Algorithmic Problem Solving 2021
17ECSE309

Q-Box Submission

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Question 01

Title: BANANA!
Level: Easy
Concepts Tested: Brute Force, Arrays.

Problem Statement:

Bob and Kevin, the minions are forced to go on a date by Agnes and Edith. Agnes and Edith have arranged a special feast of bananas!

Bob and Kevin can get quite competitive and decide to play a game. They arrange all the bananas in a row and randomly assign scores to each banana based on size. The game goes as follows:

Bob starts to eat the bananas from left while Kevin starts from the right. They take turns alternatively, i.e., Bob eats bananas on 1^{st} move, Kevin on 2^{nd}, Bob on 3^{rd} again and so on. During each move they keep a count of their scores and each player eat the least number of bananas possible that can just keep them in the lead, that is, in the current move they eat only so many number of bananas that their score is just greater than the other player's score in previous move. The game ends when Bob and Kevin finish all bananas.

Tell Agnes and Edith who is the winner.

Input Format:

First line of input contains the number of test cases T. The next lines have description of T test cases.
The first line in each test case contains the number of bananas, N.
The second line in each test case contains the score of each of N bananas, separated by space.

Output Format:

Output contains of T lines.
Each line will have the score of Bob and Kevin and the winner's name, in the same line separated by space.

Solution:

```
#include<iostream>
#include<bits/stdc++.h>
using namespace std;

void banana(long long a[],long long n)
{
  long long bob=0, kevin=0;
  long long p1=0,p2=n-1; //p1 is bob's position; p2 is kevin's position
  long long flag=0, move=1, ncopy=n, prevbob=0, prevkevin=0;
  while(ncopy>0)
  {
    flag=0;
    if(move==1)
    {
      prevbob=0;
      while(flag==0 && ncopy>0)
      {
        bob+=a[p1];
        prevbob+=a[p1];
        p1++;
        ncopy--;
        if(prevbob > prevkevin){
          flag=1;
        }
      }
      move=-1;
    }
    else
    {
      prevkevin=0;
      while(flag==0 && ncopy>0)
      {
        kevin+=a[p2];
        prevkevin+=a[p2];
        p2--;
```

```
            ncopy--;
            if(prevkevin > prevbob){
               flag=1;
            }
          }
          move=1;
       }
    }
    cout<<bob<<" "<<kevin<<" ";
    if(bob>kevin)
       cout<<"Bob\n";
    else
       cout<<"Kevin\n";
}

int main()
{
    long long t;
    cin>>t;
    while(t--)
    {
       long long n;
       cin>>n;
       long long a[n];
       for(long long i=0;i<n;i++)
       {
          cin>>a[i];
       }
       banana(a,n);
    }
}
```

Sample Test Case:

```
2
11
3 1 4 1 5 9 2 6 5 3 5
1
1000
```

Sample Output:

```
23 21 Bob
1000 0 Bob
```

Question 02

Title: Well Deserved Chocolates.
Level: Medium
Concepts Tested: **Longest Increasing Sequence**

Problem Statement:

Swati is a teacher in primary school and wants her students to perform well in tests, assessments throughout the academic year. Obviously, Swati wants the improvement to be reflected in the students' grades as well.

Swati decided to reward herself if her students' performance has been improving. If a student has consistently increasing marks in at least 4 out of 8 exams, Swati allows herself a celebratory chocolate.

Help Swati find out if her diet includes chocolates or not!

Input Format:

First line of input contains the number of students N.
In each of next N lines, the marks of each student for all 8 subjects separated by space is given.

Output Format:

Output has N lines, one for each student.
Print "YES", if Swati gets a chocolate. Print "NO" if not.
Note: Only Uppercase version of output is valid, i.e., "YES" and "NO".

Solution:

```
#include<iostream>
#include<bits/stdc++.h>
using namespace std;

int findLIS(int n, int a[])
{
   int LIS[n];
   int i, j, maxlen=1;
   for(i=0; i<n; i++)
   {
      LIS[i]=1;
   }
   for(i=1; i<n; i++)
   {
```

```
    for(j=0; j<i; j++)
    {
      if(a[i]>a[j] && LIS[j]+1>LIS[i])
        LIS[i]=LIS[j]+1;
      if(maxlen<LIS[i])
        maxlen=LIS[i];
    }
  }
  return maxlen;
}

int main()
{
  int n, a[8], result;
  cin>>n;
  while(n--)
  {
    for(int i=0;i<8;i++)
      cin>>a[i];
    result = findLIS(8,a);
    if(result>=4)
      cout<<"YES"<<endl;
    else
      cout<<"NO"<<endl;
  }
}
```

Sample Test Case:

3
20 36 12 89 40 56 78 98
43 14 52 35 84 76 52 60
38 97 51 24 99 84 20 7

Sample Output:

YES
YES
NO

Explanation:

The first student has shown increasing performance in 6 subjects. The marks are {20, 36, 40, 56, 78, 98}. Hence output is "YES". Similarly, the second student in 4 subjects.
The third student has shown increasing performance in only 3 subjects. Hence output is "NO".