4086 Rotating Rings

Any square grid can be viewed as one or more *rings*, one inside the other. For example, as shown in figure (a), a 5×5 grid is made of three rings, numbered 1, 2 and 3 (from outside to inside.) A square grid of size N is said to be sorted, if it includes the values from 1 to N^2 in a row-major order, as shown in figure (b) for $N = 4$. We would like to determine if a given square grid can be sorted by *only rotating its rings*. For example, the grid in figure (c) can be sorted by rotating the first ring two places counter-clockwise, and rotating the second ring one place in the clockwise direction.

1	1	1	1	1
1	2	2	2	1
1	2	3	2	1
1	2	2	2	1
1	1	1	1	1

Figure (a)

Input

Your program will be tested on one or more test cases. The first input line of a test case is an integer N which is the size of the grid. N input lines will follow, each line made of N integer values specifying the values in the grid in a row-major order. Note than $0 < N \leq 1,000$ and grid values are natural numbers less than or equal to 1,000,000.

The end of the test cases is identified with a dummy test case with $N = 0$.

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

Figure (b)

Output

For each test case, output the result on a single line using the following format:

$k.\sqcup result$

Where k is the test case number (starting at 1,) $\sqcup$ is a single space, and *result* is '`YES`' or '`NO`' (without the double quotes.)

9	5	1	2
13	7	11	3
14	6	10	4
15	16	12	8

Figure (c)

Sample Input

```
4
9 5 1 2
13 7 11 3
14 6 10 4
15 16 12 8
3
1 2 3
5 6 7
8 9 4
0
```

Sample Output

```
1. YES
2. NO
```