PSG COLLEGE OF TECHNOLOGY, COIMBATORE -641004
DEPARTMENT OF COMPUTER APPLICATIONS
I SEMESTER MCA
23MX16 C PROGRAMMING LABORATORY
PROBLEM SHEET 6
ARRAYS- CASE STUDY BASED QUESTIONS

1. You work for a logistics company that manages a large warehouse. The warehouse has different sections where items are stored. Each section is represented by an array of item IDs, and each ID represents a unique item. Your manager has asked you to perform the following tasks to reorganize the warehouse:

1. **Consolidate Sections:** Merge multiple sections into a single list of item IDs.
2. **Remove Duplicates:** Ensure that each item ID appears only once in the final list.
3. **Sort Items:** Sort the item IDs in ascending order.

Sample Input
Section 1: [101, 102, 103, 101]
Section 2: [103, 104, 105]
Section 3: [106, 107, 102]
Sample output
[101, 102, 103, 104, 105, 106, 107]

2. You are designing an advent calendar for a holiday event. The calendar has multiple doors, each with a number representing the day of the month. Each day, a gift is revealed, and you need to track the days when a specific type of gift is revealed. Your tasks are:

1. **Find Days:** Given an array representing the days of the month when gifts were revealed, find all days where a specific type of gift was revealed.
2. **Count Occurrences:** Count how many times each type of gift was revealed.

Sample Input
Days: [1, 5, 7, 5, 10, 15, 5]
Gift Type to Find: 5
Sample output
Days with Gift Type 5: [5, 5, 5]
Occurrences: 3

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3. As a teacher, you need to manage the grades of your students. Each student's grades are stored in a list, and you need to perform the following operations:

1. **Calculate Average Grade:** Find the average grade of a student.
2. **Find Highest Grade:** Determine the highest grade among all students.
3. **Sort Grades:** Sort the grades of each student in ascending order.

Sample Input

Student Grades: [85, 92, 88, 76, 95]

Sample output

Average Grade: 87.2
Highest Grade: 95
Sorted Grades: [76, 85, 88, 92, 95]

4. Sam is responsible for managing the attendance records of an event. Each day's attendance is recorded in an array. Write a program that will help him in performing the following tasks:

1. **Find the Maximum Attendance:** Determine the highest attendance recorded.
2. **Find the Day with Minimum Attendance:** Identify the day with the lowest attendance.
3. **Calculate the Average Attendance:** Compute the average attendance over all days.

Sample Input
Input: [120, 150, 100, 175, 130, 160, 140]

Sample output
Maximum Attendance: 175
Minimum Attendance: 100
Average Attendance: 141.43

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5. You are analyzing scores from a video game competition. The scores for each player are recorded in an array. You need to:

1. **Determine the Top Scorer:** Find the player with the highest score.
2. **Calculate the Number of Players above a Threshold:** Count how many players scored above a certain threshold.
3. **Sort Scores in Ascending Order:** Sort the scores to see them in order.

Sample Input
Input: [85, 92, 78, 96, 88, 75], Threshold: 80
Sample output
Top Scorer's Score: 96
Number of Players Above 80: 4
Sorted Scores: 75 78 85 88 92 96

6. Given an array of integers ***'ARR'*** of size ***'N'***. Replace each element of this array with its corresponding rank and return the array.

The rank of an element is an integer between 1 to 'N' inclusive that represents how large the element is in comparison to other elements of the array. The following rules can also define the rank of an element:

1. It is an integer starting from 1.

2. The larger the element, the larger the rank. If two elements are equal, their rank must be the same.

Sample Input 1

4
4, 7, 2, 90

Sample Output 1

2, 3, 1, 4

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Sample Input 2 :

2
4 1

Sample Output 2:

2 1

7. You are given an array/list 'prices' where the elements of the array represent the prices of the stock as they were yesterday and indices of the array represent minutes. Your task is to find and return the maximum profit you can make by buying and selling the stock. You can buy and sell the stock only once.
Note:

You can’t sell without buying first.

For Example:

For the given array [2, 100, 150, 120],
The maximum profit can be achieved by buying the stock at minute 0 when its price is Rs. 2 and selling it at minute 2 when its price is Rs. 150.
So, the output will be 148.

Sample Input 1:

4
1 2 3 4

Sample Output 1:

3

Sample Input 1:

4
2 2 2 2

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Sample Output 1:

0

8. You are part of an adventurous expedition team that has just returned from a lost city exploration. During your journey, you collected various artifacts, each represented by an integer value denoting its importance. However, your team accidentally mixed up the artifacts. You need to sort the artifacts, find certain interesting statistics, and identify any special patterns.

Note:

Here's what you need to do:

1. **Sort the Artifacts**: Sort the array of artifact values in non-decreasing order.
2. **Find the Most Common Artifact**: Determine which artifact value appears most frequently. If there's a tie, choose the smallest value among the most frequent ones.
3. **Identify the Missing Values**: Find out which integer values are missing from the sequence between the smallest and largest artifact values.
4. **Calculate the Sum of All Unique Artifacts**: Compute the sum of all unique artifact values.

Sample Input 1

Input Array: 12, 7, 5, 12, 6, 7, 9, 5, 15

Sample Output 1

Sorted Artifacts: {5, 5, 6, 7, 7, 9, 12, 12, 15}

Most Common Artifact: 5 (appears twice, same as 7, but 5 is smaller)

Missing Values: 8, 10, 11, 13, 14

Sum of Unique Artifacts: 5 + 6 + 7 + 9 + 12 + 15 = 54

Sample Input 2

Input Array: {3, 3, 3, 4, 5, 5, 6, 6, 7}

Sample Output 2

Sorted Artifacts: {3, 3, 3, 4, 5, 5, 6, 6, 7}

Most Common Artifact: 3 (appears three times)

Missing Values: 2

Sum of Unique Artifacts: 3 + 4 + 5 + 6 + 7 = 25

Deadline: 25.09.2025