



Goal

You are director of a rehabilitation clinic for anatidaephobia, your patients have an irrational fear of ducks. Everything goes for the best in your institution, the therapy is heavy but recovery is certain. But one day (you will always remember that day), the disaster occurs: several palmipeds infiltrate the clinic.

Fortunately, everything has been planned, the clinic is equipped with armored doors. Not enough to break three legs to a biped, but enough to prevent carnage. So you will lock everybody, patients and ducks together, then it will be for the Special Forces to blow the doors with explosive and apprehend these birds of misfortune.

The horror cries of your patients are covered by Machiavellian cackling, time is running out. However, a thought crosses your mind: although essential, these doors are extremely expensive. In a burst of greed you are looking to close as few doors as possible, while isolating patients from ducks.

The plan of the clinic is represented by a grid on which the positions of the patients and ducks are indicated. These can not move diagonally. How many doors do you have to seal at least to cut all the passages connecting ducks and patients?

Data

Input

Row 1 : an integer N between 3 and 20 , representing the height of the map, which is equal to its width.

Rows 2 to $N + 1$: the rows of the map represented by strings of N characters. The characters of the line are:

- $.$ a crossable cell
- $\#$ a wall
- $?$ an armored door

- **c** a crossable cell with a duck on it
- **p** a crossable cell with a patient on it

An armored door behaves like a wall if it is sealed, like a crossable cell if it is not sealed.

Output

An integer, indicating the minimum number of armored doors to be sealed to isolate patients from ducks. If this is not possible, display *-1*.

Example

```
7
.?.#.?.
p#.#.#c
.#.#.#.
##.?.##
.#.#.#.
p#.#.#c
.?.#.?.
```

You just have to seal the armored door (?) in the center of the map to separate the ducks from the patients, so the expected answer is 1.

You can download sample input and output data files to work locally by clicking on the link at the bottom of the French version of the question



Téléchargez des fichiers d'exemple ainsi qu'un modèle de code pour travailler localement.