

ACM Pacific NW Region Programming Contest

15 November 2003

Problem E: Toy Storage

Mom and dad have a problem: their child John never puts his toys away when he is finished playing with them. They gave John a rectangular box to put his toys in. Unfortunately, John is rebellious and obeys his parents by simply throwing his toys into the box. All the toys get mixed up, and it is impossible for John to find his favorite toys anymore.

John's parents came up with the following idea. They put cardboard partitions into the box. Even if John keeps throwing his toys into the box, at least toys that get thrown into different partitions stay separate. The box looks like this from the top:



PROBLEM

For each $i > 0$ such that there exists a partition with i toys, determine how many partitions have i toys. Provide a list of the values of i and their count of associated partitions.

INPUT: Read from file e.in

The input consists of a number of cases. The first line consists of six integers n m x_1 y_1 x_2 y_2 . The number of cardboards to form the partitions is n ($0 < n \leq 1000$) and the number of toys is given in m ($0 < m \leq 1000$). The coordinates of the upper-left corner and the lower-right corner of the box are (x_1, y_1) and (x_2, y_2) , respectively. The following n lines each consists of two integers U_i L_i , indicating that the ends of the i -th cardboard is at the coordinates (U_i, y_1) and (L_i, y_2) . You may assume that the cardboards do not intersect with each other. The next m lines each consists of two integers X_i Y_i specifying where the i -th toy has landed in the box. You may assume that no toy will land on a cardboard or on the boundary of the box.

The input is terminated by a line consisting of a single 0. Each line of input in the file is terminated by the end of line character (" $\backslash n$ ").

OUTPUT

For each box, first provide a header stating "Box" on a line of its own. After that, there will be one line of output per count ($i > 0$) of toys in a partition. The value i will be followed by a colon and a space, followed the number of partitions containing i toys. Output will be sorted in ascending order of i for each box.

Sample Input

```
4 10 0 10 100 0
```

**ACM Pacific NW Region Programming Contest
15 November 2003**

```
20 20
80 80
60 60
40 40
5 9
15 9
95 9
25 9
65 9
75 9
35 9
45 9
55 9
85 9
5 6 0 10 60 0
4 3
15 30
3 1
6 8
10 10
2 1
2 8
1 5
5 5
40 9
7 9
0
```

Sample Output

```
Box
2: 5
Box
1: 4
2: 1
```