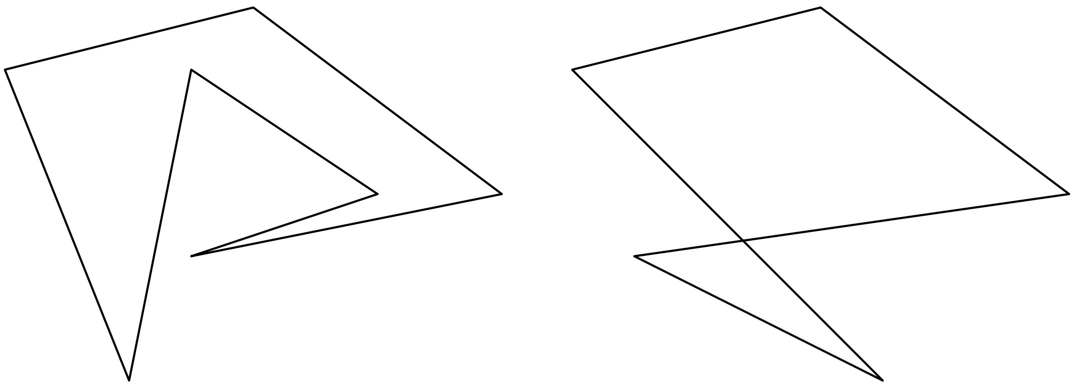
Simple Polygon

`polygon.c`, `polygon.C`, `polygon.java`, `polygon.p`

A *polygon* P determined by points p_1, p_2, ..., p_n is a closed chain of line segments (called *edges*) p_1p_2, p_2p_3, ..., p_np_1 in the plane. Polygon P is *simple*, if no two edges have any points in common, with the obvious exception of two consecutive segments having one common point (called *vertex*). Note however, that if a vertex is part of any other (third) edge, the polygon is no longer simple.

Any polygon that is not simple is called *self-intersecting*. In two example figures below, the first polygon is simple, the second one is self-intersecting.



Your task is to determine whether a given polygon is simple or self-intersecting.

Input Specification

The input contains several test cases. Each test case corresponds to one polygon. First line of the test case contains N, the number of points ($1 \leq N \leq 40\,000$). Each of the following N lines contains coordinates of point P_i, that is X_i, Y_i separated by space, $1 \leq X_i, Y_i \leq 30\,000$.

The last test case is followed by a line containing zero.

Output Specification

For each test case output either "`YES`" (the polygon is simple) or "`NO`" (the polygon is self-intersecting).

Sample Input

```
5
1 6
5 7
9 4
2 3
6 1
7
1 6
5 7
9 4
4 3
7 4
4 6
3 1
7
1 1
1 4
1 3
2 2
3 1
3 3
2 2
0
```

Output for Sample Input

```
NO
YES
NO
```