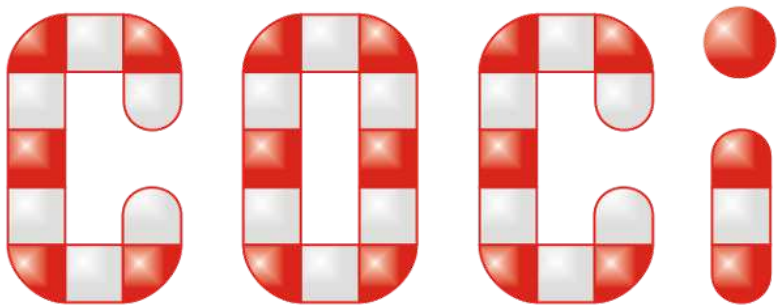


COCI 2016/2017

Round #7, March 4th, 2017

Tasks

Task	Time limit	Memory limit	Score
Baza	1 s	64 MB	50
Uzastopni	1 s	64 MB	80
Igra	1 s	64 MB	100
Poklon	1 s	256 MB	120
Paralelogrami	1 s	64 MB	140
Klavir	1 s	64 MB	160
Total			650

Mirko got a summer internship in a big IT company. This company builds a large database consisting of N rows and M columns.

On his first day, Mirko received a total of Q queries. Each query consists of M numbers. However, some numbers got lost during transition, so they are denoted with -1. Mirko wants to know how many rows of the database correspond to the query, i.e., how many rows of the database have identical numbers as the query, excluding -1.

For example, if the query is in the form of **-1 3 2**, then we need to count the rows of the database that have **any number** in the **first** column, have **the number 3** in the **second** column, and have **the number 2** in the **third** column.

Since he just started with his internship, Mirko needs your help. Help him and answer the queries!

INPUT

The first line of input contains N ($1 \leq N \leq 10^3$) and M ($1 \leq M \leq 10^3$), the size of the database.
Each of the following N lines contains M numbers A_{ij} ($1 \leq A_{ij} \leq 10^6$), the content of the database.
The following line contains Q ($1 \leq Q \leq 50$), the number of queries.
Each of the following Q lines contains M numbers B_{ij} (B_{ij} = -1 or $1 \leq B_{ij} \leq 10^6$), the description of the i^{th} query.

OUTPUT

The output must contain Q lines, each line containing X, the answer to the i^{th} query from the task.

SAMPLE TESTS

input

```
4 3
1 5 2
2 3 4
4 3 2
5 4 6
3
-1 -1 2
-1 3 2
-1 -1 -1
```

output

```
2
```

input

```
3 8
6 5 97 99 82 50 95 1
85 62 11 64 94 84 88 19
43 99 11 64 94 84 31 19
3
-1 -1 11 64 94 84 -1 19
-1 -1 -1 99 -1 -1 -1 1
95 -1 -1 -1 -1 80 -1 -1
```

output

```
2
```

1 4	1 0

Clarification of the first example:
The first query asks how many rows have the number 2 in the third column. These are rows number 1 (1 5 2) and number 3 (4 3 2).
The second query asks how many rows have the numbers 3 and 2 in the second and third column. This is only row number 3 (4 3 2).
The third query asks how many rows are there in total, and the answer is obviously 4.

Output all the ways in which a given positive integer N can be obtained as the sum of several (two or more) consecutive positive integers.[1]

INPUT

The first line of input contains the positive integer N ($3 \leq N \leq 10^{10}$).

OUTPUT

For each sum of consecutive positive integers that is equal to N, in one line output the first and the last addend. The order of lines in the output is not important. In each test case, at least one corresponding sum will exist.

SAMPLE TESTS

input	input
10	27
output	**output**
1 4	13 14 8 10 2 7

Clarification of the first test case: 10 = 1 + 2 + 3 + 4.

[1]The author apologizes if reading the task took too long, and promises that, in the future, he will try to be more concise, i.e., that he will try to explain the task using as less words and apologies in the footnotes as possible.

Mirko and Slavko are bored on their skiing trip, so they came up with an interesting game they could play. First, Mirko specifies a number *N*. Then Slavko writes *N* letters he will use to create his word. Then Mirko writes a word consisting of *N* letters. Slavko's goal is to create a word using the letters he chose, but so that not a single letter in his word matches the letter at the same position in Mirko's word. In order to make the game even more intense, Slavko must find the lexicographically smallest such word. This word will **surely exist**. Since Mirko and Slavko are still young, they know only 3 letters: a, b, and c, which greatly affects their programming skills.

INPUT

The first line of input contains the positive integer N ($1 \leq N \leq 5000$).
The following line contains a string of N lowercase letters 'a', 'b', or 'c', the letters Slavko chose.
The third line contains a string of N lowercase letters 'a', 'b', or 'c', the word Mirko wrote.

OUTPUT

The first and only line of output must contain the word Slavko found.

SCORING

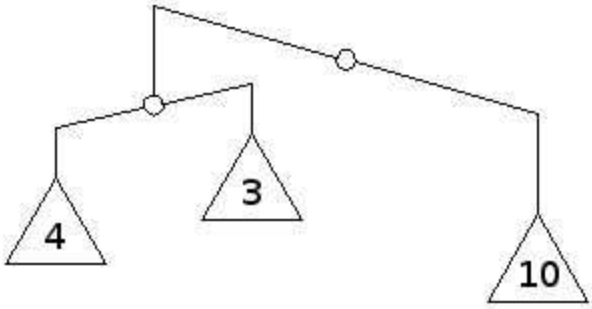
In test cases worth 40 points in total, it will hold $1 \leq N \leq 20$.

