Consider a planer grid of M rows and N columns. This grid has exactly MN intersections, each of which is denoted by a pair of coordinates (i, j) where $i = 0, 1, \ldots N - 1$ and $j = 0, 1, \ldots M - 1$.

Suppose $K \leq MN$ points are now placed on K distinct grid intersections.

Consider a diamond shaped area $D(i, j, r)$ such that the centre of the area is at intersection (i, j) and the shape itself is a square of diagonal length $2r$, rotated 45 degree clockwise, where $i = 0, 1, \ldots N - 1$, $j = 0, 1, \ldots M - 1$, and r, the radius of the diamond shape, is any integer greater than 0.

Manoranjan is interested in finding the minimum radius, $R_{min}(P_{min})$, of such a diamond shape that would guarantee of covering at least P_{min} points no matter at which grid intersection the centre of the shape resides, where $P_{min} = 1, 2, \ldots K$. Let $P_{max}(P_{min})$ be the maximum number of points that can be covered by a diamond shape of radius $R_{min}(P_{min})$.

Consider the example in the figure below. Five points at intersections $(0, 0)$, $(4, 0)$, $(2, 2)$, $(0, 4)$, and $(4, 4)$ are placed on a planer grid of 5 rows and 7 columns. The diamond shape $D(2, 4, 1)$ covers none of the points, $D(2, 1, 2)$ covers one point, and $D(3, 3, 4)$ covers four points.
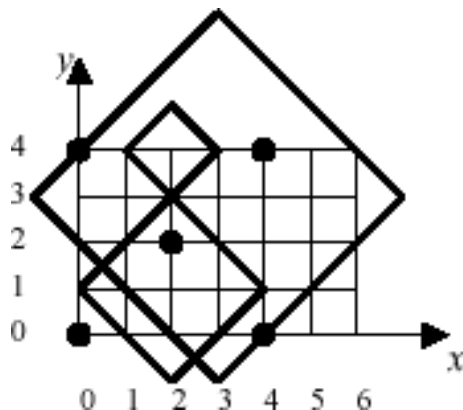
Input

The number of rows, M, and columns, N, of the grid are given in line 1. K number of points are then given in the next one or more lines, where $K \leq MN$. You may assume that $1 \leq M \leq 100$ and $1 \leq N \leq 100$. A pair of integers, representing $x-$ and $y-$coordinates of the point respectively, denotes each point.

All the values given in any of the input lines are separated from each other by one or more white spaces including tabs.

Output

Any given point outside the grid is discarded as '*invalid*' entries, e.g., the last point given in the sample input is discarded. For each possible P_{min} value, corresponding $R_{min}(P_{min})$ and $P_{max}(P_{min})$ values are written in a separate line as per the format shown in the sample output. However, a line of output should only be generated if a diamond shape of radius $R_{min}(P_{min})$ guarantees to cover exactly P_{min} points. In the sample output, no line is generated for $P_{min} = 2$ as $R_{min}(2) = R_{min}(3) = 6$.

All values are written right aligned to their column headings.

Sample Input

```
5       7
0       0 0     4
4 0
4 4             2 2
        0 5
```

Sample Output

```
Pmin   Rmin(Pmin)   Pmax(Pmin)
   1            4             5
   3            6             5
   4            8             5
   5           10             5
```