Competitive Programming SS24

Submit until end of contest

Problem: Happy Home (1 second timelimit)

After winning the ICPC World Finals, you decide to treat yourself to a new house. These two things have nothing to do with each other, but you wanted to mention it anyway.

A puppy happily lying on your carpet.
CC 0 by Josh Sorenson on Pexels

Just like your programming skills, your new house is also quite impressive, but it is missing something — a cozy atmosphere. To fix this, you decide to cover the floor of your house with cozy rectangular carpets.

As you already have anticipated that you would have to solve a nasty geometry problem concerning your house, you ensured that your house is as simple as possible. More specifically, you told the architect to design your house such that:

- All walls, when embedded in the plane, are axis-aligned, i.e., parallel to the x or y axis.
- The house is hole-free and not self-intersecting.
- There is no axis-parallel line that goes through three corners of the house.

As buying carpets can be quite expensive, you want to cover your house with the minimum number of carpets possible. You wonder, what is the minimum number of rectangular carpets needed to cover your house?

Input The input consists of:

- One line with an integer n ($4 \leq n \leq 10^4$), the number of corners of your house.
- n lines, the ith of which contains two integers x_i and y_i ($0 \leq x_i, y_i \leq 10^9$), the coordinates of the ith corner of your house.

The corners are given in counterclockwise order around the house. Furthermore, all walls of the house are axis-aligned, i.e., parallel to the x or y axis. Lastly, there is no axis-parallel line that goes through three corners of the house.

Output Output the minimum number of cozy carpets[1] needed to fully cover your home.

[1] Sadly, the letter C was already taken for this contest.

Sample Input 1

```
8
0 0
2 0
2 1
3 1
3 3
1 3
1 2
0 2
```

Sample Output 1

```
3
```

Sample Input 2

```
10
6 0
6 3
5 3
5 4
4 4
4 5
3 5
3 6
0 6
0 0
```

Sample Output 2

```
4
```

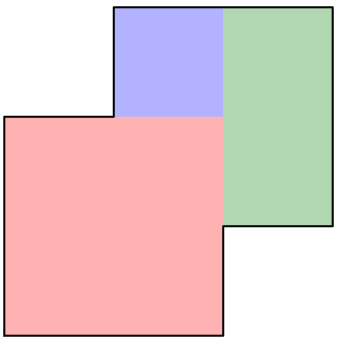

Figure U.1: A possible 3 carpet arrangement for the house from Sample Input 1.