

[C3] Bringing the L.I.T.S.O.N. (300 pts)

Time Limit: 1s
Memory Limit: 512MB

Problem Description

Wayd, your identity has been compromised! Run! Get out of the capital! NELOC agents are en-route safe house! The safe house is currently represented as an $M \times N$ grid with . as free space, # an obstacle, and E as the exit.

You and your team need to escape, but it is of utmost importance that you bring the ultra-secret device Listening Instrument To Suss Out NELOC (L.I.T.S.O.N.) so it doesn't fall into their hands! Since the L.I.T.S.O.N. is a very long device, it is unwieldy and has to be held at the head. The L.I.T.S.O.N. is of length L , and represented as a string with the form `***@`. A singular @ represents the head while a varying length of *s represent the body.

You and your team start with the L.I.T.S.O.N. somewhere in the room. Your objective is to determine whether there is a path to the exit that allows you to bring the L.I.T.S.O.N. Note that you only need to bring the head to the exit for it to count as a safe escape, as the saying goes: "Just the tip™".

With the L.I.T.S.O.N. in hand, your options at every location is to either:

- Move left, up, down, right one space
- Rotate the L.I.T.S.O.N. clockwise or counterclockwise

You can only move the L.I.T.S.O.N. by one space if the destination spaces immediately to that direction (north/south/east/west) are all free spaces. Note the the exit E is also counted as free space.

Likewise, you can only rotate the L.I.T.S.O.N. around the head @ if and only if all space in the 90° sweep angle are free spaces. To be more exact, the rectangular space encompassing the head, starting position of the stick and ending position of the stick must be empty. For example, this is a valid rotation:

```
...*      ....
...*      ....
...*  -->  ....
...@      ***@
```

but this is not:

```
#...*     ....
...*     ....
...*  --X  ....
...@     ***@
```

In addition, you cannot move or rotate the L.I.T.S.O.N. if any part of it will fall outside of the bounds of the safehouse.

With this behavior and the map of the room, determine if you can reach the exit while carrying the L.I.T.S.O.N. If there is no path, then you will be forced to abandon the L.I.T.S.O.N.

Input Specification

Input will begin with an integer T denoting the number of test cases. T test cases follow.

Each test case begins with three space separated integers: M , and N which denote the size of the room, then L which determine the length of the L.I.T.S.O.N.

The next N lines each contain a string of length M . The i^{th} character of the j^{th} line denotes the ff:

- . is free space
- # as an obstacle
- E as the exit
- @ as the L.I.T.S.O.N. head
- * as the L.I.T.S.O.N. body

The @ will be adjacent to L * characters in one line along one cardinal direction.

Output Specification

For each test case, output L.I.T.S.O.N. secured if there is a valid path to the exit (just the head needs to pass through). Otherwise, output Abandon the L.I.T.S.O.N. if there is no path.

Constraints

$1 \leq T \leq 10$
 $1 \leq M, N \leq 100$
 $0 \leq L < M, N$

The L.I.T.S.O.N. head @ will only appear once per test case and will always be adjacent to L * characters in one line. Likewise * characters will only appear on that line adjacent to @.

The exit E will always appear along the walls/edges of the $M \times N$ safe house.

Sample Input

```
2
5 5 3
...E.
.@***
.....
.....
...#
5 5 3
...E#
.@***
#....
.....
...#
```

Sample Output

```
L.I.T.S.O.N. secured
Abandon the L.I.T.S.O.N.
```

Explanation

In the first test case, the L.I.T.S.O.N. can be brought to the exit via the steps below

1. Move left
2. Rotate 90 degrees clockwise
3. Move up
4. Move right 3 times

In the second test case, there is no possible rotation that can be done on the L.I.T.S.O.N. and there is no valid path to the exit.