

Half-Planes Coloring

Input file: *standard input*
Output file: *standard output*
Time limit: 1 second
Memory limit: 1024 mebibytes

You have a 2D plane that is initially entirely white. You can perform the following operation any number of times: choose a line and the half-plane bounded by this line. Then, perform one of the following two actions:

- Paint the half-plane black, **excluding** the boundary.
- Paint the half-plane white, **including** the boundary.

You are given a polygon P with n vertices, which is not necessarily convex. The vertices of P are given in counterclockwise order as $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$, and the i -th edge of P connects vertex (x_i, y_i) to vertex $(x_{(i \bmod n)+1}, y_{(i \bmod n)+1})$.

Determine whether it is possible to use the aforementioned operations to paint only the interior of polygon P black, leaving everything else white.

Input

The first line of the input contains one integer n ($3 \leq n \leq 4000$).

Then n lines follow, each containing two integers x_i and y_i : the coordinates of the i -th vertex of the polygon ($-10^7 \leq x_i, y_i \leq 10^7$).

You may assume that all vertices are distinct, the edges of polygon P do not share any points other than the vertices, and each internal angle of polygon P is not equal to 180 degrees.

Output

If it is possible to achieve the desired state with the operations, print “Yes”; otherwise, print “No”.

Examples

<i>standard input</i>	<i>standard output</i>
4 10 -5 2 -5 -7 6 -7 -8	Yes
12 17 1 19 3 12 10 19 17 17 19 10 12 3 19 1 17 8 10 1 3 3 1 10 8	No