Mock CCO '18 Contest 2 Problem 4 - Victor's Rectangles

Roger, having figured out how to reason in two dimensions, has crafted a tricky puzzle for Victor to crack.

Roger has highlighted several lattice points in the xy-plane and wants Victor to find the rectangle with maximum area inside that has vertices among the highlighted points!

Victor takes a look at this task and scoffs. It's just a line sweep problem, what's so tricky about that?

However, Roger points out to Victor that the rectangle need not be axis-aligned. The rectangles, much like Roger, can be tilted.

Is Victor tilt-proof?

Constraints

$4 \leq N \leq 1500$

For at most 20% of full credit, $N \leq 500$.

$|x_i| \leq 10^8$

$|y_i| \leq 10^8$

All (x_i, y_i) are distinct.

Input Specification

The first line will contain a single integer, N.

Each of the next N lines will contain two space-separated integers x_i and y_i, indicating that Roger has highlighted point (x_i, y_i).

Output Specification

Print, on a single line, the maximum area of a rectangle with lattice points among the highlighted points. It is guaranteed that a non-degenerate rectangle exists.

Sample Input

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

Sample Output

```
10
```