Problem G

衝突回避

Time Limit: 3 seconds

縦 n マス，横 m マスからなるグリッド状の盤面がある．上から i 行目，左から j 列目のマスを (i, j) と表す．盤面の四隅以外のマスには障害物が置かれているかもしれない．

盤上に白い駒と黒い駒が 1 つずつある．はじめ，白い駒は左上隅のマス $(1, 1)$ に，黒い駒は左下隅のマス $(n, 1)$ に置かれている．

あなたは 2 つの駒を交互に動かす．最初に動かすのは白い駒である．白い駒は 1 回の移動で右または下に隣接するマスへ，黒い駒は右または上に隣接するマスへ動かす．ここで，2 つのマスが辺を共有しているとき，それらのマスは隣接しているとみなす．ただし，障害物の置かれたマスへ動かすことはできない．さらに，もう一方の駒のあるマスに駒を動かすことはできない．

2 つの駒をそれぞれ $n + m - 2$ 回動かし，白い駒を右下隅のマス (n, m) に，黒い駒を右上隅のマス $(1, m)$ に到達させたい．そのような移動経路の組の総数を 998 244 353 で割った余りを求めよ．

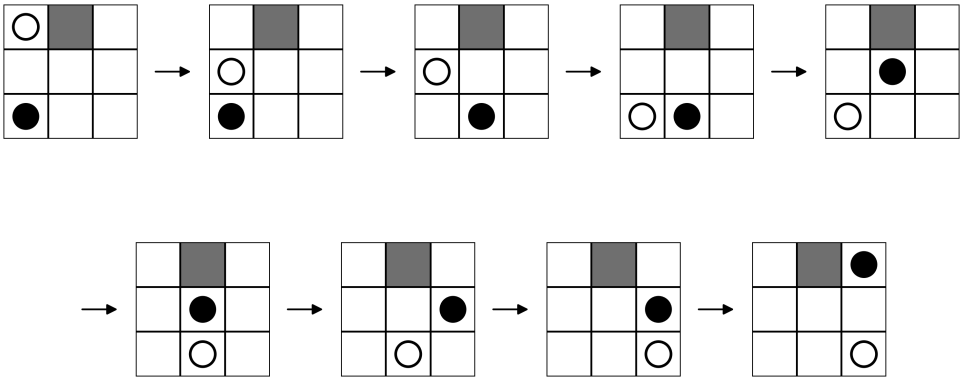

図 G.1. Sample Input 1 の最初のテストケースにおける移動の例

Input

入力は 1 個以上のテストケースからなる．各テストケースは次の形式で表される．

$$
\begin{aligned}
&n\ m\\
&s_{1,1}s_{1,2}\cdots s_{1,m}\\
&\vdots\\
&s_{n,1}s_{n,2}\cdots s_{n,m}
\end{aligned}
$$

整数 n と m は，それぞれグリッドの行数と列数を表す $(2 \le n \le 10^6, 2 \le m \le 10^6, n \times m \le 2 \times 10^6)$．続く n 行には障害物の有無を表す ‘#’ と ‘.’ からなる長さ m の文字列が与えられる．マス (i, j) には，$s_{i,j}$ が ‘#’ ならば障害物が置かれており，‘.’ ならば障害物は置かれていない．$s_{1,1}, s_{1,m}, s_{n,1}, s_{n,m}$ は必ず ‘.’ である．

入力の終わりは，2 個のゼロだけからなる行で表される．テストケースの個数は 200 を超えない．すべてのテストケースにわたる $n \times m$ の総和は 2×10^6 を超えない．

Output

各テストケースについて，移動経路の組の総数を 998 244 353 で割った余りを 1 行に出力せよ．

サンプル入出力は DOMjudge の Problemset ページからダウンロード可能である．

Sample Input 1

```
3 3
.#.
...
...
4 7
.......
###.###
###.###
.......
2 2
..
..
11 27
...........................
...........................
...........................
...###...##...###....##....
....#...#..#..#..#..#..#...
....#...#.....###...#......
....#...#..#..#.....#..#...
...###...##...#......##....
...........................
...........................
...........................
0 0
```

Sample Output 1

```
3
0
1
40019649
```

Problem G

Avoid Collision

Time Limit: 3 seconds

You have a grid board with n rows and m columns. Let (i, j) denote the cell in the i-th row from the top and the j-th column from the left. Some of the cells on the board may contain obstacles, except for the four corners.

