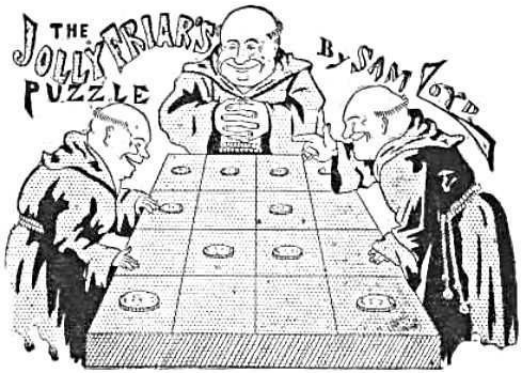
Problem F: The Jolly Friar's Puzzle

A group Jolly Friars are captivated by a puzzle presented to them. Ten coins are placed upon the sixteen squares, so that you can readily discern ten "even lines". An even line is a line (horizontal, vertical or diagonal) inside the grid with a positive, even number of coins in it.

The Friars have learned that the maximum number of even lines that can be formed on a grid with ten coins is 16. A grid with that amount of even lines is known as an *optimal grid*. The puzzle they are trying to solve now is, what is the minimum number of moves required to turn their current grid into an optimal grid?

Picking up one coin and placing it on any other cell (as long as it's empty) counts as one move.



The Jolly Friars moving coins

You receive the description of several grids, each one with ten coins placed on it arbitrarily. Solve the Jolly Friars puzzle for each grid.

Input

Input starts with a positive integer T, that denotes the number of test cases.

Each test case begins with a blank line, followed by four lines with four characters each, describing a grid. Each character of the grid is either a dot (`.`) or an asterisk (`*`) which denote an empty cell or a coin, respectively. Every grid will have exactly ten coins.

$T \leqslant 1000$

Output

For each test case, print the case number, followed by the minimum number of moves required to make the grid optimal.

Sample Input	Output for Sample Input
2 **** *.*. .**. *..* *.*. .*** *.** .**.	Case 1: 4 Case 2: 1

Explanation of Sample Cases

For the first case, moving two coins from the top row into the second row, one in the third row and one in the fourth row can turn the grid into the following:

.**.
****
..**
..

Which has 16 even lines. For the second case, just one move is necessary to turn it into an optimal grid (the question of *which* move is left as an exercise).