# WORKSHEET 5

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**Semester: 6th** **Date of Performance: 24/02/2025**

**Subject Name: AP-II** **Subject Code:22CP_351**

1. **Aim**:- Write a program for Sorting and searching, which are fundamental concepts in computer science
2. **Source Code:-**

**88. Merge Sorted Array:--**

**CODE:---**

```
import java.util.Arrays;

public class Solution {
    public void merge(int[] nums1, int m, int[] nums2, int n) {
        // Pointers for nums1, nums2, and the end of merged array
        int p1 = m - 1;       // Last element in nums1 (excluding zeros)
        int p2 = n - 1;       // Last element in nums2
        int p = m + n - 1;    // Last position in nums1 (including zeros)

        // Merge from the back to avoid overwriting values in nums1
        while (p1 >= 0 && p2 >= 0) {
            if (nums1[p1] > nums2[p2]) {
                nums1[p] = nums1[p1];  // Place larger value at the end
                p1--;
            } else {
                nums1[p] = nums2[p2];
                p2--;
            }
            p--;
        }

        // If any elements are left in nums2, copy them
        while (p2 >= 0) {
            nums1[p] = nums2[p2];
            p2--;
            p--;
        }
    }

    public static void main(String[] args) {
        Solution solution = new Solution();

        // Example input
        int[] nums1 = {1, 2, 3, 0, 0, 0};
        int m = 3;
        int[] nums2 = {2, 5, 6};
        int n = 3;

        System.out.println("Original nums1: " + Arrays.toString(nums1));
        solution.merge(nums1, m, nums2, n);
        System.out.println("Merged Array: " + Arrays.toString(nums1));
    }
}
```

**347. Top K Frequent Elements:--**

**Code:--**

```
import java.util.*;

public class Solution {
    public int[] topKFrequent(int[] nums, int k) {
        // Frequency map to count occurrences of each element
        Map<Integer, Integer> freqMap = new HashMap<>();
        for (int num : nums) {
            freqMap.put(num, freqMap.getOrDefault(num, 0) + 1);
        }

        // Priority queue (min-heap) based on frequency
        PriorityQueue<Integer> minHeap = new PriorityQueue<>((a, b) ->
freqMap.get(a) - freqMap.get(b));

        // Add elements to the heap and maintain its size as k
        for (int num : freqMap.keySet()) {
            minHeap.add(num);
            if (minHeap.size() > k) {
                minHeap.poll(); // Remove least frequent element
            }
        }

        // Prepare result array
        int[] result = new int[k];
        int index = 0;
        while (!minHeap.isEmpty()) {
            result[index++] = minHeap.poll();
        }

        return result;
    }

    public static void main(String[] args) {
        Solution solution = new Solution();

        int[] nums1 = {1, 1, 1, 2, 2, 3};
        int k1 = 2;
        System.out.println("Output for Example 1: " +
Arrays.toString(solution.topKFrequent(nums1, k1))); // Output: [1, 2]

        int[] nums2 = {1};
        int k2 = 1;
        System.out.println("Output for Example 2: " +
Arrays.toString(solution.topKFrequent(nums2, k2))); // Output: [1]
    }
}
```

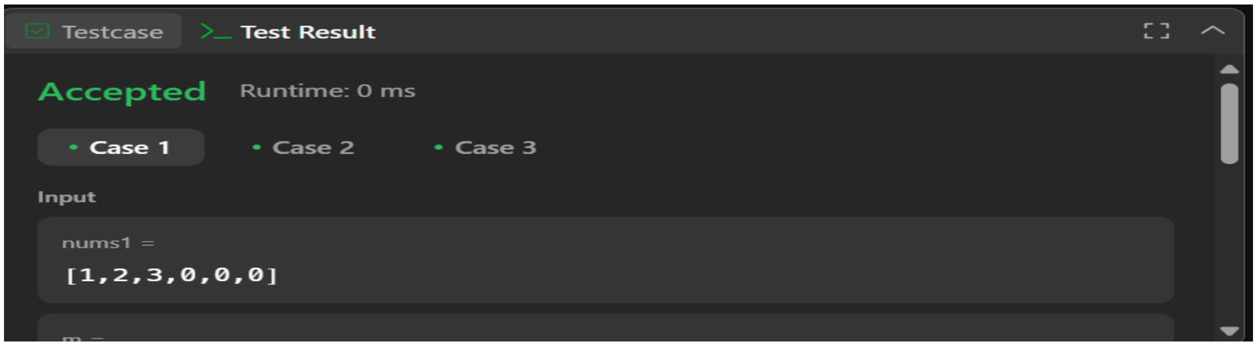
56. Merge Intervals:---

Code:--

```
import java.util.*;

public class Solution {
    public int[][] merge(int[][] intervals) {
        if (intervals.length <= 1) {
            return intervals;
        }

        // Sort intervals based on the start time
        Arrays.sort(intervals, (a, b) -> Integer.compare(a[0], b[0]));

        List<int[]> merged = new ArrayList<>();

        // Initialize the first interval
        int[] current = intervals[0];
        merged.add(current);

        // Iterate through intervals
        for (int[] interval : intervals) {
            if (interval[0] <= current[1]) {
                // Overlapping intervals, merge them
                current[1] = Math.max(current[1], interval[1]);
            } else {
                // No overlap, move to the next interval
                current = interval;
                merged.add(current);
            }
        }

        // Convert list to array
        return merged.toArray(new int[merged.size()][]);
    }

    public static void main(String[] args) {
        Solution solution = new Solution();

        int[][] intervals1 = {{1, 3}, {2, 6}, {8, 10}, {15, 18}};
        System.out.println("Output for Example 1: " +
Arrays.deepToString(solution.merge(intervals1)));
        // Output: [[1,6],[8,10],[15,18]]

        int[][] intervals2 = {{1, 4}, {4, 5}};
        System.out.println("Output for Example 2: " +
Arrays.deepToString(solution.merge(intervals2)));
        // Output: [[1,5]]
    }
}
```

