E. Vus the Cossack and a Field

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Vus the Cossack has a field with dimensions $n \times m$, which consists of "0" and "1". He is building an infinite field from this field. He is doing this in this way:

1. He takes the current field and finds a new inverted field. In other words, the new field will contain "1" only there, where "0" was in the current field, and "0" there, where "1" was.
2. To the current field, he adds the inverted field to the right.
3. To the current field, he adds the inverted field to the bottom.
4. To the current field, he adds the current field to the bottom right.
5. He repeats it.

For example, if the initial field was:

$$\begin{matrix} 1 & 0 \\ 1 & 1 \end{matrix}$$

After the first iteration, the field will be like this:

$$\begin{matrix} 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \end{matrix}$$

After the second iteration, the field will be like this:

$$\begin{matrix} 1 & 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 & 1 & 1 \end{matrix}$$

And so on...

Let's numerate lines from top to bottom from 1 to infinity, and columns from left to right from 1 to infinity. We call the submatrix (x_1, y_1, x_2, y_2) all numbers that have coordinates (x, y) such that $x_1 \le x \le x_2$ and $y_1 \le y \le y_2$.

The Cossack needs sometimes to find the sum of all the numbers in submatrices. Since he is pretty busy right now, he is asking you to find the answers!

Input

The first line contains three integers n, m, q $(1 \le n, m \le 1\,000, 1 \le q \le 10^5)$ — the dimensions of the initial matrix and the number of queries.

Each of the next n lines contains m characters c_{ij} $(0 \le c_{ij} \le 1)$ — the characters in the matrix.

Each of the next q lines contains four integers x_1, y_1, x_2, y_2 ($1 \le x_1 \le x_2 \le 10^9$, $1 \le y_1 \le y_2 \le 10^9$) — the coordinates of the upper left cell and bottom right cell, between which you need to find the sum of all numbers.

Output
For each query, print the answer.

Examples

input Copy
```
2 2 5
10
11
1 1 8 8
2 4 5 6
1 2 7 8
3 3 6 8
5 6 7 8
```

output Copy
```
32
5
25
14
4
```

input Copy
```
2 3 7
100
101
4 12 5 17
5 4 9 4
1 4 13 18
12 1 14 9
3 10 7 18
3 15 12 17
8 6 8 12
```

output Copy
```
6
3
98
13
22
15
3
```

Note
The first example is explained in the legend.

→ Contest materials

- Announcement #1 (en)
- Announcement #2 (ru)
- Tutorial #1 (en)
- Tutorial #2 (en)