

# Problem F: Fragmented Floor

Time limit: 2 seconds

A friend of yours has recently moved to the Netherlands, and while visiting potential new homes she discovered an odd peculiarity of Dutch renting practices: You can rent a flat with an oven, fridge, dishwasher and whatnot, but you most likely will have to bring your own floor. Of course the flats have a *floor*, but there is nothing *on* it. No parquet, tiles, laminate or carpet.

As a consequence, every sufficiently large Dutch settlement has several Flooring shops right in the city centre, next to cafés, restaurants and residential buildings (and probably a canal). Funnily enough, by the stacks of laminate on the side walks you can easily tell where someone is currently moving out.

For your friend this odd tradition unfortunately results in another factor that has to be considered before moving in.

She has already decided on the type of floor (some very fine “Tapijt”), but the shop she chose has a pricing policy that makes it hard to find the minimum price for laying the floor: They of course charge by the square-meter, but additionally they charge a fixed 300€ per piece of carpet delivered, no matter its size. Since this is a substantial amount of money, your friend asks you for help in determining the minimum cost for covering the floor of her new dwelling with the chosen “Vloerbedekking”.

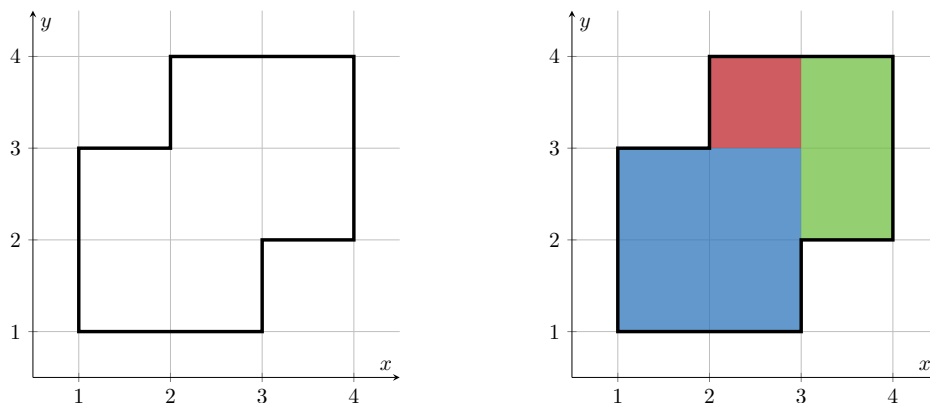


Figure F.1: In Sample Input 2 you need three rectangular carpets to cover the whole floor.

For practical reasons, any piece of carpet the shop sells is perfectly rectangular, but the customer may choose the exact width and height of it. Also, the rectangular carpet pieces have to cover the floor exactly without overlap, since your friend does not own a box cutter and is afraid she would not be able to cut precisely enough anyway.

The cost without the fixed price per piece is easy, she can just multiply the area of the flat with the cost per square-meter. However, she struggles with finding the minimum number of carpet pieces and this is where you come in: Given the floor plan of the flat, determine the minimum number of rectangular carpet pieces needed to cover the entire floor without overlap.

## Input

The input consists of:

- One line with an integer  $n$  ( $4 \leq n \leq 3\,000$ ), the number of corners of the flat.
- $n$  lines, each with two integers  $x$  and  $y$  ( $1 \leq x, y \leq 10^9$ ) giving the coordinates of one corner. The walls of the flat are built between two consecutive corners and between the

first and the last corner.

Additionally, the input satisfies the following constraints:

- The corners are given in counterclockwise order.
- The walls of the flat do not touch or intersect each other, except for consecutive walls, which share their endpoints to form a corner.
- The walls of the flat alternate between horizontal and vertical.

## Output

Print one integer, the minimum number of rectangular carpet pieces to cover the floor.

### Sample Input 1

```
4
1 1
2 1
2 2
1 2
```

### Sample Output 1

```
1
```

### Sample Input 2

```
8
1 1
3 1
3 2
4 2
4 4
2 4
2 3
1 3
```

### Sample Output 2

```
3
```

### Sample Input 3

```
16
7 1
7 3
6 3
6 2
5 2
5 4
4 4
4 5
3 5
3 6
2 6
2 4
3 4
3 3
1 3
1 1
```

### Sample Output 3

```
6
```