Harmonious Square

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

The light that sustains the island has begun to tremble, and the four elements that once shaped all things in harmony now disrupt each other's flow.

Once united in a perfect ratio, the elemental currents have fallen out of alignment, leaving scattered traces across the land.

People tried to bring back the balance, but their efforts were easily broken—structures they carefully rebuilt fell apart again and again.

Witness their final attempts to preserve the harmony of the elements. Follow their path, and restore the delicate order they fought to protect until the very end.

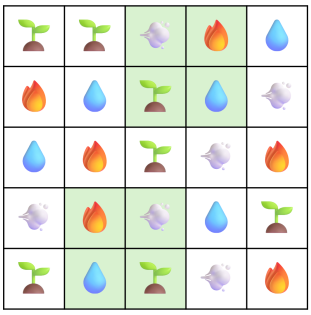
Across the island lies a grid inscribed with the four elements: **Earth**, **Water**, **Fire**, and **Air**.

This grid is of size $N \times M$, with each cell containing one of the four elements. The cell at the r-th row from the top and c-th column from the left is denoted as (r, c).

Each element is defined by two properties: temperature and humidity, as shown in the table below.

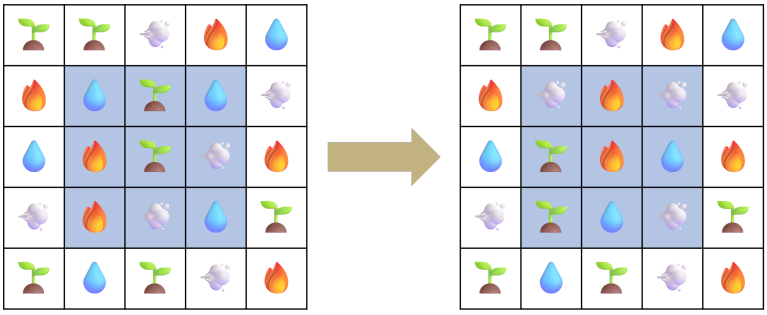
Element	Temperature	Humidity
Earth	Cold	Dry
Water	Cold	Wet
Fire	Hot	Dry
Air	Hot	Wet

Whenever all four elements appear within any 2×2 square in the grid, their properties come into perfect balance. Such a square is known as a **harmonious square**. In the example below, the two highlighted areas in green are both harmonious squares.



Lately, however, the islanders have observed growing instability in the elemental flow. A phenomenon has occurred Q times, each time altering the elements within a specific rectangular region. In each case, the affected elements shifted to their counterparts with opposite **temperature** or **humidity** properties.

For example, if the elements in the central 3×3 area of the grid below are changed to elements with opposite temperature properties, the grid would transform as shown:



The islanders want to determine the number of harmonious squares present each time a change is made to the grid.

Input

The first line contains three space-separated integers N, M, and Q, which represent the size of the grid and the number of changes.

The following N lines each contain M characters $B_{i1}, B_{i2}, \cdots, B_{iM}$. Each character is one of `E`, `W`, `F`, `A`, representing Earth, Water, Fire, and Air, respectively.

The following Q lines each contain information about the changes to the grid in the form of integers $t_i, r_{1i}, c_{1i}, r_{2i}, c_{2i}$. t_i indicates the type of grid change, where $t_i = 1$ indicates a temperature property change, and $t_i = 2$ indicates a humidity property change. The remaining four integers indicate that the change occurs in all cells (r, c) where $r_{1i} \le r \le r_{2i}$ and $c_{1i} \le c \le c_{2i}$.

- $2 \le N \le 1000$
- $2 \le M \le 1000$
- $0 \le Q \le 10^4$
- B_{ij} is one of `E`, `W`, `F`, `A` $(1 \le i \le N, 1 \le j \le M)$
- $1 \le t_i \le 2$ $(1 \le i \le Q)$
- $1 \le r_{1i} \le r_{2i} \le N$ $(1 \le i \le Q)$
- $1 \le c_{1i} \le c_{2i} \le M$ $(1 \le i \le Q)$

Output

On the first line, output a single integer — the number of harmonious squares in the initial state of the grid.

Then, for each of the Q changes, output one line containing a single integer — the number of harmonious squares in the grid after applying that change.

Scoring

- Subtask 1 (6 points): $Q = 0$
- Subtask 2 (7 points): $N \le 100, M \le 100, Q \le 100$
- Subtask 3 (31 points): $r_{1i} = r_{2i}$ $(1 \le i \le Q)$
- Subtask 4 (8 points): $r_{1i} = c_{1i} = 1, r_{2i} = N, c_{2i} = M$ $(1 \le i \le Q)$
- Subtask 5 (48 points): No additional constraints.

Examples

standard input	standard output
5 5 2 EEAFW FWEWA WFEAF AFAWE EWEAF 1 2 2 4 4 2 2 1 4 5	5 2 2
4 6 0 EWEWFA FAFAEW WEEWFA FAWFFA	10