A Grid Maze

Time limit: 1.0s
Memory limit: 256MB

Given an $R \times C$ grid, find a shortest path from a start cell `S` to an end cell `E`. You may move one cell at a time in the four cardinal directions (up, down, left, right). Cells marked `#` are walls and cannot be entered. Cells marked `.` are open. If no path exists, output `-1`.

Input

The first line contains an integer T ($1 \leq T \leq 100$), the number of test cases. Each test case starts with two integers R and C ($1 \leq R, C \leq 1000$). The next R lines each contain a string of length C describing the grid using characters: `S` (start, exactly one), `E` (end, exactly one), `.` (open), `#` (wall). The total number of cells across all test cases does not exceed 10^6.

Output

For each test case: If the end is unreachable, output a single line with `-1`. Otherwise, output two lines: (1) the length of a shortest path in number of steps, and (2) a shortest path as a string over `U`, `D`, `L`, `R`. If multiple shortest paths exist, any one is acceptable.

Samples

Sample input 1	Sample output 1
1 4 5 S..#. .##.. ..#E.	7 DDDRRRU

Sample input 2	Sample output 2
2 2 3 S.E ... 3 3 S## ### ##E	2 RR -1

Scoring

- 10%: sample tests.
- 30%: $R, C \leq 20$.
- 30%: $R, C \leq 100$.
- 30%: $R, C \leq 1000$.