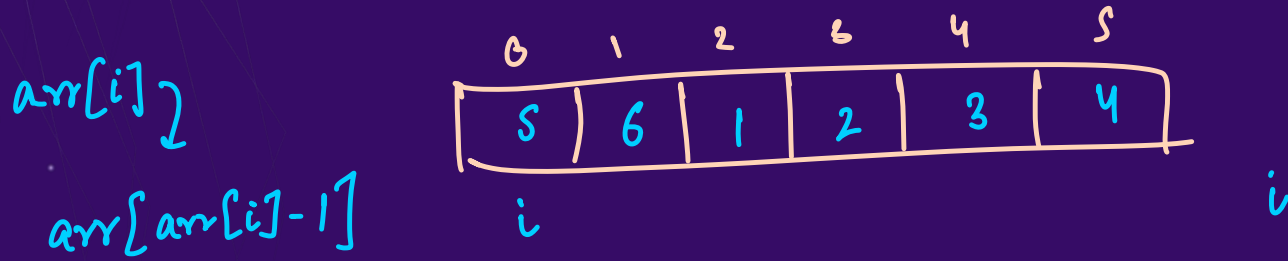
0	1	2	3	4
0	1	2	3	4

idx      i

swap(arr[i], arr[arr[i]])

idx = arr[i]

# When and where to apply?



In each swap, atleast one element gets at right place

Time Complexity  $\rightarrow O(n^2)$

**Ques:** Homework:

**Q :** What is the worst number of swaps in Cyclic sort for an length  $n$  ?

# Ques:

## Q : Missing Number

$n = 7$   
↑  
size

0 to 7 numbers are in array

array

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

3 is missing

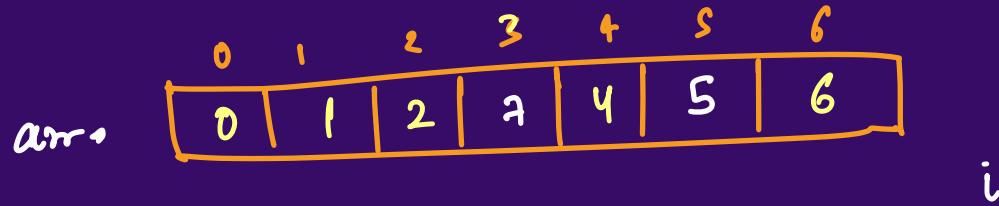
b

0	1	2	3	4	5	6	7
T	T	T	F	T	T	T	T

# Ques:

Q : Missing Number

0, n

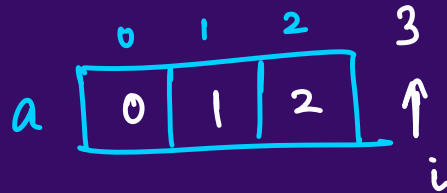
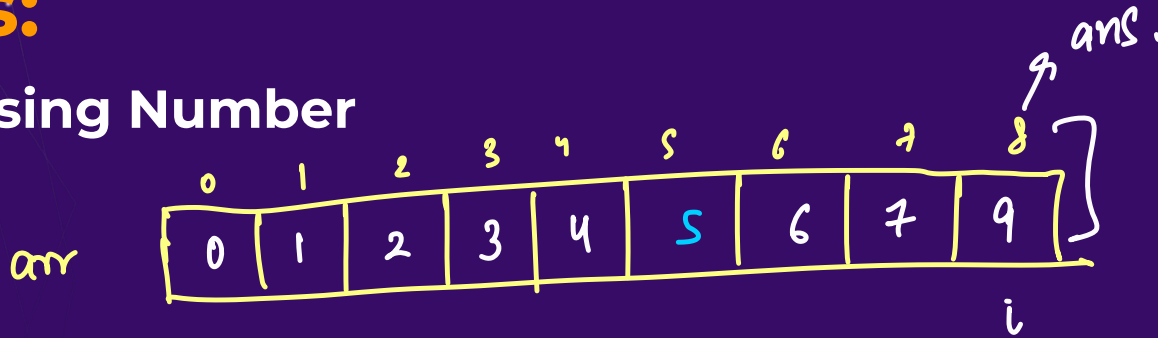


```
if (arr[i] != i) swap(i, arr[i])  
else i++
```

[Leetcode 268]

# Ques:

Q : Missing Number



missing = 3

[Leetcode 268]



# Ques:

Q: Find the duplicate number

a

0	1	2	3	4
2	1	2	3	4

a

0	1	2	3	4
3	1	3	3	4

1 to n  $\rightarrow$  some ele  $\rightarrow$  1

$\rightarrow$  1  $\rightarrow$  2 or more

array is being modified.

