F - Balanced Rectangles

Editorial (/contests/abc410/tasks/abc410_f/editorial)

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Time Limit: 3 sec / Memory Limit: 1024 MiB

Score : 525 points

Problem Statement

You are given an $H \times W$ grid, where each cell contains `#` or `.`.

The information about the symbols written in each cell is given as H strings $S_1, S_2, \ldots, S_H$ of length W, where the cell in the i-th row from the top and j-th column from the left contains the same symbol as the j-th character of S_i.

Find the number of rectangular regions in this grid that satisfy all of the following conditions:

- The number of cells containing `#` and the number of cells containing `.` in the rectangular region are equal.

Formally, find the number of quadruples of integers (u, d, l, r) that satisfy all of the following conditions:

- $1 \leq u \leq d \leq H$
- $1 \leq l \leq r \leq W$
- When extracting the part of the grid from the u-th through d-th rows from the top and from the l-th through r-th columns from the left, the number of cells containing `#` and the number of cells containing `.` in the extracted part are equal.

You are given T test cases. Find the answer for each of them.

Constraints

- $1 \leq T \leq 25000$
- $1 \leq H, W$
- The sum of $H \times W$ over all test cases in one input does not exceed 3×10^5.
- S_i is a string of length W consisting of `#` and `.`.

Input

The input is given from Standard Input in the following format:

$$
\begin{aligned}
&T \\
&\mathrm{case}_1 \\
&\mathrm{case}_2 \\
&\vdots \\
&\mathrm{case}_T
\end{aligned}
$$

case_i represents the i-th test case. Each test case is given in the following format:

$$
\begin{aligned}
&H \quad W \\
&S_1 \\
&S_2 \\
&\vdots \\
&S_H
\end{aligned}
$$

Output

Output T lines. The i-th line should contain the answer for the i-th test case.

Sample Input 1 Copy

Copy

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```
3
3 2
##
#.
..
6 6
..#...
..#..#
#.#.#.
.###..
######
.###..
15 50
....................#..........###.###.###.###
.................#..#..#.........#.#.#...#.#..
...............#...#####...#.....###.#.#.###.###
................#..##.##..#......#...#.#.#.....#
................#########.......###.###.###.###
.................#.....#....................
.###........##......#.....#..#...#.####.####.##..#
#..#........#......#.....#..#...#.#....#....##..#
#..#........#......#.....#..#...#.#....#....##..#
#.....##...###..##..#.....#..#...#.#....#....#.#.#
#....#..#.#..#.#..#.#..##.#..#...#.####.####.#.#.#
#....#..#.#..#.####.#....##..#...#.#....#....#.#.#
#....#..#.#..#.#....#.....#..#...#.#....#....#..##
#..#.#..#.#..#.#..#.#....#.#.#...#.#....#....#..##
.##...##...####.##...####..#..###..####.####.#..##
```

Sample Output 1 Copy

```
4
79
4032
```

This input contains 3 test cases.

For the 1st case, the following 4 rectangular regions satisfy the conditions in the problem statement:

- From the 1st to 2nd rows from the top, from the 2nd to 2nd columns from the left
- From the 2nd to 3rd rows from the top, from the 1st to 1st columns from the left
- From the 2nd to 2nd rows from the top, from the 1st to 2nd columns from the left
- From the 1st to 3rd rows from the top, from the 1st to 2nd columns from the left

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