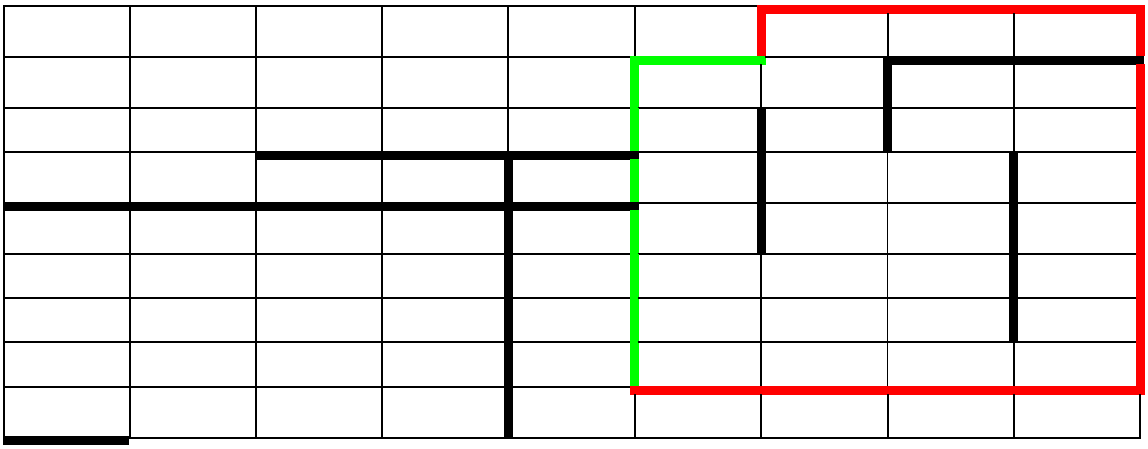
Problem 6
Wiring Assistant

A printed circuit board has a number of horizontal and vertical tracks that may be used to connect electronic components. The example below demonstrates a square board with 10 vertical tracks that we shall assign labels from 0 to 9 starting from the left end, 10 horizontal tracks that we shall assign labels from 0 to 9 starting from the bottom end, and 8 laid down wires (shown in black). Each wire occupies a single horizontal or a single vertical track, and is described by its lower left coordinate followed by its upper right coordinate. In the example below, the 8 wires are described by

0 0 1 0 4 0 4 6 0 5 5 5 8 2 8 6 6 4 6 7 7 6 7 8 2 6 5 6 7 8 9 8



A horizontal wire may overlap with a vertical wire in a single grid point. A horizontal wire may not overlap with another horizontal wire, except at their endpoints. Similarly a vertical wire may not overlap with another vertical wire, except at their endpoints.

Your task is to write a program to identify a path on a printed circuit board to connect two given points on the grid, which adheres to the above rules, such that the number of points your path has in common with the existing wires is minimised. The four red wires, in the above example, connect the points (6 8) and (5 1) with minimum number of 1 overlap. The green wires connect the same two points with 2 overlaps.

In some cases a path may not exist, but your program will only be used to connect a pair of points in printed circuit boards where such a path is known to exist. Those cases will be identified and removed by a sophisticated imaging system, but that is another story.

INPUT:

Input to this problem consists of a sequence of one or more design situations. Several lines describe each design situation as follows:

- The first line consists of two integers: the number of existing wires, M, $0 < M < 100$; the number of horizontal tracks (and also the number of vertical tracks) on a square printed circuit board S, $0 < S < 1000000000$. The integers are separated by a single space.
- The second line consists of $4*M$ integers (i.e., M pairs of 2-dimensional coordinates), separated by a single space, that describe the exact positions of the existing wires in the design.
- The third line consists of four (4) integers (i.e., a pair of 2-dimensional coordinates), separated by a single space, that describe the exact positions of the two points to be connected.

The input will be terminated by a line that consists of two zeros (0 0). This line should not be processed.

OUTPUT:

For each design situation, the output is a single line that contains the minimum number of overlaps.

EXAMPLE INPUT:

```
8 10
0 0 1 0 4 0 4 6 0 5 5 5 8 2 8 6 6 4 6 7 7 6 7 8 2 6 5 6 7 8 9 8
6 8 5 1
7 10
0 0 1 0 4 0 4 6 0 5 5 5 8 2 8 6 6 4 6 7 2 6 5 6 6 4 8 4
6 8 5 1
0 0
```

EXAMPLE OUTPUT:

```
1
0
```