Indian Institute of Information Technology, Design & Manufacturing, Kurnool (IIITDMK)

Department of Computer Science and Engineering

Machine Learning Practice -JULY- NOV 2025 (S5-B.Tech CSE)

Assignment 0

Last date for submitting: 30/07/2025 18:00 Hrs

Naming Conventions for Submission

Submit a single ZIP (.zip) file (do not submit in any other archived formats like .rar or .tar.gz).

The name of this file must be ASSG<NUMBER>_<ROLLNO>_<FIRSTNAME>.zip. (eg:

ASSG1_118cs0006_LAXMAN.zip). DO NOT add any other files (like temporary files,

inputfiles, etc.) except your source code, into the zip archive. The source codes must be named

as ASSG<NUMBER>_<ROLLNO>_<FIRSTNAME>_<PROGRAM-NO>.<extension>. (For

example: ASSG1_118cs0006_LAXMAN_1.py). If there are multiple parts for a particular

question, then name the source files for each part separately as in

ASSG1_118cs0006_LAXMAN_1b.py.

If you do not conform to the above naming conventions, your submission might not be

recognized by some automated tools, and hence will lead to a score of 0 for the submission. So,

make sure that you follow the naming conventions.

1. Problem Statement:
You are given two sets of integers. Perform the union operation and print the total number of distinct elements in the combined set.

Input Format:
The first line contains an integer n, the number of elements in the first set.
The second line contains n space-separated integers.
The third line contains an integer m, the number of elements in the second set.
The fourth line contains m space-separated integers.

Constraints:
0 ≤ n, m ≤ 1000
All integers are between 1 and 10^4

Output Format:
Print a single integer: the total number of elements in the union of both sets.

Sample Input:
4
1 2 3 4
3
3 4 5

Sample Output:
5

Set Intersection Count

2.Problem Statement:
You are given two sets of strings. Write a program to compute the number of common elements between them.

Input Format:
The first line contains an integer n, the number of elements in the first set.
The next n lines contain one string each.
The following line contains an integer m, the number of elements in the second set.
The next m lines contain one string each.

Constraints:
0 ≤ n, m ≤ 1000
Each string contains only lowercase letters and is at most 20 characters long

Output Format:
Print the number of common elements between the two sets.

Sample Input:
3
apple
banana

mango
2
banana
grape

Sample Output:
1

Set Symmetric Difference

3.Problem Statement:
Given two sets of integers, print the elements that are in either of the sets but not both (i.e., the symmetric difference). Print the elements in ascending order, one per line.

Input Format:
The first line contains an integer n, followed by n space-separated integers.
The second line contains an integer m, followed by m space-separated integers.

Constraints:
$0 \leq n, m \leq 1000$
All integers are distinct and between 1 and 10^4

Output Format:
Print the symmetric difference elements in ascending order, one per line.

Sample Input:
4 2 4 6 8
3 2 5 7

Sample Output:
4
5
6
7
8

Check Subset

4.Problem Statement:
You are given two sets A and B. Determine whether A is a subset of B.

Input Format:
The first line contains an integer n, the size of set A.
The next line contains n space-separated integers of set A.
The next line contains an integer m, the size of set B.
The final line contains m space-separated integers of set B.

Constraints:
0 ≤ n, m ≤ 1000
All integers are between 1 and 10^4

Output Format:
Print 'True' if A is a subset of B, otherwise print 'False'.

Sample Input:
3
1 2 3
5
1 2 3 4 5

Sample Output:
True

Set Difference

5.Problem Statement:
You are given two sets of integers A and B. Print all elements of A that are not in B in ascending order.

Input Format:
The first line contains an integer n, followed by n space-separated integers of set A.
The second line contains an integer m, followed by m space-separated integers of set B.

Constraints:
0 ≤ n, m ≤ 1000
All integers are between 1 and 10^4

Output Format:
Print the difference A - B in ascending order, one element per line.

Sample Input:
5 1 2 3 4 5
3 2 4 6

Sample Output:
1
3
5

NumPy Coding Problems

1. Array Manipulation with NumPy

Problem Statement:
Given an array of integers, double all even numbers and halve all odd numbers using NumPy. Print the resulting array.

Input Format:
The first line contains an integer `n`, followed by `n` space-separated integers representing the array.

Constraints:
1 ≤ n ≤ 1000
Each integer x: $1 \leq x \leq 10^4$

Output Format:
Print the transformed array as a space-separated list of integers.

Sample Input:
5 2 3 4 5 6

Sample Output:
4 1 8 2 12

2. Matrix Diagonal Sum using NumPy

Problem Statement:
You are given a square matrix. Calculate the absolute difference between the sums of its diagonals using NumPy.

Input Format:
First line: integer `n`, the size of the matrix (n x n)
Next n lines: each containing `n` space-separated integers

Constraints:
1 ≤ n ≤ 100
$-10^4 \leq$ matrix[i][j] $\leq 10^4$

Output Format:
Print the absolute diagonal difference as a single integer.

Sample Input:
3
11 2 4
4 5 6
10 8 -12

Sample Output:
15

3. Reshape Array using NumPy

Problem Statement:
Given a 1D array of integers and a target number of rows and columns, reshape the array using NumPy. If reshaping is not possible, print -1.

Input Format:
First line: integers `n`, `r`, `c` (number of elements, target rows, target columns)
Second line: `n` space-separated integers

Constraints:
1 ≤ n, r, c ≤ 1000
The reshape is only possible if r * c == n

Output Format:
Print the reshaped matrix row by row. If impossible, print -1.

Sample Input:
6 2 3
1 2 3 4 5 6

Sample Output:
1 2 3
4 5 6

4. Element-wise Operations on Two Arrays

Problem Statement:
Given two arrays of the same shape, perform and print the result of the following operations using NumPy: element-wise addition, subtraction, multiplication, and integer division.

Input Format:
First line: integer `n`, the size of the arrays
Second line: `n` space-separated integers (array A)
Third line: `n` space-separated integers (array B)

Constraints:
1 ≤ n ≤ 1000
Each integer x: $1 \leq x \leq 10^4$

Output Format:
Print four lines with space-separated results of: A+B, A−B, A×B, A//B

Sample Input:
4
2 4 6 8
1 2 3 4

Sample Output:
3 6 9 12
1 2 3 4
2 8 18 32
2 2 2 2

5. Find Unique Elements Using NumPy

Problem Statement:
Given an array of integers, find and print the unique elements in ascending order using NumPy.

Input Format:
The first line contains an integer `n`, followed by `n` space-separated integers.

Constraints:
1 ≤ n ≤ 1000
Each integer x: 1 ≤ x ≤ 10^4

Output Format:
Print the unique elements in ascending order, space-separated on a single line.

Sample Input:
10 4 5 6 5 4 7 8 6 9 7

Sample Output:
4 5 6 7 8 9

6. Boolean Indexing with NumPy

Problem Statement:
Given an array of integers, filter and print only those elements which are greater than a given threshold using NumPy.

Input Format:
First line: integer `n` followed by `n` space-separated integers (the array)
Second line: an integer `t`, the threshold value.

Constraints:
1 ≤ n ≤ 1000
Each integer x: 1 ≤ x ≤ 10^4
1 ≤ t ≤ 10^4

Output Format:
Print all elements strictly greater than `t`, space-separated on a single line. If no such elements exist, print an empty line.

Sample Input:
6 3 10 15 8 6 2
7

Sample Output:
10 15 8