Data Structures

Assignment 1

Deadline: 15th Jan (Friday) evening 8 PM

1. You are given an array A of size N. It contains integers such that one particular element occurs more than N/2 times in this array. Find this element.

Input format:
First line contains the the number of test cases, T.
The lines that follow contain the test cases. The first line in each test case contains the size of the array, N. The next line contains the elements of the array (space separated).

Output format

For each test case output a single line containing the desired element.

Constraints

$1 <= T <= 10$

$1 <= N <= 200000$

$1 <= A[i] <= 10^5$

Sample Input:

3
5
2 1 2 3 2
7
1 1 7 6 1 1 11
10
1 2 3 4 5 4 4 4 4 4

Sample Output:

2
1
4

2. Given a Postfix Expression, find its value.

Input format:
First line contains the the number of test cases, T.
The following T lines each consist of a string containing the postfix expression.

Output format:
For each test case output a single line containing the solution of the respective postfix expression.

Constraints

$1 <= T <= 10$

$1 <= $ Length of Input String $ <= 200000$

It is guaranteed that the string contains only digits, '+', '-', '/', '*', '(' & ')'

Sample Input:
1
231*+9-

Sample Output:
-4

3. You are given an expression consisting of ()[]{}, check if the expression is a proper bracketed sequence. (Your solution must use stacks)

Input Format:
First line contains number of test cases, T. Following lines contain the test cases.

Output Format:
Print Yes or No for each test cases in a line.

Constraints

1 <= T <= 10

1 <= Length of Input String <= 200000

Sample Input:
2
((([]))
([)]

Sample Output:
Yes
No

4. Given an array A[] and a sliding window of size 'w' which is moving from very left of the array to the very right. Assume that we can only see 'w' numbers in the window. Each time the window moves by one position. Find the maximum in every position of the window.

Input Format:
First line contains the the number of test cases, T.
The lines that follow contain the test cases. The first line in each test case contains the size of the array, N and window size W. The next line contains the elements of the array (space separated).

Output Format:
For each test case output the maximum in every position of the window.

Constraints

1 <= T <= 20

1 <= W <= N <= 100000

1 <= A[i] <= 10^9

Sample Input:
2
9 3

1 2 3 1 4 5 2 3 6

10 4
8 5 10 7 9 4 15 12 90 13

Sample Output
3 3 4 5 5 5 6
10 10 10 15 15 90 90

5. Given a grid of size m x n where some eggs are placed at some positions. But among them some are rotten. Now a rotten egg at position[i,j] can rot other fresh eggs at position [i-1,j], [i+1,j], [i,j-1], [i,j+1] (up, down, left and right). Find the minimum time required to rot all eggs.

Convention for the grid is
'e' – Empty cell
'f' – fresh egg
'r' – rotten egg

Input Format
First line contains the the number of test cases, T.
The lines that follow contain the test cases. The first line in each test case contains M and N. The next M lines contains strings of size N (string contains only characters 'e','f','r').

Ouput Format
Print the minimum time required to rot all the eggs. If it is not possible to rot all the eggs just print -1.

Constraints

1 <= T <= 10

1 <= M, N <= 1000

A[i][j] = {'e', 'f', 'r'} for 1<=i<=N, 1<=j<=M

Sample Input
2
3 5
rferf
fefrf
feerf

3 5
rferf
eefrf
feerf

Sample Output
2
-1

6. Given three sorted arrays in non-decreasing order, print the number of common elements in these arrays.

Input Format:
First line contains the number of test cases, T.
Each test case has 3 lines. Each line has a number N followed by N numbers.

Output Format
Output the number of common elements of the three arrays.

Constraints

1 <= T <= 10

1 <= N <= 100000

1 <= A[i] <= 10^9

Sample Input
2
6 1 5 10 20 40 80
5 6 7 20 80 100
8 3 4 15 20 30 70 80 120
3 1 5 5
5 3 4 5 5 10
4 5 5 10 20

Sample Output
2
2