Appleby Contest '19 P4 - Rectangles

Time limit: 0.5s **Memory limit:** 64M
Python: 256M

King Brian is looking at rectangles!

He has a list of N points $(x_1, y_1), (x_2, y_2), \ldots, (x_N, y_N)$ and can select any four at random. If the four points form the four corners of an **axis aligned** rectangle, he writes down the area.

What is the largest possible area he can get from selecting four random points?

Note: axis aligned means that the four lines that form the rectangle are all either horizontal or vertical (aligning with the x and y axes respectively).

Constraints

For all subtasks:

$4 \leq N \leq 2 \times 10^3$

$1 \leq |x_i|, |y_i| \leq 2 \times 10^4$

No two points will be the same.

Subtask 1 [15%]

$1 \leq N \leq 50$

Subtask 2 [70%]

$1 \leq N \leq 500$

Subtask 3 [15%]

No additional constraints.

Input Specification

The first line will contain the integer N.

The next N lines will each contain two space separated integers: x_i, y_i.

Output Specification

Output one line, the maximum possible area of an **axis aligned** rectangle King Brian can get from selecting four random points. If no rectangles can be formed, print 0.

Sample Input

```
9
1 1
5 5
7 7
5 7
7 5
10 10
5 10
10 5
20 20
```

Sample Output

```
25
```

Sample Explanation

There are two possible rectangles that can be constructed with the 9 points:

- From $(5, 5)$ to $(7, 7)$ with an area of 4
- From $(5, 5)$ to $(10, 10)$ with an area of 25

Thus the answer is 25.