Problem 810: Chalkboard XOR Game

Problem Information

Difficulty: Hard
Acceptance Rate: 64.66%
Paid Only: No
Tags: Array, Math, Bit Manipulation, Brainteaser, Game Theory

Problem Description

You are given an array of integers `nums` represents the numbers written on a chalkboard.

Alice and Bob take turns erasing exactly one number from the chalkboard, with Alice starting first. If erasing a number causes the bitwise XOR of all the elements of the chalkboard to become `0`, then that player loses. The bitwise XOR of one element is that element itself, and the bitwise XOR of no elements is `0`.

Also, if any player starts their turn with the bitwise XOR of all the elements of the chalkboard equal to `0`, then that player wins.

Return `true` _if and only if Alice wins the game, assuming both players play optimally_.

Example 1:

Input: nums = [1,1,2] **Output:** false **Explanation:** Alice has two choices: erase 1 or erase 2. If she erases 1, the nums array becomes [1, 2]. The bitwise XOR of all the elements of the chalkboard is 1 XOR 2 = 3. Now Bob can remove any element he wants, because Alice will be the one to erase the last element and she will lose. If Alice erases 2 first, now nums become [1, 1]. The bitwise XOR of all the elements of the chalkboard is 1 XOR 1 = 0. Alice will lose.

Example 2:

Input: nums = [0,1] **Output:** true

Example 3:

Input: nums = [1,2,3] **Output:** true

Constraints:

* `1 <= nums.length <= 1000` * `0 <= nums[i] < 216`

Code Snippets

C++:

```
class Solution {
public:
bool xorGame(vector<int>& nums) {

}
};
```

Java:

```
class Solution {
public boolean xorGame(int[] nums) {

}
}
```

Python3:

```
class Solution:
def xorGame(self, nums: List[int]) -> bool:
```