AXSOS ACADEMY

Problem-Solving Patterns
Find the Missing Numbers

Outline

- Introduce the topic to the academy team including Idea, Problem statement, and solution. **(15 Minutes)**
- Practice a challenge with the team. **(15 Minutes)**
- Take feedback from the team and update later the slides and confluence accordingly. **(10 Minutes)**
- Team to evaluate the session. **(5 Minutes)**

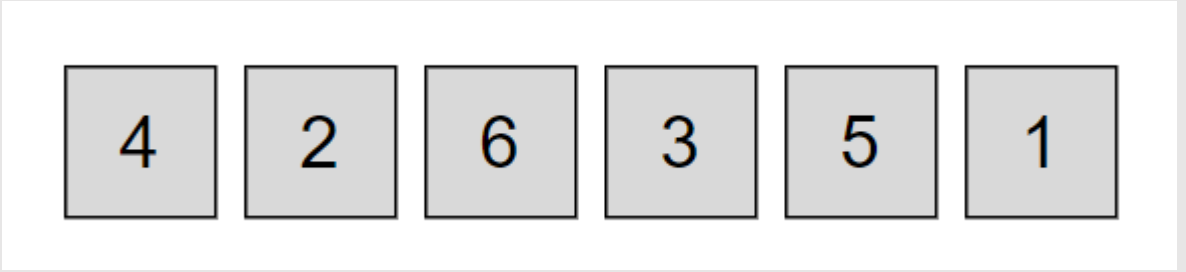
- **Total time: 45 Minutes**

What is a Cyclic sort pattern?

- Cyclic sort is used for coding problems that involve arrays of numbers with a given range (from 1 to n).
- What do we mean by arrays with a given range??
- Include only the element from the given range.

What is a Cyclic sort pattern?

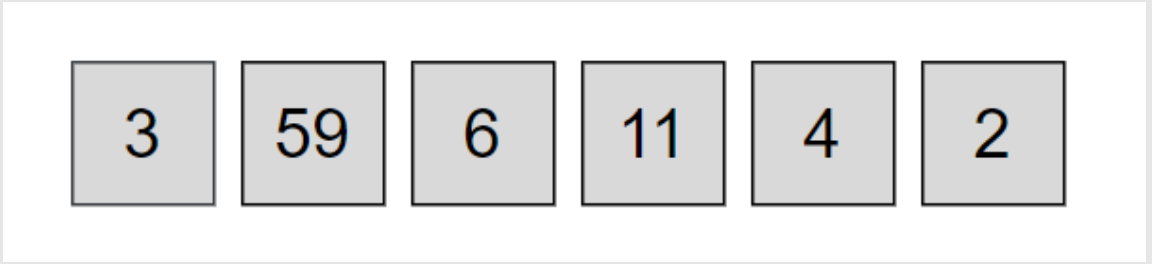
- **Example:** An array with a given range from 1 to 6.
- Unsorted array within a given range from 1 to 6.



What is a Cyclic sort pattern?

- Sorted array within a given range from 1 to 6.

- Unsorted array without a given range from 1 to 6.



Problem Statement

- Given an unsorted array containing numbers taken from the range 1 to ‘n’. The array can have duplicates, which means some numbers will be missing. Find all those missing numbers.

Solution

- Brute-Force solution indicates iterating two for loops.
- **B-F Time complexity:** $O(N^2)$ Not accepted!

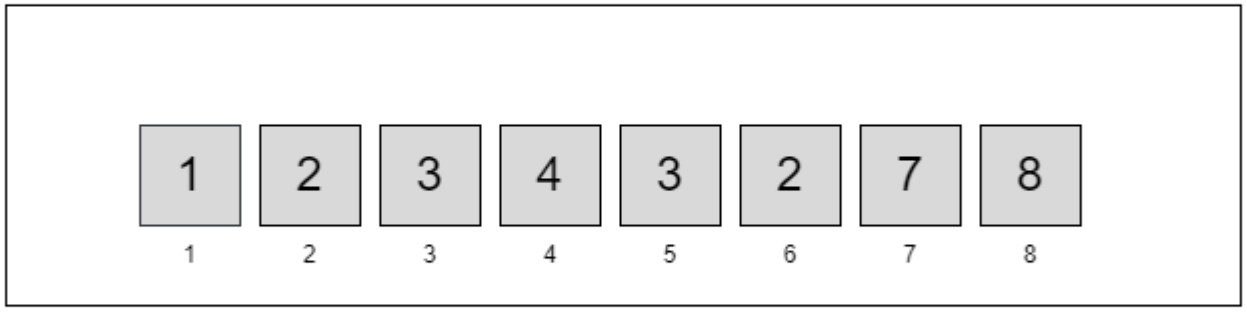
- *Do we have a better solution??*

Solution

- Let’s check the below-recommended solution.
- What if we apply the cyclic sort that we started with in the previous session?
- After that we iterate the array and check if the value equal index + 1 (because it started from 1 to n)

Solution

- Example: [4, 3, 2, 7, 8, 2, 3, 1]



Solution code

```
function cyclic_sort(arr){
    let i = 0
    var count = 0;
    while ( i < arr.length){
        var newspot = arr[i] - 1;
        if ( arr[i] !== arr[newspot]){
            var newvalue = arr[i];
            arr[i] = arr[newspot]
            arr[newspot] = newvalue;
            count++;
            console.log(count)
        }else{
            i++;
            count++;
            console.log(count)
        }
    }
    missingNumbers = []

    for ( i  = 0 ; i < arr.length ; i++){
        if ( arr[i] !== i+1){
            missingNumbers.push(i+1);
        }
    }

    console.log("Final "+count)
    return missingNumbers;
}
```

Time & Space complexity

- **Time complexity:** *O(N)*

- **Space complexity:** *O(1)*

Team Practice

- **Let’s go to the below link:**
- https://leetcode.com/problems/find-all-numbers-disappeared-in-an-array/description/

- ***Time to solve is 15 minutes.***

Feedback


OPINION
IDEA
SURVEY
RESULT
FEEDBACK
COMMENT
ADVICE
RATING
RESPONSE

Evaluation

- **Let us evaluate this session by filling out the survey.**
- https://forms.office.com/e/nYjZHFtsPV
- **The aim of the evaluation is to enhance the content.**

Problem Solving Pattern Session evaluation

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