Let M be an n by n matrix, in which $M(i, j)$ is the entry in the i-th row and the j-th column. We say a path from $M(1, 1)$ to $M(n, n)$ is monotonic if the path only goes downward (in the direction that the row-index increases) or rightward (in the direction that the column-index increases). Write a program to decide whether there exists a monotonic path P from $M(1, 1)$ to $M(n, n)$ so that the entries $e_1, e_2, \ldots, e_{2n-1}$ on P, ordered by their visiting time, form an arithmetic progression. In other words, there exist a and d so that $e_k = a + (k - 1)d$ for all $k \in [1, 2n - 1]$.

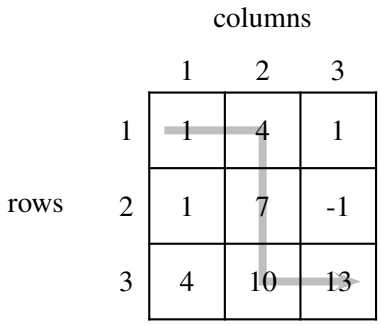

Figure 1: An illustration of the monotonic path.

Hint. Observe that a must have value $M(1, 1)$. What are possible values for d? You may find the monotonic paths for each guess of d.

Input

The first line contains n. Each of the subsequent n lines contains the value of n entries on a row so that the second line represents the first row, the third line represents the second row, and so on. You may assume that n is an integer in $[2, 100]$ and $M(i, j)$ is an integer in $[1, 10^6]$ for every $i, j \in [1, n]$.

Output

Output "Yes" if such a monotonic path exists, or "No" otherwise.

Sample Input

```
4
8 16 4 9
1 24 5 9
4 32 40 48
3 3 8 56
```

Sample Output

```
Yes
```