

Czech ACM Student Chapter
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Masaryk University
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Czech Technical University in Prague
Technical University of Ostrava
University of Žilina
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CTU Open Contest 2026

Domino Tiling

`domino.(c|cpp|py)`, `Domino.(java|kt)`

Qminers are decorating a wall in their new office with a mosaic. To save money, they bought a lot of domino tiles on sale. The tiles cannot be split, and no new dominoes can be ordered. The design is approved, and every last tile has to go on the wall. Make it look as close to the design as you can.

Task

Tile the given rectangle with the provided dominoes, matching the color of each cell to the design as closely as possible. Each domino covers two cells that share a side, and every cell must be covered by exactly one domino. A domino can be placed horizontally or vertically.

Any valid tiling will be accepted by the evaluation system, but only the one with the **lowest total cost** (see below) will be rewarded during the final ceremony.

Input Specification

The first line contains three integers M, N and T, where:

- $2 \leq M, N \leq 1024$ and both are even,
- T is the number of domino types you have, $1 \leq T \leq 21$.

Each of the next M lines contains N integers between 1 and 6, the cell values of one row. These correspond to the desired color of each cell based on the design.

Each of the next T lines contains three integers a, b, k, where $1 \leq a \leq b \leq 6$ and $k \geq 1$: you have k dominoes with color a on one half and b on the other. Each possible type is listed at most once, and the values of k sum to $M \cdot N/2$.

Output Specification

Print $M \cdot N$ digits: the number on the domino half covering each cell, in the order in which the cells appear in the input.

Then print $M \cdot N$ characters, giving the orientation of the domino covering each cell in the same order: `H` for horizontal, `V` for vertical. Both cells of a domino carry the same letter.

Whitespace in the output is ignored, wherever it is. You can, for example, print each row on its own line and separate the numbers by spaces, as in the example below, or print everything without any whitespace.

Scoring

The cost of a cell is $\sqrt{|t-c|}$, where t is the number on the domino half covering the cell and c is the number in the cell according to the design. The total cost of the solution is the sum of the costs of all cells. Total costs are rounded to 6 decimal places.

The score is the total cost on the largest test; lower is better.

Example

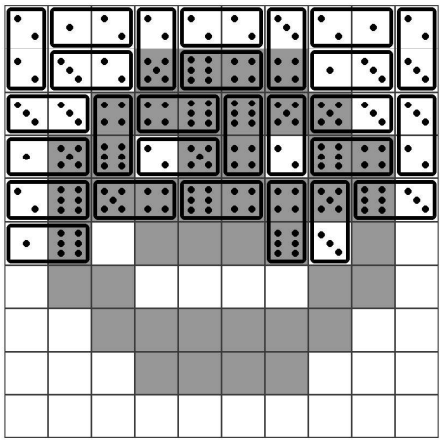
Input

```
2 2 2
1 6
2 5
1 2 1
5 6 1
```

Possible Output

```
1 6
2 5
VV
VV
```

This tiling places both dominoes vertically and costs 0. The same output can be printed as `1625VVVV`. Tiling with two horizontal dominoes would cost at least 4.



An example of a partially solved problem.

Qminers