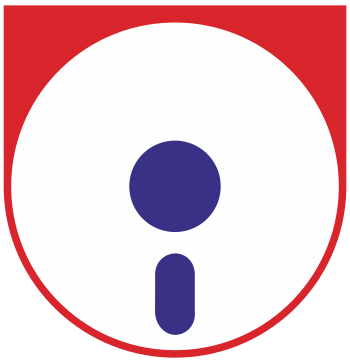

Croatian Open Competition in Informatics

Round 5, February 8th 2020

Tasks

Task	Time limit	Memory limit	Score
Emacs	1 second	512 MiB	50
Političari	1 second	512 MiB	70
Matching	? seconds	512 MiB	110
Putovanje	1 second	512 MiB	110
Zapina	1 second	512 MiB	110
Total			450

Task Emacs

While playing in his favourite text editor, Daniel decided to draw a picture that was N characters high and M characters wide. The picture consists solely of characters `'.'` and `'*'` such that characters `'*'` form some non-overlapping rectangles. The rectangles don't even touch each other on their sides or corners.

Help Daniel count the number of rectangles drawn on the picture.

Input

The first line contains two integers N and M ($1 \leq N, M \leq 100$) from task description.
Each of the next N lines contains M characters `'.'` or `'*'` which represent the picture that Daniel drew.

Output

In a single line you should output the number of rectangles on the picture.

Scoring

In the test cases worth a total of 10 points, all rectangles will consist of a single `'*'` character.
In the test cases worth additional 15 points, it will hold $N = 1$.

Examples

input

```
6 7
***....
***..**
.....**
.***.**
.***...
.***...
```

output

```
3
```

input

```
3 3
*.*
...
*.*
```

output

```
4
```

input

```
1 10
.*.**.***.
```

output

```
3
```

Task Političari

All politicians of an unknown, completely invented and totally unrealistic country are spending their time accusing each other on national television instead of doing their jobs. It all started one Sunday afternoon when politician **number 1** was a guest in the first episode of a (now very popular) talk show. During the show, he accused the politician **number 2** for the poor state of the country. Naturally, in the second episode of the show the guest was politician number 2. The talk show host told his guest that politician number 1 accused him and politician number 2 then blamed some other politician. The newly blamed politician was the guest in the next show where the host told him that...

Even today, after almost 20 years, a new politician is a guest in each episode of the show where he is being told by whom he was accused for the poor state in the country. That politician then blames another politician and the vicious cycle continues. To make things more interesting, we have exclusively found out that each politician has a fixed strategy on how to behave during the show. More precisely, each politician knows who to blame based on the person who blamed him in previous show. We will provide you with this information and hope you will be able to write a program that calculates what politician will be the guest of the K-th show.

Input

The first line contains integers N ($2 \leq N \leq 500$) and K ($1 \leq K \leq 10^{18}$) from the task description.

The i-th of the next N lines contains N integers where j-th integer tells us who will be blamed by the i-th politician if he was blamed by politician number j in the last show.

You can assume that no politician will ever blame himself. Therefore, none of the numbers in i-th line of matrix will be equal to i. Similarly, note that the i-th number in the i-th matrix row will always be equal to 0 and can be disregarded.

Output

In a single line you should output the number of a politician that will be the guest of the K-th episode of the talk show.

Scoring

In the test cases worth a total of 35 points, it will hold $1 \leq K \leq 10^5$.

Examples

input

```
2 4
0 2
1 0
```

output

```
2
```

input

```
3 7
0 3 2
3 0 3
2 1 0
```

output

```
1
```

input

```
4 7
0 4 3 2
4 0 4 1
2 1 0 1
3 2 3 0
```

output

```
3
```

Task Matching

You are given N, where N is even, points on a plane that have integer coordinates. For each integer a, there are at most two points with coordinates (a, x). Analogously, for each integer b, there are at most two points with coordinates (x, b).

You are able to draw horizontal or vertical line segments between pairs of given points. Is it possible to draw $\frac{N}{2}$ lines such that each of the given points is an endpoint of exactly one line segment and that no two line segments intersect?

Input

The first line contains an even integer N ($2 \leq N \leq 100\,000$) from the task description.

The i-th of the next N lines contains two integers X_i, Y_i ($1 \leq X_i, Y_i \leq 100\,000$), coordinates of the i-th point.

Output

If it is not possible to draw the line segments as explained in the task statement, you should output `"NE"` (NO in Croatian) in a single line.

Otherwise, you should output `"DA"` (YES in Croatian) in the first line. In each of the next $\frac{N}{2}$ lines you should output two space-separated integers i and j ($1 \leq i, j \leq N$), which represent indices of the points that are connected with a drawn line segment.

