Increasing XOR (increasingxor)

An array B consisting of k positive integers is *beautiful* if and only if there exists an array $C = [C_0, C_1, \ldots, C_{k-1}]$ such that C is a permutation of B and the sequence of its prefix-XORs is strictly increasing. That is, $P_0 < P_1 < \cdots < P_{k-1}$ where $P_i = C_0 \oplus C_1 \oplus \ldots C_i$ for each $i = 0, \ldots, k-1$.

> ☞ The bitwise XOR $a \oplus b$ of two integers a and b is defined in the following way: the i-th bit of $a \oplus b$ is 1 if and only if exactly one among a and b has 1 in the i-th bit.

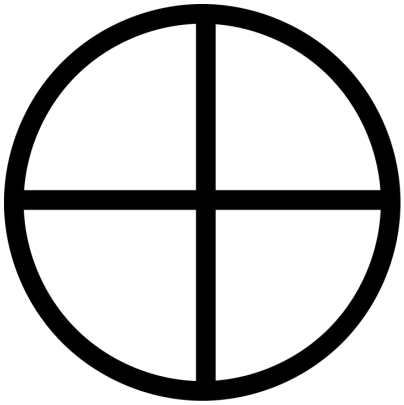

Figure 1: The XOR symbol.

Given an array A consisting of N positive integers, you have to determine for each non-empty prefix of A whether it is *beautiful*.

> ☞ Among the attachments of this task you may find a template file `increasingxor.*` with a sample incomplete implementation.

Input

The first line contains the only integer N. The second line contains N integers, $A_0, A_1, \ldots, A_{N-1}$.

Output

You should print N lines. In the ith line, you must write `YES` if the ith prefix is *beautiful* and `NO` otherwise.

Constraints

- $1 \leq N \leq 200\,000$.
- $1 \leq A_i < 2^{30}$ for each $i = 0 \ldots N-1$.

Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

– **Subtask 1** (0 points) Examples.

– **Subtask 2** (10 points) $N \leq 10$.

– **Subtask 3** (11 points) $A_i \leq 7$ for each $i = 0 \ldots N-1$.

– **Subtask 4** (35 points) $N \leq 500$.

– **Subtask 5** (44 points) No additional limitations.

Examples

input	output
5 3 1 4 1 5	YES YES YES YES NO
5 3 3 5 8 19	YES NO NO NO YES

Explanation

In the **first sample case**:

1. The 1st prefix is *beautiful* because a sequence consisting of a single element is, by definition, strictly increasing.
2. For the 2nd prefix, the permutation $1, 3$ is suitable as the sequence $1, 2 = 1 \oplus 3$ is strictly increasing.
3. For the 3rd prefix, the permutation $1, 3, 4$ is suitable as the sequence $1, 2 = 1 \oplus 3, 6 = 1 \oplus 3 \oplus 4$ is strictly increasing.
4. For the 4th prefix, the permutation $1, 3, 4, 1$ is suitable as the sequence $1, 2, 6, 7$ is strictly increasing.
5. It can be checked that the 5th prefix is not *beautiful*.