[Leetcode 287]

# Ques:

Q : Find all numbers disappeared in the Array



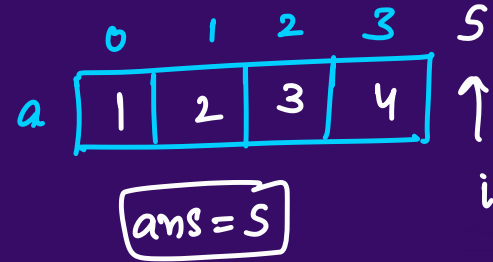
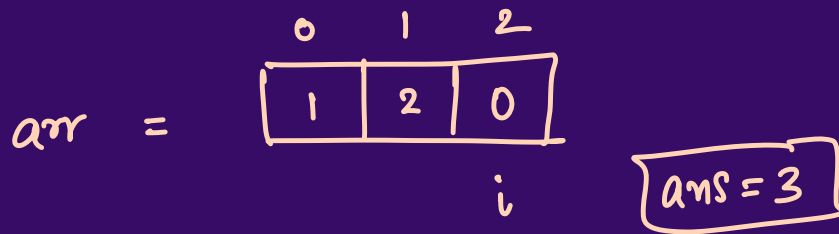
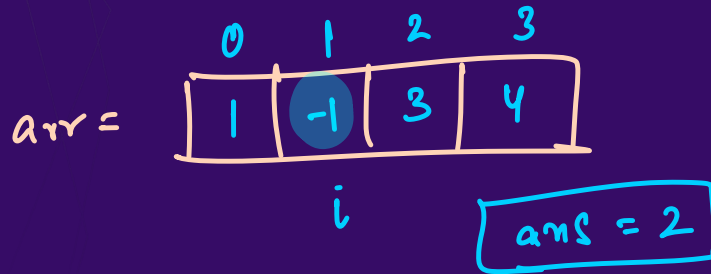
ans = { 1, 5, 6 }

[Leetcode 448]

# Ques:

Q : First missing positive

$1, 2, 3, 4, \dots, n+1$



[Leetcode 41]

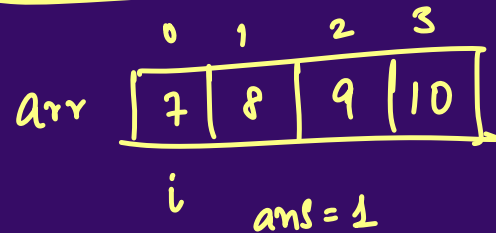
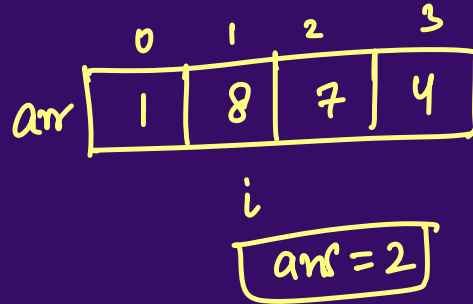
# Ques:

Q : First missing positive

$i++$  when?

- 1)  $arr[i] \leq 0$
- 2)  $arr[i] = i+1$
- 3)  $arr[i] > n$
- 4)  $arr[i] == arr[idx]$

where  $idx = arr[i]$



# Ques:

Q : First missing positive

arr =

0	1	2	3	4	5
1	2	-7	4	5	5

i → ans = 3

[Leetcode 41]

# Homework:

Q : Set mismatch



[Leetcode 645]

# Homework:



**Q : Find all duplicates in an Array**

**[Leetcode 442]**

◀ **THANK YOU** ▶