

D: Tunnel Digging

The famous Italian Constructions and Pizza Company (ICPC) was entrusted of a very important task: the renovation of Leonardo da Vinci Campus, in Milan.



As you know, in the Leonardo da Vinci Campus there are N buildings. The i -th building is located at some coordinates (x_i, y_i) of Città Studi. The ICPC was asked to build underground tunnels, each of them connecting two buildings, in order to make it possible to go (using one or more tunnels) from each building to all the others.

This would've been an easy task, but in order to follow the strict regulations of the EU, the ICPC needs to **keep the longest tunnel as short as possible**, to avoid collapses.

As engineers, we consider the distance between two buildings located in (x_0, y_0) and (x_1, y_1) , and thus also the length of the tunnel between the two, to be computed as follows:

$$\sqrt{(x_0 - x_1)^2 + (y_0 - y_1)^2}$$

Please, help the ICPC by computing what is the smallest integer number L such that the **longest tunnel** has a length $\leq L$.

Input

The input consists of $N + 1$ lines. The first line contains the integer N : the number of buildings in the campus. The following N lines contain two integers each: x_i and y_i , the coordinates of the i -th building.

Output

Output a number indicating the smallest possible length for the longest tunnel you will need to drill to connect all the locations together, rounded to the smallest integer not less than it.

Constraints

- $1 \leq N \leq 10^3$.
- $0 \leq x_i, y_i \leq 10^6$.

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Scoring

Your program will be tested against several testcases, and will be considered **correct** only if it will solve all of them correctly.

Examples

input	output
4 0 2 0 3 2 2 3 1	2
4 1 1 1 2 1 3 2 2	1