



## 2437 - Pattern Finder

Oceania - South Pacific - 2008/2009

A number pattern is a sequence of two or more numbers that satisfies a certain rule. For instance, the sequence "3, 5, 7, 9,..." is a number pattern that starts with three and jumps by twos. In primary school, number patterns are used as a tool for learning basic arithmetic and problem-solving skills. Finding a number pattern in a grid of integers is Mrs Brown's favourite challenge for her pupils.

Mrs Brown's number pattern challenge for her 2<sup>nd</sup> grade pupils is to find a number pattern in a grid of integers. The number pattern must start at the smallest value, jumps to an adjacent cell in the grid by adding a fixed positive value, and terminates at the largest value. Two cells are considered adjacent if they share the same row or share the same column.

5	4	6	9
10	7	8	4
13	9	10	12
12	14	12	14

8	4	6	9
5	7	8	4
10	9	10	12
15	14	12	14

For instance, the grid on the left has a pattern that starts at 4 and jumps by 2 and terminates at the largest value of 14, but no pattern can be found in the grid on the right.

Mrs Brown has a large number of these grids, but she does not have the time to find the correct answer for each one. Your task is to help by writing a program to check the existence of a pattern of the required form in a given grid.

### Input

The input consists of a series of scenarios. The first line in each scenario consists of two positive integers  $N$  and  $M$  that represent the number of rows and columns in a grid.  $1 \leq N, M \leq 100$ . Each of the following  $N$

lines contains  $M$  integers that represent the integers in a single row in the grid. The integers are separated by single spaces, and have values that does not exceed 30000.

Input is terminated by a challenge where  $N$  and  $M$  equal  $-1$ .

This challenge should not be processed.

### Output

Output consists of one line for each grid. It will be in one of the following two formats:

At least one pattern exists.

No pattern can be found.

## Sample Input

```
28
77 78 79 77 77 77 77 77
78 79 80 81 82 83 84 85
-1 -1
```

## Sample Output

At least one pattern exists.

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