J. Climbers

Time limit: 3 seconds
Memory limit: 128 kBytes

Description

A group of ECN competitors decides to go hiking along a mountain ridge.

A mountain sequence is a sequence of numbers that meets the following criteria:

- Unique Peak: The sequence has exactly one peak element, which is strictly greater than its immediate neighbors (if neighbors exist).
- Monotonic Increase Before the Peak: All elements to the left of the peak (if any exist) form a monotonically increasing sequence, meaning each element is greater than or equal to the preceding one.
- Monotonic Decrease After the Peak: All elements to the right of the peak (if any exist) form a monotonically decreasing sequence, meaning each element is less than or equal to the preceding one.

A square matrix is said to have a mountain ridge if the following conditions are satisfied:

- Each row of the matrix forms a valid mountain sequence, meaning each row contains a unique peak element that satisfies the mountain sequence criteria.
- The peaks of consecutive rows are neighboring elements, meaning the peak in one row is adjacent (vertically, or diagonally) to the peak in the next row.

Task

The program should:

- Read a natural number n and an $n \times n$ matrix of natural numbers from the standard input.
- Print `YES` to the standard output if the matrix contains a valid mountain ridge.
- Print `NO` to the standard output if no valid mountain ridge exists.

Input

The input format is as follows:

- The first line contains a single natural number n.
- The next n lines contain n space-separated natural numbers, representing the elements of the $n \times n$ matrix.

Output

Output a single line:

- Print `YES` if the given matrix forms a valid mountain ridge.
- Print `NO` otherwise.

Constraints

- $2 \leq n \leq 2500$
- $0 \leq matrix[i][j] \leq 10^9$
- Remember: the *memory limit* refers to all included libraries as well as to every declared variable. So be careful, it is not as much as it seems!

Example

Input	Output
7 1 2 3 **4** 3 2 1 1 3 4 7 **8** 4 1 3 4 6 7 **8** 2 1 1 2 3 4 5 6 **7** 0 1 2 4 5 **6** 5 3 2 1 5 3 4 4 0 2 8 **9** 7 5 1	`NO`

Explanation: The result is `NO`, because the peaks of the mountain sequences in consecutive rows neither align in the same column nor in adjacent columns. Furthermore, the penultimate row does not form a valid mountain sequence.

Input	Output
5 0 1 1 **4** 2 3 4 5 7 **8** 0 1 2 **8** 3 0 3 **7** 6 6 1 3 **5** 4 3	`YES`

Explanation: The result is `YES`, because the peaks of the mountain sequences in consecutive rows are either in the same column or in adjacent columns, thereby forming a valid mountain ridge.