The Jeweller's Game (gemgame)

John is playing the new hit mobile game: "The Jeweller's Game".

In this game, there is an $N \times N$ board full of different kinds of gems. Let's denote by (r, c) the cell located at the r-th row and c-th column of the board. Each cell of the board contains a gem. The type of the gem in cell (r, c) is represented by a positive integer $G_{r,c}$.

We group the cells according to the following rule. Cells a and b are in the same group if and only if there exists a sequence of cells $p_0, \ldots, p_k$ such that:

- $p_0 = a$ and $p_k = b$, and
- cells p_{i-1} and p_i are edge-adjacent and are of the same type for each $i = 1, \ldots, k$.

Note that every cell belongs to exactly one group.

The player can improve their score by swapping edge-adjacent cells of the board. Depending on whether the two swapped cells are in the same row or in the same column, we call a swap either horizontal or vertical, respectively. If the two swapped gems are of the same type, then the score of the swap is 0. Otherwise, consider the board **after** performing the swap: the score is the product of the *values* of the two swapped cells. The *value* of a cell is the number of cells in its group (including itself).

Figure 1: There were many similar games in the past.

Find the score of all horizontal and vertical swaps on the board!

☞ Among the attachments of this task you may find a template file `gemgame.*` with a sample incomplete implementation.

Input

The input file consists of:

- a line containing integer N.
- N lines, the j-th of which consisting of the N integers $G_{j,1}, \ldots, G_{j,N}$.

Output

The first N lines of the output should contain $N-1$ integers each. On the i-th line the j-th number ($1 \le i \le N$, $1 \le j < N$) should be the score of the swap of cells (i, j) and $(i, j+1)$.

The next $N-1$ lines of the output should contain N integers each. The j-th number on i-th line ($1 \le i < N$, $1 \le j \le N$) should be the score of the swap of cells (i, j) and $(i+1, j)$.

Constraints

- $2 \le N \le 1000$.
- $1 \le G_{r,c} \le 1\,000\,000$ for each $r = 1 \ldots N$ and $c = 1 \ldots N$.

Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

– **Subtask 1** (0 points) Examples.

– **Subtask 2** (15 points) $N = 2$.

– **Subtask 3** (45 points) $N \le 75$.

– **Subtask 4** (40 points) No additional limitations.

Examples

input	output
3 1 2 1 1 3 2 2 2 2	2 15 1 5 0 0 0 5 2 1 4 0
4 2 1 9 1 1 2 1 1 2 1 2 7 2 9 2 1	4 4 4 24 12 0 8 16 1 3 3 1 8 12 4 0 6 30 4 2 0 1 0 4

Explanation

In the **first sample case**, consider the result of the (horizontal) swap of cells $(1, 2)$ and $(1, 3)$:

$$\begin{matrix} 1 & \mathbf{1} & \mathbf{2} \\ 1 & 3 & 2 \\ 2 & 2 & 2 \end{matrix}$$

The groups of the two swapped cells are marked with red and blue. So the score of the swap is $3 \cdot 5 = 15$.