Problem 2005: Subtree Removal Game with Fibonacci Tree

Problem Information

Difficulty: Hard
Acceptance Rate: 57.23%
Paid Only: Yes
Tags: Math, Dynamic Programming, Tree, Binary Tree, Game Theory

Problem Description

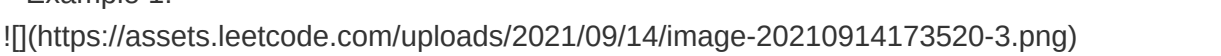
A **Fibonacci** tree is a binary tree created using the order function `order(n)`:

* `order(0)` is the empty tree. * `order(1)` is a binary tree with only **one node**. * `order(n)` is a binary tree that consists of a root node with the left subtree as `order(n - 2)` and the right subtree as `order(n - 1)`.

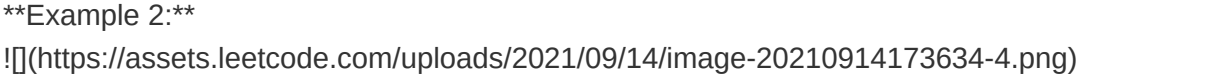
Alice and Bob are playing a game with a **Fibonacci** tree with Alice staring first. On each turn, a player selects a node and removes that node **and** its subtree. The player that is forced to delete `root` loses.

Given the integer `n`, return `true` if Alice wins the game or `false` if Bob wins, assuming both players play optimally.

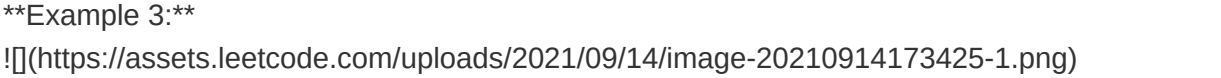
A subtree of a binary tree `tree` is a tree that consists of a node in `tree` and all of this node's descendants. The tree `tree` could also be considered as a subtree of itself.

Example 1:


Input: n = 3 **Output:** true **Explanation:** Alice takes the node 1 in the right subtree. Bob takes either the 1 in the left subtree or the 2 in the right subtree. Alice takes whichever node Bob doesn't take. Bob is forced to take the root node 3, so Bob will lose. Return true because Alice wins.

Example 2:


Input: n = 1 **Output:** false **Explanation:** Alice is forced to take the root node 1, so Alice will lose. Return false because Alice loses.

Example 3:


Input: n = 2 **Output:** true **Explanation:** Alice takes the node 1. Bob is forced to take the root node 2, so Bob will lose. Return true because Alice wins.

Constraints:

* `1 <= n <= 100`

Code Snippets

C++:

```
class Solution {
public:
bool findGameWinner(int n) {

}
};
```

Java:

```
class Solution {
public boolean findGameWinner(int n) {

}
}
```

Python3:

```
class Solution:
def findGameWinner(self, n: int) -> bool:
```