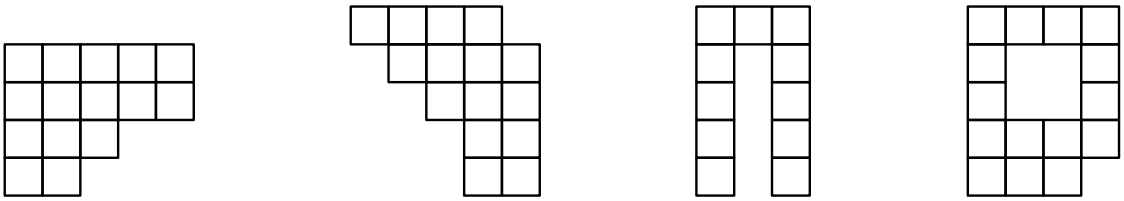
Problem J. Jinxiety of a Polyomino

Input file:	`jinxiety.in`
Output file:	`jinxiety.out`
Time limit:	2 seconds
Memory limit:	512 megabytes

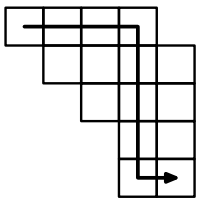
A polyomino is a connected set of unit squares on a square grid. The picture below shows 4 examples of polyominoes.



(a) (b) (c) (d)

Polyomino is called *convex* if its intersection with any vertical or horizontal line is a segment. The picture above shows two convex polyominoes (a) and (b) and two non-convex ones (c) and (d).

Two squares are called adjacent if they share a common side. It is easy to see that for any two squares of a convex polyomino it is possible to get from any square to any other one moving from a square to adjacent one and using only two directions. The picture below shows an example of such path for polyomino (b).



For a convex polyomino P let us define its *jinxiety* $J(P)$ as a minimal k such that it is possible to get from any square to any other square by a path that uses two directions and makes at most k turns. For example, the polyomino (a) has jinxiety of 1 and polyomino (b) has jinxiety of 2.

Given a convex polyomino you have to find its jinxiety.

Input

The input file contains multiple test cases.

Each test case contains two integers h and w — the number of rows and columns in polyomino description, respectively ($1 \le h, w \le 2000$).

The following h lines contain w characters each and describe the polyomino. Each character is either "`.`" for an empty square, or "`#`" for a polyomino square. It is guaranteed that the described figure is a convex polyomino.

Input is followed by a line with $h = w = 0$. The total number of characters in all polyomino descriptions of the input file is at most $4 \cdot 10^6$. There are at most 40 000 tests.

Output

For each test case print one integer: the jinxiety of the polyomino in the input.

Examples

jinxiety.in	jinxiety.out
4 5 ##### ##### ###.. ##... 5 5 ####. .#### ..### ...## ...## 0 0	1 2