D - Ulam-Warburton Automaton

Editorial (/contests/abc425/tasks/abc425_d/editorial)

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 425 points

Problem Statement

There is a grid with H rows and W columns. We call the cell at the i-th row from the top $(1 \leq i \leq H)$ and j-th column from the left $(1 \leq j \leq W)$ as cell (i, j).

Initially, cell (i, j) is colored black if $S_{i,j}$ is `#` and white if it is `.`.

Perform the following operation 10^{100} times:

- Let T be the set of cells that are colored white and have exactly one adjacent cell colored black. Color each cell in T black. Here, two cells (i_1, j_1) and (i_2, j_2) are adjacent if and only if $|i_1 - i_2| + |j_1 - j_2| = 1$.

Find the number of cells that are colored black after all operations are completed.

Constraints

- $2 \leq H, W$
- $HW \leq 3 \times 10^5$
- H and W are integers.
- $S_{i,j}$ is `#` or `.`.

Input

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

$$
\begin{aligned}
&H \quad W \\
&S_{1,1}S_{1,2}\ldots S_{1,W} \\
&S_{2,1}S_{2,2}\ldots S_{2,W} \\
&\vdots \\
&S_{H,1}S_{H,2}\ldots S_{H,W}
\end{aligned}
$$

Output

Output the answer.

Sample Input 1 Copy

Copy

```
9 9
.........
.........
.........
.........
....#....
.........
.........
.........
.........
```

Sample Output 1 Copy

Copy

```
57
```

The grid changes as follows through the operations. (The number above represents the operation count. The first ten operations are displayed.)

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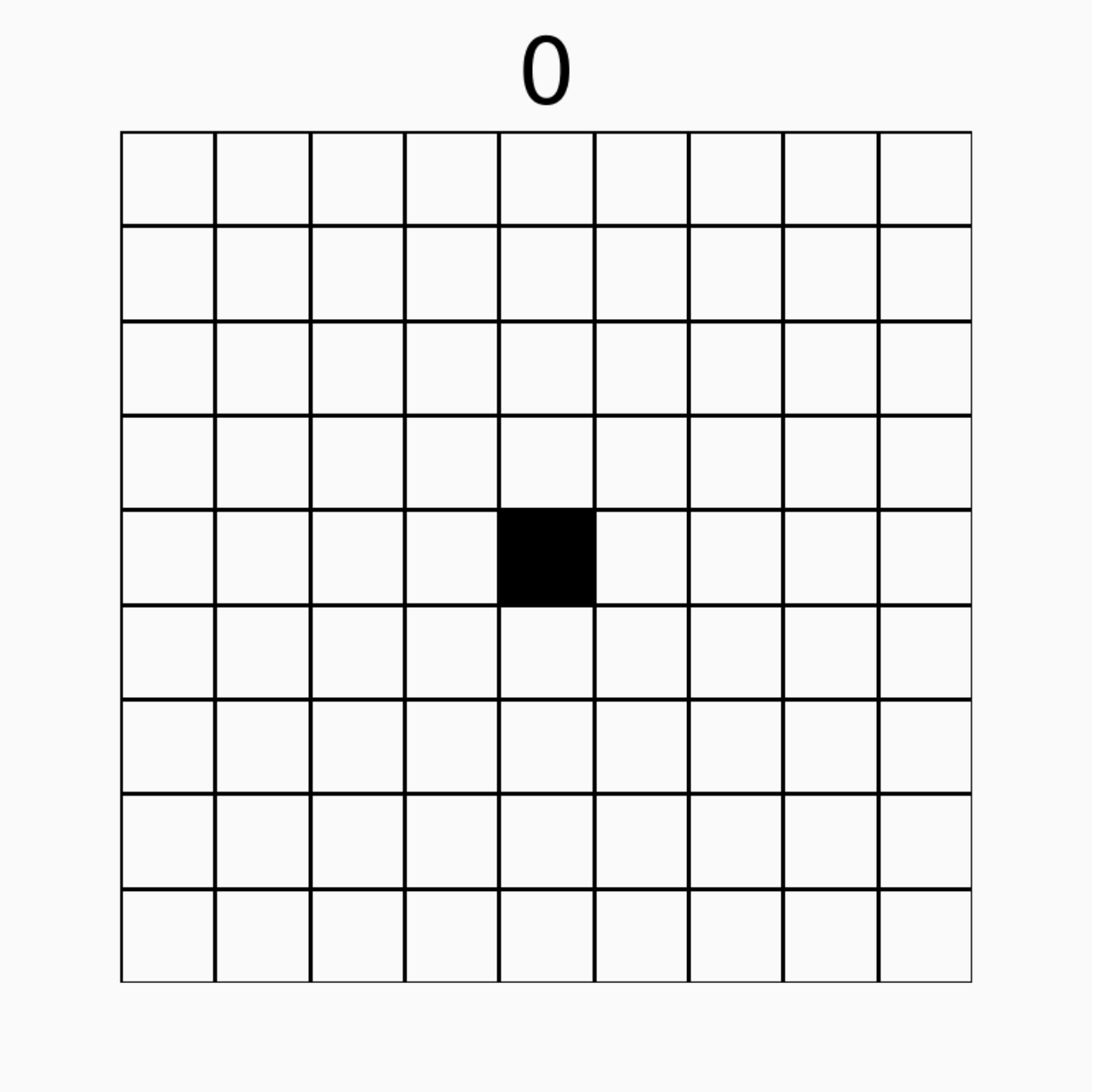

Eventually, 57 cells are colored black.

Sample Input 2 Copy

```
2 2
..
..
```

Copy

Sample Output 2 Copy

```
0
```

Copy

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Sample Input 3 Copy

```
10 10
..........
....#.....
#.......#.
......#...
.......#..
.....#....
..........
..........
..#...#...
.......#..
```

Sample Output 3 Copy

```
64
```

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