A white piece and a black piece are on the board. Initially, the white piece is placed in the top-left corner cell $(1, 1)$, and the black piece is placed in the bottom-left corner cell $(n, 1)$.

You move the two pieces alternately. You first move the white piece. In one move, you move the white piece to the adjacent cell to the right or below, and you move the black piece to the adjacent cell to the right or above. Two cells are considered adjacent if they share an edge. However, you cannot move a piece onto a cell containing an obstacle. Also, you cannot move a piece onto a cell occupied by the other piece.

You want to move the two pieces $n + m - 2$ times each, so that the white piece reaches the bottom-right corner cell (n, m) and the black piece reaches the top-right corner cell $(1, m)$. Find the number of the pairs of such moving paths modulo $998\,244\,353$.

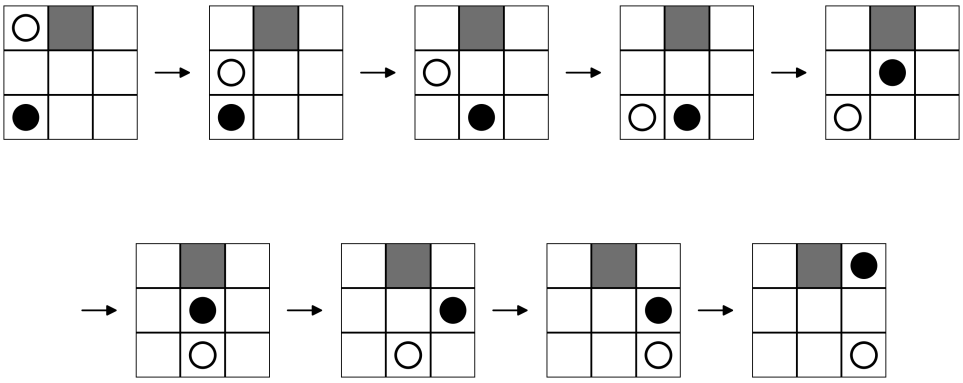

Figure G.1. One way to move the pieces for the first test case of Sample Input 1

Input

The input consists of one or more test cases. Each test case is given in the following format.

$$
\begin{aligned}
&n\ m\\
&s_{1,1}s_{1,2}\cdots s_{1,m}\\
&\vdots\\
&s_{n,1}s_{n,2}\cdots s_{n,m}
\end{aligned}
$$

The integers n and m denote the numbers of rows and columns of the grid, respectively ($2 \le n \le 10^6, 2 \le m \le 10^6, n \times m \le 2 \times 10^6$). Each of the following n lines contains a string of length m consisting of '`#`' and '`.`', representing whether or not an obstacle is there. If $s_{i,j}$ is '`#`', cell (i, j)

contains an obstacle, and if it is '.', the cell does not contain an obstacle. The characters $s_{1,1}$, $s_{1,m}$, $s_{n,1}$, and $s_{n,m}$ are always '.'.

The end of the input is indicated by a line containing two zeros. The number of test cases does not exceed 200. The sum of $n \times m$ over all the test cases does not exceed 2×10^6.

Output

For each test case, output in a line the number of the pairs of the moving paths modulo 998 244 353.

Sample inputs and outputs are available on the Problemset page in DOMjudge.

Sample Input 1	Sample Output 1
3 3 .#. ... ... 4 7 .... ###.### ###.### .... 2 2 .. .. 11 27 ....###...##...###....##.... ....#...#..#..#..#..#..#... ....#...#.....###...#...... ....#...#..#..#.....#..#... ...###...##...#......##.... .... 0 0	3 0 1 40019649