

THE INTERNATIONAL OLYMPIAD IN INFORMATICS IN TEAMS

MAY 23-28, 2018

Map

time limit per test: 1,5 seconds
 memory limit per test: 512 megabytes
 input: standard input
 output: standard output

The 2D map of the world has the shape of a matrix with m lines and n columns. On this map, the countries are labelled with numbers 1, 2, 3, ... The countries have the shape of a square with the side 1 or a rectangle made of two adjacent squares with the side 1. There can be only one *superpower*, a country which is made of 3 adjacent squares of side 1. Two countries can be considered neighbours if they have at least a common side.

In the scheme on the right, we have a 4x5 sized map, which contains 11 countries (the country 1 is a superpower). Our purpose is to paint the countries on the map, so that each country should have a different colour from all its neighbours. A possible colouring is presented in the scheme on the right.

1	1	1	2	9	3	3	3	4	3
3	3	4	2	9	1	1	2	4	3
5	6	4	7	10	4	3	2	3	4
5	6	8	8	11	4	3	4	4	1

Task

Paint the countries on the map in maximum four colours, codified with 1, 2, 3, 4, so that two neighbouring countries should have different colours.

Input

The first line contains the values of m and n separated by a space, representing the number of lines and the number of columns of the map. Each of the following m lines contains n natural numbers different from zero separated by **one or more** spaces, and together, they form the map of the world, with countries counted 1, 2, 3, ...

Output

A matrix with m lines and n columns will be displayed, containing a possible painting of the map, as it is defined above. The numbers on a line will be separated from each other by a space.

Constraints and specifications

- $2 \leq m, n \leq 1000$
- any correct solution is accepted
- a valid painting can contain 4 or fewer colours
- for 25% of testcases, $2 \leq m, n \leq 10$ and does not exist superpower
- for 15% of testcases, $10 \leq m, n \leq 11$ and exists superpower
- for 30% of testcases, $100 \leq m, n \leq 1000$ and does not exist superpower
- for 30% of testcases, $100 \leq m, n \leq 1000$ and exists superpower

Example

Input	Output	explanation
4 5 1 1 1 2 9 3 3 4 2 9 5 6 4 7 10 5 6 8 8 11	3 3 3 4 3 1 1 2 4 3 4 3 2 3 4 4 3 4 4 1	The countries 3 and 11 are painted using colour 1. The country 4 is painted using colour 2. The countries 1, 6, 7 and 9 are painted using colour 3. The countries 2, 5, 8 and 10 are painted using colour 4.
3 3 1 2 3 5 4 9 6 8 7	1 2 1 2 1 2 1 2 1	All the countries are squares with the side 1. In this case, all the countries can be painted using only two colours.

Maximum size of the source : 10 KB