SHIV NADAR UNIVERSITY

Course – CSD 207

Lab Sheet – 3

Question 1:

Bob and Khatu are stuck in matrix. The command center sent them a string which decodes to their final destination. Since Bob and Khatu are not good at problem solving help them to figure out their final destination. They are initially at (0, 0). String contains L, R, U, D denoting left, right, up and down. In each command they will traverse 1 unit distance in the respective direction. For example if they are at (2, 0) and the command is "R" they will go to (1, 0).

Input:

Input contains a single string.

Output:

Print the final destination location of Bob and Khatu.

Constraints:

$1 \leq |\mathbf{S}| \leq 10^5$

SAMPLE INPUT
LLRDDR
SAMPLE OUTPUT
0 -2
Explanation

Initail Postion : 0, 0
1.) 'L' -> cover one unit of distance in left direction. New position (-1,0)
2.) 'L' -> new position (-2,0)
3.) 'R' -> new position (-1,0)
4.) 'D' -> new position (-1,-1)
5.) 'D' -> new position (-1,-2)
6.) 'R' -> new position (0,-2)

Question 2:

2^N participants (P_1 , P_2 , P_3 .... , P_{2^N}) have enrolled for a knockout chess tournament. In the first round, each participant P_{2k-1} is to play against participant P_{2k}, ($1 \leq k \leq 2^{N-1}$). Here is an example for **k = 4**:

Some information about all the participants is known in the form of a triangular matrix **A** with dimensions $(2^N-1) \times (2^N-1)$. If $A_{ij} = 1$ ($i > j$), participant P_i is a better player than participant P_j, otherwise $A_{ij} = 0$ and participant P_j is a better player than participant P_i. Given that the better player always wins, who will be the winner of the tournament?

Note: Being a better player is not transitive i.e if P_i is a better player than P_j and P_j is a better player than P_k, it is not necessary that P_i is a better player than P_k.

Input

The first line consists of **N**. Then, 2^N-1 lines follow, the i^{th} line consisting of **i** space separated integers $A_{i+1\ 1}$, $A_{i+1\ 2}$, ... $A_{i+1\ i}$

Output

A single integer denoting the id of the winner of the tournament.

Constraints

$1 \leq N \leq 10$
$A_{ij} = \{0, 1\}$ ($i > j$)

SAMPLE INPUT

```
2
0
1 0
0 1 1
```

SAMPLE OUTPUT

```
1
```

Explanation

When 1 plays against 2, 1 wins. When 3 plays against 4, 4 wins. When 1 plays against 4, 1 wins.

So, 1 wins the tournament.

Question 3:

Little Shino loves to play with coins. In the city she lives, there are 26 different types of coins. Each coin is represented with a lowercase letter a,b,c,...,y,z. Shino has some number of coins and she placed them in some random sequence, S, on the table. She is wondering how many pairs (i,j)(i,j) are there, where i≤ji≤j, such that number of distinct coins in sequence Si,Si+1,Si+2,...,Sj−1,Sj is **exactly equal** to K. Two coins of same type (same letters) are considered equal and two coins of different types (different letters) are considered distinct.

Input:
First line contains one integer, K.
Second line contains a string, S, consist of lowercase letters only.

Output:
Print one integer, number of pairs (i,j), where i≤ji≤j, such that number of distinct coins in sequence Si,Si+1,Si+2,...,Sj−1,Sj is **exactly equal** to K.

Constraints:
1≤K≤26
1≤|S|≤5∗103

S consists of lowercase letters only.

SAMPLE INPUT

3
abcaa
SAMPLE OUTPUT

5

Explanation

Note: S[i:j] denotes the sequence Si,Si+1,....,Sj−1,Sj
Since, K=3
Possible pairs (i,j) such that number of distinct coins in S[i:j] is **exactly equal** to K are:
(1,3) and S[1:3]= abc
(1,4) and S[1:4]= abca
(1,5) and S[1:5]= abcaa
(2,4) and S[2:4]= bca
(2,5) and S[2:5]= bcaa

So the answer is 5.

Question 4:

After the death of Meghnad and Kumbhakaran, Raavan got scared. He used his mind and presented a proposal of a war of numbers instead of Bow and arrows to Ram.

According to him, Laxman will select a number **N**, Raavan has to subtract a number which is at least **1** and at most **k**. After that Ram has to subtract a number at least **1** and at most **k**. And they both subtract alternatively till the number becomes **less than 1**. The last player to subtract will be the winner.

You are Laxman and you have to find out the **p** smallest numbers that can be used as **N** so that Ram will always win. Both Ram and Raavan are genius-minded and play optimally at every point.

Input Format :

First line contains one integer **T** - No. of testcases. After that, the next **T** lines will contain two space-separated integers **p** and **k**.

Output Format :

For every testcase print the **p** smallest space-separated integers that can be taken as **N** which assures the winning of Ram.

