
3. The Chase

Program Name: chase.java

Input File: chase.in

Cats chase mice, but who will win?

Simulate a cat and a mouse in a maze. Each is facing in a cardinal direction (north, east, west, south) and takes turns moving, with the mouse going first. Both the cat and the mouse can see indefinitely far in a straight line in the direction which they are facing.

The mouse moves according to the following rules:

1. If the mouse sees the cat at the beginning of its move, he will turn 90 degrees counterclockwise and then run straight as far as possible until he hits a wall or successfully exits the maze (yay!).
2. If the mouse does not see the cat at the beginning of its move, he will run straight as far as possible until he hits a wall or successfully exits the maze (yay!).
3. Whenever the mouse hits a wall, he turns 90 degrees counterclockwise and waits for the cat to take his turn.

The cat moves according to the following rules:

1. If the cat sees the mouse at the beginning of his move, he runs and eats it immediately (yum!).
2. If the cat saw the mouse run by, he moves to the last position where he saw the mouse, turns to face the direction the mouse was moving, and waits for the mouse to take his turn.
3. If neither 1 nor 2 apply, the cat will run straight until he hits a wall or arrives at the edge of the maze. He then stops, turns 90 degrees clockwise, and waits for the mouse to take his turn.

Input

The first line of the input file will contain a single integer, n , indicating the number of mazes that need analysis. Each maze in the input begins with a line containing two integers, c and r , indicating the size of the maze. The following r lines each contain c printable characters that form the maze, each of which is one of:

'#' - wall

'.' - empty floor

'n', 'e', 's', 'w' – A lower-case letter representing the mouse and the direction it is facing.

'N', 'E', 'S', 'W' – An upper-case letter representing the cat and the direction it is facing.

Each maze has exactly one cat and one mouse.

Each dimension of each maze is in the range 1 to 20, inclusive.

Output

For each maze in the input, determine whether the mouse escapes, is caught, or if the chase continues forever. If the mouse escapes, print, “The mouse escapes in x moves.” where x is the number of moves made by the mouse. If the mouse is caught, print, “The mouse is caught in y moves.” where y is the number of moves made by the cat to catch the mouse. Otherwise, since the chase continues without end, print, “The chase never ends.”

Example Input File

```
3
6 5
#####
#....#
#.#.#.#
#E..n#
#.#.###
6 5
#####
#....#
#.#.#.#
#...W#
#n#####
6 5
#####
#....#
#.#.#.#
.E..n#
#####
```

Example Output To Screen

```
The mouse escapes in 3 moves.
The mouse is caught in 2 moves.
The chase never ends.
```