746 Polygon Visibility

As a building block of a new graphic tool, a visibility function has to be designed: Given two convex polygons, it is necessary to identify the set of points **in the plane** from which the visibility of the second polygon is obstructed by the first one. More precisely, you are looking for the points P, not in the interior of the first polygon, for which there is a point Q in the second polygon such that the *interior* of the line segment $\overline{PQ}$ contains some point of the first polygon. Your task is to write a program that implements that building block.

You may assume that the two polygons have no common points and that neither one is degenerate.

The set of points from which the visibility is obstructed can be described by a finite set of finite segments together with two infinite lines. Remember that the points in the interior of the first polygon are not included in the set of points from which the visibility is obstructed.

Input

The input file contains several instances. Each instance consists of the following consecutive lines:

- One line containing two positive integers N and M separated by one or more blank spaces. These are the number of vertices of the first and the second polygons. You may assume $3 \leq N, M \leq 10000$.
- N lines containing each a pair of coordinates in the XY plane, separated by one or more blank spaces. These are the vertices of the first polygon. Every coordinate is an integer number in the range 1..10000.
- M lines containing each a pair of coordinates in the XY plane, separated by one or more blank spaces. These are the vertices of the second polygon.

The vertices of each polygon appear in clockwise order. The input file ends with a line containing '`0 0`' and should not be processed.

Output

For each instance, you must write a line that identifies that instance, followed by a description of the set of points from which the visibility is obstructed. The description is formed by one of the infinite lines, the vertices that define the finite segments, and the second infinite line.

Each line and each vertex must appear in a separate line of output. Each infinite line must be represented by the slope of the line, rounded to three digits to the right of the decimal point. If the line is vertical, the word '`VERTICAL`' must replace its slope value. Each vertex must be represented with its coordinates, separated by a space. To avoid ambiguity, the vertices must be given in clockwise order with respect to the first polygon.

Sample Input

```
3 3
10 20
20 20
20 10
10 10
7 5
```

```
5 7
4 3
20 19
25 15
20 10
15 15
10 20
10 10
5 15
0 0
```

Sample Output

```
Instance 1
VERTICAL
10 20
20 20
20 10
0.000
Instance 2
1.000
15 15
20 19
25 15
20 10
-1.000
```