In the game, there is a maze divided into NxN squares. Start in the top-left corner, which is square (1,1), and go to the bottom-right corner, which is square (n,n).

Some of the squares are blocked and some of the squares contain treasures.

Capture all the treasures in the maze before going to square (n,n).

From each square go to one of its four adjacent squares (if the destination is not blocked).

Find the fastest route to reach the destination(n,n) after collecting all the treasures in the maze.

#### Input

The first line contains t, the number of test cases (about 15). Then t test cases follow. Each test case has the following form.

The first line contains N (1 <= N <= 13), the size of the maze

The N following lines describe the maze. The meaning of the symbols is as follows:

'.': an empty square

'\*': a treasure

'#': a blocked square

The number of treasures in the maze does not exceed 13. Squares (1,1) and (n,n) are always empty.

Each test case's input is separated by a blank line.

## Output

For each test case, print in a single line the earliest time that the destination can be reached after collecting all the treasures. If the destination cannot be reached, print -1.

# **Example**

### Input:

4

3

.##

\*#.

3

...

3

\*..

4

.... .#.\*

.#\*. \*\*#.

## **Output:**

-1

4

6 16