

## 7142 Block The Roads

Larry is a game fan. Larry likes play games very much.

One day, Larry found an interesting game and could not stop playing it. This game is played on a  $m \times n$  board. Initially, some of the cells are empty and some of them are occupied. There is also a little ant in one cell. The ant is going to reach a cell with delicious food.

In one step, the ant can move to an adjacent cell. 2 cells are adjacent if they share an edge. Since it can see the whole board, it will choose the cell that belong to the current shortest paths to the food. If there are several adjacent cells belong to the shortest paths, it will choose them in the priority of east, south, west, north. In other words, it will try in the following order:

- If the east cell belong to the current shortest path to the food, choose it.
- Otherwise, if the south cell belong to the current shortest path to the food, choose it.
- Otherwise, if the west cell belong to the current shortest path to the food, choose it.
- Otherwise, if the north cell belong to the current shortest path to the food, choose it.

Larry is acting as the god. He can replace any number of the empty cells into occupied cells at any time. He is not allowed to make the food unreachable to the ant and he is also not allowed to occupy the food cell and the ant's current cell.

One of the example game on  $3 \times 3$  board looks like this:

Initially, the board is empty, the ant is located at A and the food is at F.

```
A . .  
...  
..F
```

Then, the east cell belong to one of the shortest path to food, so the ant moves 1 cell east, Larry do nothing at this time and the ant moves 1 all east again.

```
..A  
...  
..F
```

After that, Larry is really evil and makes 2 cells occupied

```
..A  
.##  
..F
```

Now the ant had to go west, west, south, south, east, east to get the food and Larry is not allowed to block its way anymore. In this game, the ant spent 8 steps to reach the food.

Now Larry would like know the most steps he can make the ant to reach the food. Help him to find it.

## Input

The first line of the input gives the number of test cases,  $T$ .  $T$  test cases follow. Each test case starts with 2 integers,  $m$  and  $n$ , the size of the game board. Then  $m$  lines of  $n$  characters follow, represents the initial status of the board. 'A' represents the current position of the ant, 'F' represents the position of the food, '.' represents empty cells and '#' represents occupied cells. No other characters will appear on the board. The ant can reach the food at the initial board.

## Output

For each test case, first output one line containing 'Case # $x$ :  $y$ ', where  $x$  is the test case number (starting from 1) and  $y$  is the maximum number of steps Larry can make the ant to reach the food.

### Limits:

$$1 \leq T \leq 100$$

$$1 \leq n \leq 5$$

$$1 \leq m \leq 5$$

## Sample Input

```
1
3 3
A..
...
..F
```

## Sample Output

```
Case #1: 8
```