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HS 2012
Exercise Sheet ACM Week II

Algorithms Lab

Exercise 3 – *Forced Landing*

Imagine the airplane you are currently flying with encounters a problem with it's engines and has to make a forced landing. Luckily there is a big, rectangular area that is flat enough for landing. The only remaining problem is that there are many trees growing in this area and the pilot has problems finding enough space to land.

Since you are the only passenger who knows a lot about efficient algorithms they asked you for help. Their precise description is:

There is this rectangular area of width w and height h (in meters) we would like to land in. ("In" meaning entirely inside!) Unfortunately there are n trees on integer positions (x_i, y_i) for $1 \leq i \leq n$. Our airplane needs a strip that is s meters in width and at least r meters long. Since there is strong wind coming from east and our engines are broken, we'll have to land directly towards east or we will die. If you find more then one possible place to land, please point us to the one as far as possible in the west, and as far possible north if there are multiple equally-west solutions. This is the direction we are coming from and therefore maximizes our chances of survival. Please find the place for our forced landing if it exists!

Input The first line of the input file will contain an integer giving the number of test cases that follow.

Each test case starts with a line containing w and h, followed by a line containing the needed width s, the needed runway length r, and n, the number of trees. (w, h, s, r and n are integers). After that you'll find n lines, the i-th line being "x_i y_i", the integer coordinates of the i-th tree ($0 \leq x_i \leq w$, $0 \leq y_i \leq h$). The origin of the coordinate system lies in the north-west corner.

Output For each test case either the coordinates of the upper left corner of the area the airplane can land in, or the word "`Impossible`" if there is not enough space for landing. In the latter case let's hope all this was just one of your algorithmic dreams and not your end...

Remember that you should not just pick any place big enough, but the one as far as possible in the north-west, west being more important.

Constraints

- Small and bordercase datasets - $0 \leq h, w \leq 500$, $0 \leq n \leq 5000$
- Medium dataset - $0 \leq h, w \leq 100000$, $0 \leq n \leq 5000$
- Large dataset - $0 \leq h, w \leq 100000$, $0 \leq n \leq 100000$

Sample Input

```
2
7 4
2 6 3
4 1
6 2
```

```
2 3
10 6
2 8 5
7 1
2 2
4 3
7 4
3 5
```

Sample Output

```
0 1
2 1
```