XOR Operations

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	1024 megabytes

You are given n integers $a_1, a_2, \ldots, a_n$. You have a sequence of n integers $B = (b_1, b_2, \ldots, b_n)$ which initially are all zeroes.

In one operation, you choose two different indices i and j, then simultaneously

- replace b_i with $b_i \oplus a_i \oplus a_j$, and
- replace b_j with $b_j \oplus a_i \oplus a_j$.

Note that $\oplus$ represents the bitwise XOR operation, which returns an integer whose binary representation has a 1 in each bit position for which the corresponding bits of either but not both operands are 1. For example, $3 \oplus 10 = 9$ because $(0011)_2 \oplus (1010)_2 = (1001)_2$.

You want to compute the number of different possible sequences B you can obtain after performing zero or more operations. Since this number might be huge, calculate this number modulo $998\,244\,353$.

Two sequences of length n are considered different if and only if there exists an index i $(1 \le i \le n)$ such that the i-th element of one sequence differs from the i-th element of the other sequence.

Input

The first line of input contains one integer n $(2 \le n \le 200\,000)$. The second line contains n integers $a_1, a_2, \ldots, a_n$ $(0 \le a_i < 2^{30}$ for all $i)$.

Output

Output an integer representing the number of different possible sequences B you can obtain after performing zero or more operations modulo $998\,244\,353$.

Examples

standard input	standard output
3 1 2 1	4
4 852415 852415 852415 852415	1

Note

Explanation for the sample input/output #1

Starting from $B = (0, 0, 0)$, we can obtain the following two sequences B:

- Perform the operation with $i = 1$ and $j = 2$. We will have $B = (3, 3, 0)$.
- After that, perform the operation with $i = 2$ and $j = 3$. We will have $B = (3, 0, 3)$.

Starting from $B = (0, 0, 0)$, we can also obtain the following sequence B:

- Perform the operation with $i = 2$ and $j = 3$. We will have $B = (0, 3, 3)$.

It can be shown that $(0, 0, 0)$, $(3, 3, 0)$, $(3, 0, 3)$, and $(0, 3, 3)$ are the only possible sequences B you can obtain. Therefore, the answer is 4.

This page is intentionally left blank.