Art Gallery Selection (gallery)

Luca decided to enter the art business, and is opening a new modern art gallery in Milan. As soon as he opened a call for young emerging artists, his e-mail was flooded by pictures of paintings! In fact, too much to be selected by hand: he needs an algorithm to extract the most promising among them. Following blindly his profound artistic sense, developed in years studying engineering, Luca believes that the most beautiful paintings are those featuring subjects arranged symmetrically with respect to a vertical axis.

Figure 1: Few of the paintings that Luca has to sort.

Given a description of a painting, picturing N main subjects, each of them on a specific coordinate (X_i, Y_i), help Luca determine whether there exists a vertical axis of symmetry for the given points.

☞ Among the attachments of this task you may find a template file `gallery.*` with a sample incomplete implementation.

Input

The first line contains the only integer N. The following N lines contains two integers X_i, Y_i.

Output

You need to write a single line with the string `'YES'` if a vertical axis of symmetry exists, or the string `'NO'` if it does not.

Constraints

- $1 \leq N \leq 100\,000$.

- $0 \leq X_i, Y_i \leq 100\,000$ for each $i = 0 \ldots N-1$.
- The points are all distinct.

Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

– **Subtask 1** (0 points) Examples.

– **Subtask 2** (10 points) $N \leq 50$ and Y_i are all equal.

– **Subtask 3** (30 points) $N \leq 200$ and Y_i are all equal.

– **Subtask 4** (25 points) $N \leq 3000$ and Y_i are all equal.

– **Subtask 5** (15 points) $N \leq 3000$.

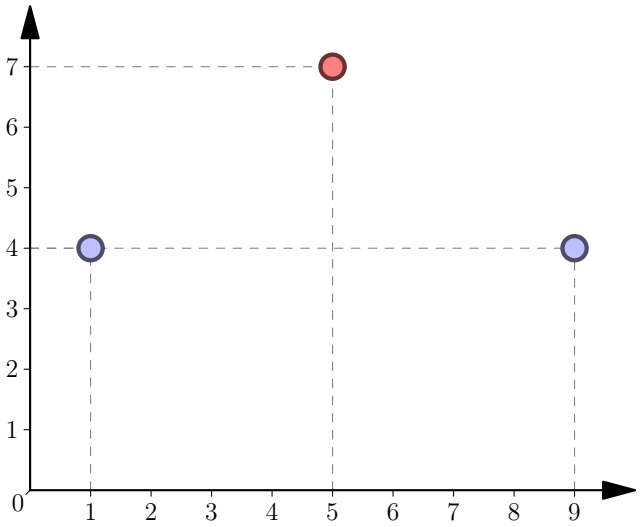
– **Subtask 6** (20 points) No additional limitations.

Examples

input	output
3 5 7 1 4 9 4	YES
4 1 4 9 4 3 7 6 7	NO

Explanation

In the **first sample case**, a vertical symmetry axis exists at $X = 5$.



In the **second sample case**, two points would be symmetric for $X = 5$, and other two for $X = 4.5$: overall, no vertical symmetry axis exists.