The Sidewinder Sleeps Tonite

Introduction:

Slitherlink is a type of logic puzzle made popular by Nikoli, the same Japanese puzzle company that has made Sudoku popular the world over. Like most good logic puzzles, it has a set of very basic rules that can nonetheless result in devilishly difficult (and delightful!) puzzling experiences.

The rules of Slitherlink are as follows:

- A Slitherlink board is made up of a lattice of dots; in this problem, it will be a regular rectangular lattice.
- Some of the boxes (or cells) defined by the lattice have numbers within them; with a regular rectangular lattice, the numbers will be between 0 and 3 inclusive.
- The goal of a Slitherlink puzzle is to connect adjacent dots (horizontally or vertically, like the sides of boxes) so that there is a single loop that never crosses itself, with no line segments that are not part of the loop (no "dangling" segments or other, separate loops) such that every cell that has a number has exactly that many sides as segments of the loop.

Given a supposedly solved Slitherlink puzzle, your task will be to determine whether or not it is indeed legitimately solved.

Input:

Input to this problem will begin with a line containing a single integer \( N (1 \leq N \leq 100) \) indicating the number of data sets. Each data set consists of the following components:

- A line containing two integers \( H, W (1 \leq H, W \leq 20) \) representing the height and width of the Slitherlink puzzle by the number of cells (not dots!) per edge;
- A series of \( 2H + 1 \) lines representing the Slitherlink puzzle, using the following non-whitespace characters:
  - 0, 1, 2, 3, ? : The numbers written inside a given cell. A ? represents an empty cell, as in the example graphic above.
  - #: A dot in the lattice.
  - - , | : A horizontal or vertical line segment.
  - . : An empty adjacency between two dots in the lattice.

Note that all Slitherlink puzzles will be fully represented; that is, there is no internal whitespace on a given line to represent empty cells or adjacencies.

Output:

For each data set, print "VALID" if the solution is a valid solution to the given Slitherlink, or "INVALID" if the solution is not valid.

Sample Input:

```
2
5 5
#-#-#-#-#
|.??.?..3|
#.##.#.#.|
|?|.?.?|?.|
##.###.##
#.20.22|.
##-##-##
```
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