SAMPLE TESTS

input	**input**	**input**
3 abc abc	4 baba baab	5 aaabc abcba
output	**output**	**output**
bca	abba	baaac

The main (potentially tragic) hero of this task is Kile, otherwise known as the joker from the bench of the semiliterate team *El Locos*, and who is celebrating his birthday today.

His best friend Ivan has decided to gift him a special pharmaceutical scale. The specialty of this scale is that it is recursive, i.e., at the end of each beam, there is either a weight, a new scale, or nothing. Of course, the scale leans to the left if the total mass on its left beam is larger than the total mass on its right beam. Analogously, if the mass is larger on the right beam, then the scale leans to the right. Otherwise, we say that the scale is balanced.



Kile really likes the gift, and, as a true computer scientist, he immediately tries to balance it using new weights which **total mass is the lowest possible**. We say that a recursive scale is balanced if it is balanced and all its subscales are balanced.

After having successfully balanced the scale, Kile decided to tattoo on his chest the total mass of the weights placed on the scale, in binary notation, without leading zeros. What number is tattooed on Kile's chest?

INPUT

The first line of input contains the positive integer N ($1 \leq N \leq 10^6$) that represents the total number of scales Kile's recursive scale consists of (including itself).

The i^{th} of the following N lines contains two numbers that respectively describe the left and the right beam of the scale with index i. A positive number in the scale description denotes the index of the scale located on that beam, whereas a non-positive number denotes that there is a weight on that beam, with its mass corresponding to the absolute value of the number.

All numbers from the input are in absolute value less than or equal to 10^9.

OUTPUT

The first and only line of output must contain the total mass of the weights located on Kile's scale. This number needs to be in binary notation, without leading zeros.

SAMPLE TESTS

input	input
2 2 -10 -4 -3	4 2 3 -9 4 -2 -13 -1 -7
output	**output**
10100	111000

Clarification of the first test case:
The example corresponds to the image from the task. Kile will add another weight of mass 1 to the weight of mass 4, and will add another weight of mass 2 to the weight of mass 3. After this, the mass of both beams of the scale with index 2 is equal to 5, so it is balanced, and the mass of both beams of the scale with index 1 is 10, so it is balanced as well. The entire scale is now balanced, and the total mass is 5+5+10=20, i.e., 10100 in binary notation.

Recently, a new popular computer game has appeared, called “Parallelograms”. In the beginning of the game, the computer draws N points on the screen whose coordinates are integers between -10 and 10 (inclusive).

The only allowed move in the game is to take 3 non-collinear points A, B, C, and, instead of point C, draw point D such that ACBD is a parallelogram whose one diagonal is segment AB. Notice that such point D always exists and is unique.
In the beginning, all points are different, but during the game it is allowed for two or more points to have identical coordinates. Additionally, all newly created points' coordinates must be at most 10^9 in absolute value.

The aim of the game is to, using a series of moves, bring all points to the first quadrant. More precisely, at the end of the game, all points must have non-negative coordinates.
Find a series of moves, consisting of at most 2 500 moves, that brings all points to the first quadrant, or determine that such a series of moves does not exist.

INPUT

The first line of input contains the number N from the task ($3 \leq N \leq 400$).
The i^{th} of the following N lines contains coordinates of the i^{th} point X_i, Y_i ($-10 \leq X_i, Y_i \leq 10$).
In the beginning, no two points have identical coordinates.

OUTPUT

If the solution does not exist, the first and only line of output must contain -1.
Otherwise, the first line of output must contain the number of moves M ($0 \leq M \leq 2\,500$).
Each of the following M lines must contain 3 different numbers A, B, C ($1 \leq A, B, C \leq N$) that denote the indices of the points involved in the move. The point with index C changes according to the described rule, and points with indices A and B do not change.

SAMPLE TESTS

input

```
3
0 0
4 0
3 -1
```

output

```
1
1 2 3
```

input

```
4
5 0
0 5
-2 -2
-3 2
```

output

```
2
1 2 3
1 2 4
```

input

```
3
-1 -1
-2 -2
-3 -3
```

output

```
-1
```

Young Alisa likes to play the piano using only one finger. Unfortunately, Alisa never learned to play the piano, so her playing is entirely random. More precisely, any time she chooses a tone to play, she does it independently of all previous tones, and chooses each of the *N* tones with the same probability.

Her good friend Mirta wants to listen to a composition containing *M* consecutive tones, but since Alisa plays the piano randomly, Mirta does not know how long she will have to wait to hear an array of exactly these *M* tones. Help Mirta determine the **expected** number of key presses in order to hear, for the first time, her wanted array of consecutive tones. Moreover, since Mirta is a very curious girl, she also wants to know the expected number of key presses for each prefix of her wanted array of tones.

INPUT

The first line of input contains the positive integer *N*, the number of different piano tones ($1 \leq N \leq 100$).
The second line of input contains the positive integer *M*, the length of the wanted array ($1 \leq M \leq 10^6$).
The third line of input contains the array of *M* positive integers between 1 and *N*.

OUTPUT

The i^{th} of the following M lines must contain the expected number of key presses in order for Mirta to hear the prefix of length *i* of her wanted array of tones, **modulo** $10^9 + 7$.
The test data will be such that the expected number of key presses will always be an integer.

SCORING

In test cases worth 64 points in total, it will hold $1 \leq M \leq 200$.

SAMPLE TESTS

input	input	input
2 2 1 2	2 2 1 1	3 3 1 2 3
output	**output**	**output**
2 4	2 6	3 9 27