

Cyclic Sort :-

When given numbers from range 1 to N \rightarrow use cyclic sort

eg:-

0	1	2	3	4
3	5	2	1	4

Q. What is cyclic sort and how it works?

3, 5, 2, 1, 4 \rightarrow { Here the no.'s are jumbled but are from 1 to 5 }
let say $N=5$

{ When the array is sorted in that case all the numbers are going to be at their correct indices }

so, after sorting = 1, 2, 3, 4, 5 - { Here after sorting index will become value - 1 }

Index = value - 1 - { using this we gonna sort the array }

why?

Ans

Because index starts from 0

CHECK - SWAP - MOVE

Q. might be :- you have given the array find the missing & number

a. you're given no. from 1 to n. find the duplicate no.

* worst case

Eg



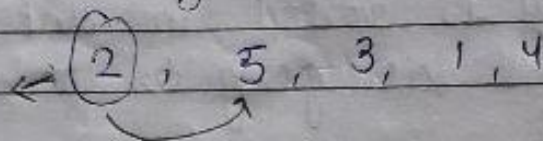
- ① - Check if 3 is at the correct index if not do $3-1=2$ (index = value - 1) the swap with correct index.

∴ 2, 5, 3, 1, 4

After swapping we know that 3 is at correct position now, but we do not know whether the other number that came at the position of 3 is correct or not. So, check again.

②

If 2 is at correct

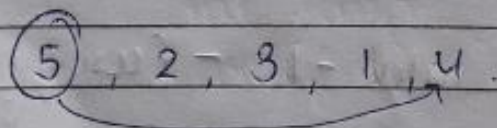


position no

it's not

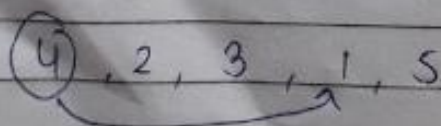
So again swap it, because it should be at index no 1. but it's at no. 0. So swap it with index

③



- Same theory as above

④



- Same

⑤

1, 2, 3, 4, 5

Now we'll check if 1 is at the correct position, if it is then move forward and so on, hence it'll be our ans.

- * We know that every unique item is only getting swapped once.
- * Here we are not incrementing i when we are swapping so that might result in more than n iterations of the loop.
- * Worst Case :- $N-1$ (swap)
 $(N-1) + N$
 $= (2N-1)$
 $\therefore O(n)$ linear.

3

2

3