2. **Screenshot of Outputs:**

**88. Merge Sorted Array:--**



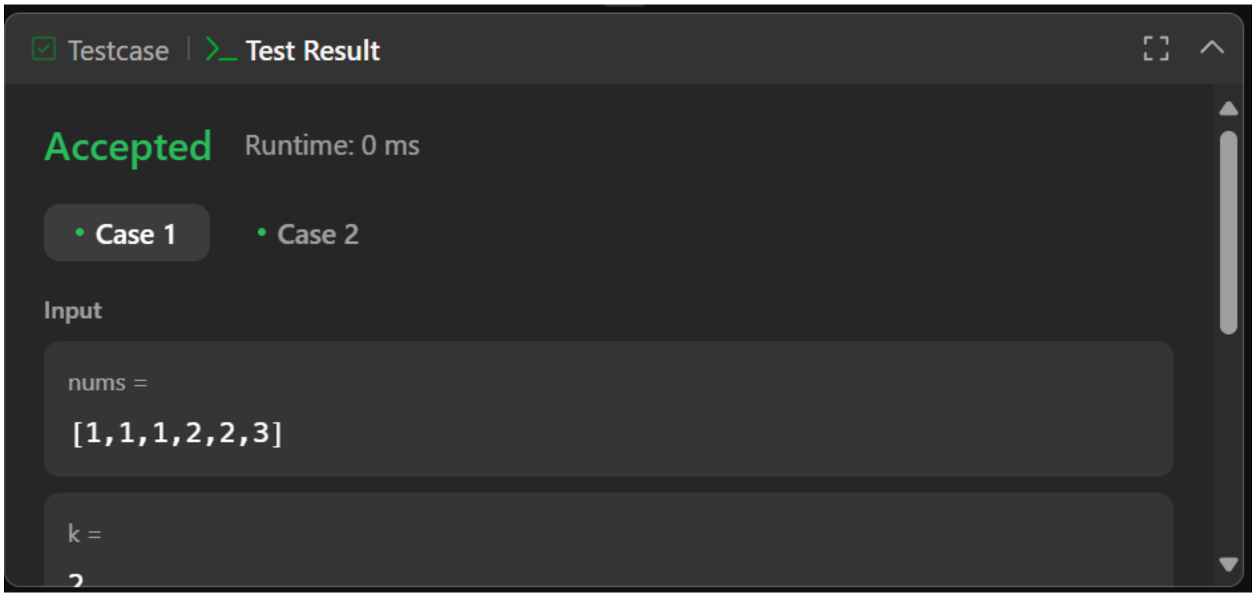
Accepted Runtime: 0 ms

Case 1 Case 2 Case 3

Input

```
nums1 =
[1,2,3,0,0,0]
```

## 347. Top K Frequent Elements:--


Testcase | Test Result

Accepted Runtime: 0 ms

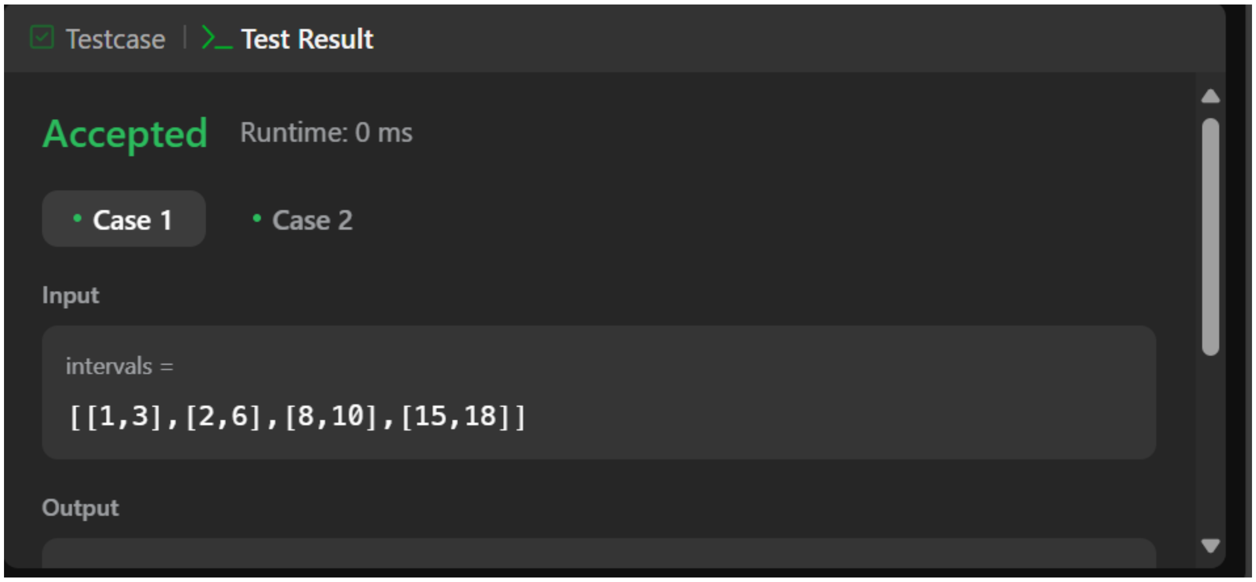
• Case 1 • Case 2

Input

nums =
```
[1,1,1,2,2,3]
```

k =
```
2
```

## 56. Merge Intervals:---


Testcase | Test Result

Accepted Runtime: 0 ms

• Case 1 • Case 2

Input

intervals =
```
[[1,3],[2,6],[8,10],[15,18]]
```

Output