Problem A: Stars

Advanced Algorithms for Programming Contests

Restrictions

Time: 2 seconds
Memory: 512 MB

Problem description

In order to call a polygon a star, we require two things:

- the corners are alternating between pointing into and out of the polygon in a zig-zag pattern.
- the angles of the outer corners should be acute ($0° < \text{angle} < 90°$).

Given a polygon as a list of points describing the corners in clockwise order (neighboring and the last and first point are connected), you are to find out if it is a star.

Input

The input consists of

- one line containing N ($3 \leq N \leq 1000$) – the number of corners
- N lines describing the corners, the i-th of which contains two integers x_i and y_i ($-1000 \leq x_i, y_i \leq 1000$) – the coordinates of the i-th corner.

Output

Output `YES` if the given shape is a star and `NO` otherwise.

Sample input and output

Input	Output
6 1 -1 1 -4 -1 1 -2 3 1 2 3 3	YES
4 1 -1 -1 -1 -1 1 1 1	NO