C1 – Pollution Simulation

In modeling oil spills and other polluted environments, scientists often want to know how the flow of the pollutant spreads through the environment and around obstacles. In this problem, you are to simulate the flow of a pollutant through a sample environment.

Input:

The input contains two parameters, r and c, specifying the rows and columns of the environment to test (both r and c will be between 1 and 100, inclusive). Then there will be an $r \times c$ grid of characters, where each cell in the grid is either:

- which signifies an empty space;

***** which signifies a barrier that the pollution cannot get through;

P which signifies a pollutant.

Output:

Output a grid showing the time at which each cell in the grid becomes polluted. If a cell never gets polluted, leave it in its initial state (marked with '.'). Some assumptions to make:

- All P spots start polluted at time 0.
- Each time step, all empty squares rectilinearly adjacent (i.e. not diagonally) to a polluted square become polluted themselves.
- Each cell is either polluted or not. You can't be "doubly polluted".

Your output grid should show the timestep (starting at 0) when the cell becomes polluted. If a cell never becomes polluted, leave it in its initial state.

Input and output samples:

```
Input:
5 5
*****
*---*
*-P-*
*---*
*****
```

```
Output:
*****
*212*
*101*
*212*
*****
```

```
Input:
10 10
**********
*----P---*
*--------*
*------***
****-*****
*--------*
----------
----------
------P---
----------
```

```
Output:
**********
*43210123*
*54321234*
*654323***
****4*****
*87654345*
8765432345
7654321234
6543210123
7654321234
```