

---

---

---

---

---




---

---

---

---

---



## Cyclic Sort :

<sup>0</sup> <sup>1</sup> <sup>2</sup> <sup>3</sup> <sup>4</sup>  
3, 5, 2, 1, 4

★ When given nos. from range 1, N  $\Rightarrow$  Use Cyclic sort.

V V V V V I

<sup>0</sup> <sup>1</sup> <sup>2</sup> <sup>3</sup> <sup>4</sup>  
3, 5, 2, 1, 4

N = 5

After Sorting:

<sup>0</sup> 1 2 3 4  
1, 2, 3, 4, 5

why? Because  
index val  
starts from 0.

<sup>0</sup> 1 2 3 4  
3, 5, 2, 1, 4

swap with index 2

<sup>0</sup> 1 2 3 4  
2, 5, 3, 1, 4

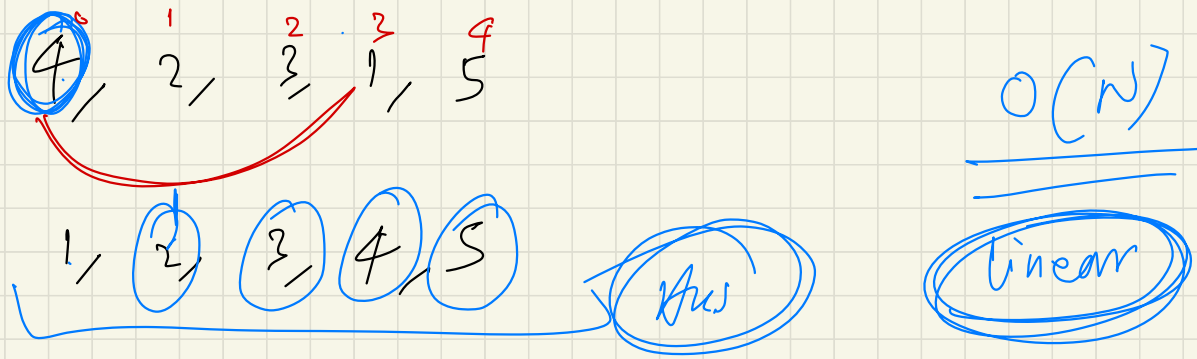
swap with index 1

<sup>0</sup> 1 2 3 4  
5, 2, 3, 1, 4

Worst case example:

4 swaps made  
+ 5 swaps made

$$= (N-1) + N$$
$$= (2N-1) \text{ swaps}$$



Q1

Nos from 0 till  $N \Rightarrow$  Total there will be  $N+1$  nos.

Ex:  $N=4$ , arr =  $[4, 0, 2, 1]$

$[0, 1, 2, 3, 4]$   $\Rightarrow$  here you can see that in sorted version,  
 element == index  
 $0, 1, 2, 3, 4$

<sup>0</sup> 4, <sup>1</sup> 0, <sup>2</sup> 2, <sup>3</sup> 1

in 1x(N) does not exist? ignore

0, 4, 2, 1

<sup>0</sup> 0, <sup>1</sup> 1, <sup>2</sup> 2, <sup>3</sup> 4

→ Answer

Answer

Case 2 : when N is not there in array!

$N=4$

arr = [1, 0, 3, 4]  $\Rightarrow$  [ <sup>0</sup> 0, <sup>1</sup> 1, <sup>2</sup> 2, <sup>3</sup> 3 ]

Ans = 4

Tips: If range  $\Rightarrow [0, N]$

★ every element will be at index = value

If range  $\Rightarrow [1, N]$

★ every element will be at index = value - 1

---

Q2 : Google

N = 8

[<sup>0</sup>4, <sup>1</sup>3, <sup>2</sup>2, <sup>3</sup>7, <sup>4</sup>8, <sup>5</sup>2, <sup>6</sup>3, <sup>7</sup>1]

<sup>0</sup>7, <sup>1</sup>3, <sup>2</sup>2, <sup>3</sup>4, <sup>4</sup>~~8~~, <sup>5</sup>2, <sup>6</sup>3, <sup>7</sup>1

<sup>0</sup>3, <sup>1</sup>3, <sup>2</sup>2, <sup>3</sup>4, <sup>4</sup>8, <sup>5</sup>2, <sup>6</sup>~~7~~, <sup>7</sup>1

<sup>0</sup>2, <sup>1</sup>3, <sup>2</sup>3, <sup>3</sup>4, <sup>4</sup>8, <sup>5</sup>2, <sup>6</sup>7, <sup>7</sup>1

<sup>0</sup>3, <sup>1</sup>2, <sup>2</sup>3, <sup>3</sup>4, <sup>4</sup>8, <sup>5</sup>2, <sup>6</sup>7, <sup>7</sup>1



