

Problem J

Housing Estate



POTYCZKI ALGORYTMICZNE

The 3rd Universal Cup, Stage 40: Potyczki. Limits: 1024 MB, 2 s.

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The ByteBud company plans to build a housing estate filled with apartment blocks. ByteBud has already purchased a rectangular plot of land and divided it into n rows and m columns. This way, the company has split the land into $n \cdot m$ rectangular cells. For simplicity, let coordinates (i, j) denote the cell located in the i -th row and j -th column of the plot. They need to choose some cells (maybe none or all) and build an apartment block on each of them. Your task is to decide on which cells to build the apartment blocks and determine the height (in floors) of each block.

Creating the design is not straightforward! According to the official zoning regulation, the block on the cell with coordinates (i, j) can be at most $h_{i,j}$ floors high. In particular, if $h_{i,j} = 0$, it means that no block can be built on that cell. Additionally, ByteBud has already created a preliminary plan for the space between the blocks. Specifically, for each point on the plot where four cells meet, they have already planned the exact sum of the heights of the blocks located on these cells. You are given the numbers $s_{i,j}$ for each pair of indices $i \in \{1, \dots, n-1\}$, $j \in \{1, \dots, m-1\}$; such a number specifies the requirement that the blocks on the cells with coordinates $(i, j), (i+1, j), (i, j+1), (i+1, j+1)$ must have a total of exactly $s_{i,j}$ floors.

There are many requirements, and ByteBud needs the housing estate design today... So, check if there exists a housing estate design that meets all the requirements – and if it exists, propose any valid one!

Input

The first line of the input contains two integers n and m ($2 \leq n, m \leq 300$), representing the number of rows and columns, respectively, into which ByteBud has divided the plot.

Then, the i -th of the following n lines contains m integers $h_{i,1}, \dots, h_{i,m}$ ($0 \leq h_{i,j} \leq 10^{10}$); the j -th number $h_{i,j}$ indicates the maximum height (in floors) of the apartment block on the cell with coordinates (i, j) .

The next $n-1$ lines describe the preliminary space plan between the blocks. The i -th of those lines contains $m-1$ integers $s_{i,1}, \dots, s_{i,m-1}$ ($0 \leq s_{i,j} \leq 10^{10}$); the j -th number $s_{i,j}$ specifies the requirement for the exact sum of the heights (in floors) of the apartment blocks on the cells with coordinates $(i, j), (i+1, j), (i, j+1), (i+1, j+1)$.

Output

If a housing estate design meeting all the requirements exists, print **TAK** in the first line of the output. Then provide an example of such a design in the following n lines. The i -th line should contain m non-negative integers $x_{i,1}, \dots, x_{i,m}$ indicating the heights (in floors) of the apartment blocks on the cells with coordinates $(i, 1), \dots, (i, m)$.

If the required design does not exist, print **NIE** in the only line of the output.

When printing **TAK** or **NIE**, every character can be lowercase or uppercase.

Example

For the input data:

```
3 4
5 7 9 4
3 4 9 6
9 0 8 5
11 26 20
13 16 18
```

a correct result is for example:

```
TAK
0 6 9 3
1 4 7 1
8 0 5 5
```

However, for the input data:

```
2 2
0 0
0 0
1000
```

the correct result is:

NIE