

Task **Ministarstvo**

After a successful career in a party we won't name, Pero got a job at the Ministry of Tourism. Pero oversees a network of N cities, labeled with numbers from 1 to N , where there is exactly one, one-way road between each pair of cities. In order to increase revenue, he has decided to introduce permits for traffic. Pero would prefer to introduce a special permit for each road, but that would alert his superiors. Therefore, he will introduce K different permits, labeled from 1 to K , and possession of a specific permit will be required to travel on each road.

To still ensure substantial revenue, Pero will settle for the following property.

- For each city v , there is some city u , such that it is not possible to travel from city v to city u with just one permit.

Pero asks for your help to determine the minimum K such that there exists an assignment of permits with the desired property, if such an assignment exists! If no such assignment exists, output -1.

Input

The first line contains a positive integer N .

The i -th of the following N lines contains N numbers $a_{i,j}$ where $a_{i,j} = 1$ if there is a road from city i to city j . Note that $a_{i,i} = 0$ and for $i \neq j$, exactly one of the numbers $a_{i,j}$ and $a_{j,i}$ is non-zero.

Output

If there is no assignment with the desired property, output -1 in the first and only line.

Otherwise, output the minimum positive integer K in the first line.

In the following N lines, output the description of the assignment.

In the i -th line, output N numbers $b_{i,j}$ where if $a_{i,j} = 0$, then $b_{i,j} = 0$, otherwise $1 \leq b_{i,j} \leq K$ indicating which permit is required for traveling on that road.

Scoring

In all subtasks, $2 \leq N \leq 1000$. In each subtask, 15% of the points come from only deciding whether such an assignment exists or not. For these points, if you don't output -1, you need to output some assignment, but it doesn't have to satisfy Pero's desired property.

Subtask	Score	Constraints
1	20	$N \leq 5$
2	80	No additional constraints.



Examples

input

```
3
0 1 0
0 0 1
1 0 0
```

output

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

input

```
3
0 1 1
0 0 1
0 0 0
```

output

```
-1
```

input

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

output

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

Explanation for the third sample test:

Roads requiring the first permit are marked in red, the second permit in blue, and the third permit in green.

From city 1, it is not possible to reach city 3 using just one permit.

From city 2, it is not possible to reach city 1 using just one permit.

From city 3, it is not possible to reach city 2 using just one permit.

From city 4, it is not possible to reach city 1 using just one permit.

