

Round 2 2012

[A. Swinging Wild](#)[B. Aerobics](#)[C. Mountain View](#)**D. Descending in the Dark**[Contest Analysis](#)[Questions asked](#)

## Submissions

## Swinging Wild

5pt	Not attempted <b>2006/2307 users</b> correct (87%)
9pt	Not attempted <b>1587/1995 users</b> correct (80%)

## Aerobics

6pt	Not attempted <b>1124/1509 users</b> correct (74%)
15pt	Not attempted <b>741/1067 users</b> correct (69%)

## Mountain View

13pt	Not attempted <b>435/888 users</b> correct (49%)
14pt	Not attempted <b>196/375 users</b> correct (52%)

## Descending in the Dark

8pt	Not attempted <b>106/170 users</b> correct (62%)
30pt	Not attempted <b>0/79 users</b> correct (0%)

## Top Scores

hos.lyric	70
LayCurse	70
eatmore	70
Gennady.Korotkevich	70
ACRushTC	70
mikhailOK	70
dolphinigle	70
Chmel.Tolstiy	70
EgorKulikov	70
Eryx	70

**Problem D. Descending in the Dark**

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the [Quick-Start Guide](#) to get started.

Small input  
8 points

Solve D-small

Large input  
30 points

Solve D-large

## Problem

You are on the face of Mount Everest. You need to find shelter before you freeze, and it's dark! What do you do?

The good news is you have already memorized the layout of the mountain. It is a grid with certain squares impassable and other squares containing caves where you can rest for the night. The bad news is you don't know where you are, and it's too steep to climb up. All you can do is move left, right, or down.

Here is an example layout, with '.' representing a passable square, '#' representing an impassable square, and numbers representing caves.

```
#####
##...#
#.#.#
#...##
#0#..#
####1#
#####
```

Since it is so dark, you will move around by following a *plan*, which is a series of instructions, each telling you to move one square left, right, or down. If an instruction would take you to a passable square or to a cave, you will follow it. If it would take you to an impassable square, you will have to ignore it. Either way, you will continue on to the next step, and so on, until you have gone through the whole plan.

To help with your descent, you want to find out two things for each cave **C**:

- What squares is it possible to reach **C** from? We will label the set of these squares by **S<sub>C</sub>**, and the number of them by **n<sub>C</sub>**.
- Is there a single plan that, if followed from any square in **S<sub>C</sub>**, will finish with you at cave **C**? If so, we say the cave is *lucky*.

Note that you might pass by several caves while following a plan. All that matters is what square you *finish* on after executing all the steps, not what caves you visit along the way.

For example, in the layout above, cave 0 is lucky. There are 9 squares that it can be reached from (including itself), and the plan "left-left-down-down-left-down" will finish with you at the cave from any of those squares.

## Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow, beginning with a line containing integers **R** and **C**, representing the number of rows and columns in the mountain layout.

This is followed by **R** lines, each containing **C** characters, describing a mountain layout. As in the example above, a '#' character represents an impassable square, a '.' character represents a passable square, and the digits '0'-'9' represent caves (which are also passable squares).

## Output

For each test case, first output one line containing "Case #x:", where x is the case number (starting from 1). For each cave **C**, starting with 0 and counting up from there, write a line "**C**: **n<sub>C</sub>** **L<sub>C</sub>**". Here, **C** is the cave number, **n<sub>C</sub>** is the number of squares you can reach the cave from, and **L<sub>C</sub>** is either the string "Lucky" or the string "Unlucky", as defined above.

## Limits

There will be between 1 and 10 caves inclusive.  
If there are *d* caves, they will be labeled with the digits {0, 1, ..., *d* - 1}, and no two caves will have the same label.  
All squares on the boundary of the mountain layout will be impassable.  
 $1 \leq T \leq 20$ .

## Small dataset

$3 \leq R, C \leq 10$ .

Large dataset

$3 \leq R, C \leq 60$ .

Sample

Input	Output
2	Case #1:
7 5	0: 1 Lucky
####	1: 3 Lucky
##0##	2: 4 Unlucky
##1.#	3: 7 Lucky
##2##	Case #2:
#3..#	0: 9 Lucky
##.##	1: 11 Unlucky
####	
7 6	
#####	
##...#	
#..#.#	
###.##	
#0#..#	
####1#	
#####	

In the first case, here are some valid plans you could use for the lucky caves:

- For cave 0, you can use the empty plan. If you can reach the cave at all, you are already in the right place!
- For cave 1, you can use the plan right-down-left.
- For cave 3, you can use the plan right-right-left-down-down-down-left.

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