3, 2, 3, 4, 1, 2, 7, 8

1, 2, 3, 4, 3, 2, 7, 8

<sup>0</sup> 1, <sup>1</sup> 2, <sup>2</sup> 3, <sup>3</sup> 4, <sup>4</sup> 3, <sup>5</sup> 2, <sup>6</sup> 7, <sup>7</sup> 8

5, 6 Ans

Q3 Amazon / Microsoft

0 1 2 3 4  
1, 3, 4, 2, 2

1, 4, 3, 2, 2

1, 2, 3, 4, 2

if element  
 $\neq$  index + 1  
2 things:

if element at  $(i-1)$   
i.e.  $(2-1 = 1)$

$\neq$  element at current  
index  $\Rightarrow$  swap

else,  
you have found the  
ans.

Q:

[<sup>0</sup>4, <sup>1</sup>3, <sup>2</sup>2, <sup>3</sup>7, <sup>4</sup>8, <sup>5</sup>2, <sup>6</sup>3, <sup>7</sup>1]

(7) 3, 2, 4, 8, 2, 3, 1

(3) 3, 2, 4, 8, 2, ~~7~~, 1

(2) 3, 3, 4, 8, 2, 7, 1

(3) (2) (3) (4) 8, 2, 7, 1

3, 2, 3, 4, 1, 2, 7, 8

1, 2, 3, 4, 3, 2, 7, 8

0 1 2 3 4 5 6 7  
1, 2, 3, 4, 3, 2, 7, 8

Ans: 2, 3

0

N=6 :

! no. is missing  
! no. is repeating

[<sup>0</sup>2, <sup>1</sup>1, <sup>2</sup>4, <sup>3</sup>2, <sup>4</sup>6, <sup>5</sup>5]

1, 2, 4, 2, 6, 5

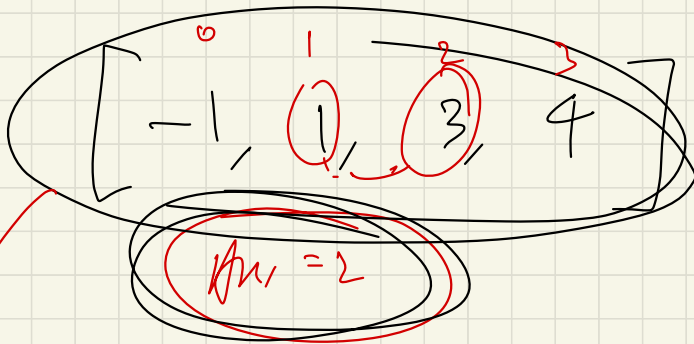
1, 2, 2, 4, 6, 5

<sup>0</sup>1, <sup>1</sup>2, <sup>2</sup>2, <sup>3</sup>4, <sup>4</sup>5, <sup>5</sup>6

(missing = index + 1  
duplicate = no. at the missing index)

Q Leftwde hand / Arrayori:

3, 4, -1, 1



Note:

Ignore -ve wzy  
the n's are asked

\* Start checking  
from 1.

$[1, 2, 0] \rightarrow$

$[0, 1, 2]$  Ans = 3

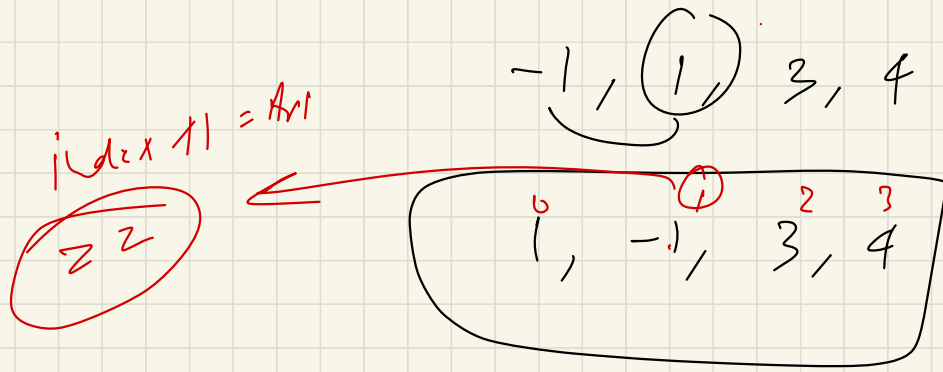
Ignore elements that are  $-ve$  and  $> N$

1  
Ans

Ans → <sup>0</sup> 7, <sup>1</sup> 8, <sup>2</sup> 9, <sup>3</sup> 11, <sup>4</sup> 12

[ <sup>0</sup> 3, <sup>1</sup> 4, <sup>2</sup> -1, <sup>3</sup> ~~1~~ ]

-1, 4, 3, 1



$$[3, 4, 2, 1] \Rightarrow [1, 2, 3, 4]$$

$N+1 = 5$