Assignment: Array-Based Problems

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Question 1: Frequency of Each Number

Problem Statement:
Given an array **A** of size **N** containing numbers from **1 to N**, find the frequency of each number in the array.

Input Format:
- First line contains an integer **N** (1 <= N <= 10^6), the size of the array.
- Second line contains **N** integers **a[i]** (1 <= a[i] <= N).

Output Format:
- Print the frequency of each number from **1 to N**.

Example:
Input:
5
1 3 2 1 4

Output:
1: 2
2: 1
3: 1
4: 1
5: 0

Question 2: Count Distinct Numbers

Problem Statement:
Given an array **A** of size **N**, find how many distinct numbers are present in the array.

Input Format:
- First line contains an integer **N** (1 <= N <= 10^6), the size of the array.
- Second line contains **N** integers **A[i]** (1 <= A[i] <= 10^6).

Output Format:
- Print a single integer representing the number of distinct elements in the array.

Example:
Input:

5
1 2 1 3 1

Output:
3

Question 3: Find Maximum Element

Problem Statement:
Find the maximum element in a given array of integers.

Input Format:
- First line contains an integer **N** (1 <= N <= 100), the size of the array.
- Second line contains **N** integers **ar[i]** (-10^9 <= ar[i] <= 10^9).

Output Format:
- Print the maximum element of the given array.

Example:
Input:
5
-2 -19 8 15 4

Output:
15

Question 4: Sum of Odd Elements

Problem Statement:
Print the sum of all odd elements in an array.

Input Format:
- First line contains an integer **N** (1 <= N <= 100), the size of the array.
- Second line contains **N** integers **ar[i]** (-10^9 <= ar[i] <= 10^9).

Output Format:
- Print the sum of all odd elements in the array.

Example:
Input:
5

6 9 8 4 3

Output:
12

Question 5: Find Duplicate Element

Problem Statement:
Find a duplicate element in the given array of integers. There will be only a single duplicate element in the array.
Note: Do not use any inbuilt functions/libraries for your main logic.

Input Format:
- First line contains an integer **N** (2 <= N <= 100), the size of the array.
- Second line contains **N** integers **ar[i]** (0 <= ar[i] <= 10^9).

Output Format:
- Print the duplicate element from the given array.

Example:
Input:
6
5 4 10 9 21 10

Output:
10

Instructions:
1. Solve each problem using arrays in a programming language of your choice.
2. Ensure that the programs correctly handle edge cases.
3. Submit your solution along with test cases verifying different inputs.
4. Maintain proper code indentation and readability.