Constraints:

1<=T<=10

1<=N<10^6

1<=k<=10000

1<=p<=50

SAMPLE INPUT

2
1 4
2 3

SAMPLE OUTPUT

5
4 8

Explanation

There are 2 testcases. For first testcase: p is 1 i.e. the smallest number of N is to find out. And k is 4 i.e. the number which can be subtracted is at least 1 and at most 4. N is 5 initially. After this, if Raavan subtracts 1, then Ram will subtract 4 to make it less than 1. If Raavan subtracts 2, then Ram will subtract 3. If Raavan subtracts 3, then Ram will subtract 2. If Raavan subtracts 4, then Ram will subtract 1. Hence in all cases, Ram will win. There is no N smaller than 5 which can make Ram win because ,say, if N is 4 then Raavan will subtract 4 from it to make it 0. So, 5 is the smallest one.

For second testcase: p is 2 i.e 2 smallest numbers are to find out. And k is 3 i.e. number from 1 to 3 can be subtracted. We can check taking from N=1,2,3,... and we will get that the smallest two numbers are 4 and 8 which make Ram win.

Question 5:

Dexter is a young genius. He is so smart that he has built a big laboratory for himself. His rival's name is Mandark. Dexter's laboratory has developed a power failure due to a prank played on him by Mandark. He decided to buy batteries to temporarily provide power to his lab. His lab has n machines. The i^{th} machine requires a battery with voltage rating of atleast Vi volts (1<=i<=n). Dexter went to the local electronics shop. They have one battery of each voltage rating from 1 to M. Dexter is very suspicious of his rival Mandark. He thinks that Mandark has planted bombs in batteries with a prime voltage rating. He doesn't want those batteries. As his lab computer is not working, Dexter wants you to find out the number of ways he can buy batteries for each of his machines.

Input:

The first line of the input contains t, the number of test cases. t test cases follow.

Each test case consists of two lines. The first line contains n and m. The second line contains n space separated integers denoting Vi.

Output: For each test case output a single number, that is the answer for that test case. Output the number of ways modulo 1000000007(109+7).

Constraints:

$1 \leq t \leq 100$

$1 \leq m, n, Vi \leq 100000$

SAMPLE INPUT

```
2
3 100
98 100 99
2 8
5 6
```

SAMPLE OUTPUT

```
1
2
```

Explanation

In the first test case, there is only one way of buying batteries for each machine, 98 for the first machine, 100 for the second machine and 99 for the third In the second test case, there are the following two ways: (8,6) (6,8)

Question 6:

Rahul's Dad is the CEO of one of the leading companies. Every time somebody seeks for an appointment he calls up his secretary and asks her whether the day is a Sunday or not. He has to keep his caller on hold and is unhappy about it. Knowing that his son Mayank knows a bit of programming he asks him to make a program to help him find all the sundays in a given month of a specific year.

Input: The first Line contains t an integer, the number of test cases. The next t lines contain two integers, first the year and then month.
Output: Output consists of t lines containing the dates of sundays in that particular month

Constraints : t<100000, month<=12, 2000<=year<=5000

Test cases updated.. You may submit now

SAMPLE INPUT

2
3 2013
5 2010

SAMPLE OUTPUT

3 10 17 24 31
2 9 16 23 30

Question 7:

Have you ever been a part of the exciting game **Passing the Parcel** ? Sid is on a school picnic with his classmates. The teacher decides to make the whole class play the game of Passing the Parcel. Since the winner of the game gets lots of chocolates and ice cream as his/her prize, all the students are over-excited about the game, including Sid. Here are the rules of the game:

- For the purpose of the game, our Parcel here is a football.
- There are a total of N students in the class. Their roll numbers being 1,2,3...N.
- All N students are made to sit uniformly in a circle in roll number order (ie. from 1 **to** N **in clockwise direction**).
- The Parcel is first handed over to the student with roll number 1.
- The teacher starts playing a song using a loud stereo system. The lyrics of the song are denoted by a string which consists of only letters **'a'** and **'b'**. Assume that each lyric of the song is a single letter.
- If the lyric '**a**' occurs in the song, the student who is currently holding the Parcel passes it on to the next student. This passing takes place in **clockwise direction**.
- If the lyric '**b**' occurs in the song, the student who is currently holding the Parcel loses his/her chances of winning the game. He/she hands over the parcel to the next student (in clockwise direction) and moves out.
- The game continues until a single student survives in the end. He/she will be the winner of the game.
- Note that the song repeats continuously ie. while the game is going on, if at all the song ends, the stereo system will automatically start playing the song from the start **without any delay**.

Given N the number of students in the class and the lyrics of the song, you have to find out the **roll number** of the student who wins the game.

Input :

The input consists of 2 lines. The first line consists of N, the number of students in the class. The next line consists of a string denoting the lyrics of the song the teacher plays.

Output :

Print a single integer denoting the roll number of the student who wins the game.

Constraints :

$2 \leq N \leq 1000$

1≤|S|≤1000, where |S| denotes the length of the input string. It is guaranteed that at least 1 lyric in the song will be a '**b**'

SAMPLE INPUT

6
abba
SAMPLE OUTPUT

5

Explanation

a : 1−>2 b : 2 goes out, handing over the parcel to 3. b : 3 goes out, handing over the parcel to 4. a : 4−>5 a : 5−>6 b : 6 goes out, handing over the parcel to 1 b : 1 goes out, handing over the parcel to 4 a : 4−>5 a : 5−>4 b : 4 goes out

Hence winner is 5.