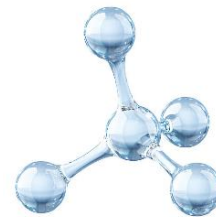


NZPC2023

MOLECULES

Organic molecules can be amazingly complex and need a great variety of shapes and conventions to represent them, particularly if we wish to depict details of their 3-dimensional structures. For this problem, we will restrict ourselves to reasonably simple compounds with only single bonds between atoms, that can be represented on a simple rectangular grid with bonds aligned horizontally or vertically. In such molecules, carbon is bonded to 4 adjacent atoms, nitrogen to 3, oxygen to 2 and hydrogen to 1. These numbers are called the *valences* of the atoms.



Of course, not all such grids represent valid molecules. Your task is to write a program that will determine whether a given grid could represent one or more valid molecules, satisfying the valences of all the atoms. Note that the molecule(s) in a valid grid do not need to exist in the real world.

Input

The first line of the input consists of a pair of integers (r and c , $1 \leq r, c \leq 20$) representing the number of rows and columns in the rectangle to follow. The next r lines contain c characters each, where the characters are chosen from the set {'H', 'O', 'N', 'C', '.'} representing hydrogen, oxygen, nitrogen, carbon and 'empty', respectively.

Output

Output consists of a single line containing a single word:

- *Valid* if it possible to draw horizontal and/or vertical bonds between neighbouring atoms so as to satisfy the valences of all the atoms in the grid, or
- *Invalid* if no such set of bonds exists.

Sample Input #1

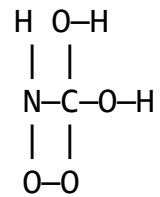
3 4
HOH.
NCOH
OO..

Output for Sample Input #1

Valid

Explanation

A valid bonding is:

**Sample Input #2**

3 4
HOH.
NCOH
OCNH

Output for Sample Input #2

Invalid

Sample Input #3

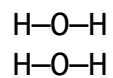
2 3
HOH
HOH

Output for Sample Input #3

Valid

Explanation

This could represent two water molecules:

**Sample Input #4**

4 10
0000N00000
0000H00000
000HNHH000
0000000000

Output for Sample Input #4

Invalid