Scoring

Subtask	Score	Constraints
1	5	$2 \leq N \leq 20$, for each integer a, there is an even number of points with coordinates (a, x) and an even number of points with coordinates (x, a).
2	6	$2 \leq N \leq 20$
3	7	$2 \leq N \leq 40$
4	40	$2 \leq N \leq 2000$
5	52	No additional constraints.

Examples

input

```
8
1 1
1 3
2 2
2 4
3 1
3 3
4 2
4 4
```

output

```
DA
1 5
3 7
2 6
4 8
```

input

```
6
1 2
1 3
2 1
2 4
3 2
3 3
```

output

```
DA
1 2
3 4
5 6
```

input

```
2
1 1
2 2
```

output

```
NE
```

Task Putovanje

Little Fabijan loves bars and travels. He wishes to drink ~~beer~~ coffee in each of the N towns in his country conveniently numbered from 1 to N. The towns are connected via $(N-1)$ bidirectional roads such that each town is reachable from any other town by traversing some of the roads. Fabijan decided to drink coffee in every town in order from town number 1 to town number N. Therefore, he starts from town number 1 (where he drinks his first coffee) and travels to town number 2 for his next cup of coffee. During that travel he might pass through a number of different towns but he won't make a coffee stop in those towns. After drinking coffee in town 2, he will proceed to travel to town 3, and so on until he finally reaches town N where he will drink his last coffee.

In order to traverse a certain road, he needs to have a valid ticket. The i-th road can be traversed if you have either a single-pass ticket which costs C_{i1} euros or a multi-pass ticket which costs C_{i2} euros. For each road, Fabijan can decide to buy a single-pass ticket each time he needs to traverse that road or he might opt to buy a multi-pass ticket once.

Write a program that computes the smallest number of euros Fabijan needs to spend on tickets in order to successfully complete his travels.

Input

The first line contains an integer N ($2 \leq N \leq 200\,000$) from task description.

In i-th of the next $(N-1)$ lines there are four integers A_i, B_i, C_{i1}, C_{i2} ($1 \leq A_i, B_i \leq N, 1 \leq C_{i1} \leq C_{i2} \leq 100\,000$) which represent that towns A_i and B_i are connected with a road with ticket prices C_{i1} and C_{i2}.

Output

In a single line output the smallest cost of travel.

Scoring

Subtask	Score	Constraints
1	20	$2 \leq N \leq 2000$
2	25	Each town will be directly connected with at most two other towns.
3	65	No additional constraints.

Examples

input

```
4
1 2 3 5
1 3 2 4
2 4 1 3
```

output

```
10
```

input

```
4
1 4 5 5
3 4 4 7
2 4 2 6
```

output

```
16
```

input

```
5
1 2 2 3
1 3 2 3
1 4 2 3
1 5 2 3
```

output

```
11
```

Clarification of the first example:

Fabijan first travels from town 1 to town 2 and it is optimal for him to buy a multi-pass ticket (5 euros) for the road which connects them. Then he travels from town 2 to town 3 via town 1. He already has a multi-pass ticket that takes him from 2 to 1 and he buys a single-pass ticket from town 1 to town 3 (2 euros). On his travels from town 3 to town 4 he buys another single-pass ticket that takes him from town 3 back to town 2 (2 euros) and after that buys a single-pass ticket that takes him from town 2 to town 4 (1 euro). In total, he spent $5 + 2 + 2 + 1 = 10$ euros.

Task Zapina

There is a total of N young programmers which are preparing for the second part of competitive season during a winter camp in ~~Krapina~~ Zagreb. Mr. Malnar, a big promoter of order, discipline and hard work, told the programmers to form a line and gave each of them a certain number (possibly zero) tasks. He gave away a total of **N different** tasks and he knows that the i-th programmer in line will be happy if they got exactly i tasks.

In how many different ways could Mr. Malnar give out the tasks in such a way that **at least one** programmer was happy? Two ways of giving out the tasks are considered different if there exists a programmer and a task such that in one way that programmer received that task while in the other one they didn't.

Input

The first line contains an integer N ($1 \leq N \leq 350$) from task description.

Output

Output the sought number of ways modulo $10^9 + 7$.

Scoring

Subtask	Score	Constraints
1	22	$1 \leq N \leq 7$
2	33	$1 \leq N \leq 20$
3	55	No additional constraints.

Examples

input	**input**	**input**
1	2	314
output	**output**	**output**
1	3	192940893

Clarification of the second example:

Ways of giving out the tasks in which at least one programmer is happy are:

1. First task to first programmer, second task to the second one.
2. Second task to the first programmer, first task to the second one.
3. Both tasks to the second programmer.