Problem B. Point Pairs

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	256 mebibytes

There are $2N + 1$ points on a plane. The i-th point is at (X_i, Y_i). Two points i and j can be paired if $X_i = X_j$ or $Y_i = Y_j$.

For each point, determine the following:

- If you remove this point from the set of points, you get $2N$ points. Can these $2N$ points be separated into N disjoint pairs?

Input

Input format:

N
X_1 Y_1
X_2 Y_2
$\vdots$
X_{2N+1} Y_{2N+1}

Constraints:

- $1 \leq N \leq 100,000$
- $1 \leq X_i, Y_i \leq 2N + 1$
- The points are pairwise distinct.
- All values in the input are integers.

Output

Output $2N + 1$ lines. For the i-th line, print "`OK`" if all points except for the i-th can be separated into N disjoint pairs. Otherwise print "`NG`".

Examples

standard input	standard output
1 1 1 1 2 2 1	NG OK OK
2 1 1 1 2 2 2 2 3 3 3	OK NG OK NG OK
2 1 1 1 2 3 3 4 4 4 5	NG NG OK NG NG