Problem 1510: Stone Game IV

Problem Information

Difficulty: Hard
Acceptance Rate: 0.00%
Paid Only: No

Problem Description

Alice and Bob take turns playing a game, with Alice starting first.

Initially, there are

n

stones in a pile. On each player's turn, that player makes a

move

consisting of removing

any

non-zero

square number

of stones in the pile.

Also, if a player cannot make a move, he/she loses the game.

Given a positive integer

n

, return

true

if and only if Alice wins the game otherwise return

false

, assuming both players play optimally.

Example 1:

Input:

n = 1

Output:

true

Explanation:

Alice can remove 1 stone winning the game because Bob doesn't have any moves.

Example 2:

Input:

n = 2

Output:

false

Explanation:

Alice can only remove 1 stone, after that Bob removes the last one winning the game (2 -> 1 -> 0).

Example 3:

Input:

n = 4

Output:

true

Explanation:

n is already a perfect square, Alice can win with one move, removing 4 stones (4 -> 0).

Constraints:

1 <= n <= 10

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Code Snippets

C++:

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

}
};
```

Java:

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

}
}
```

Python3:

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

Python:

```
class Solution(object):
def winnerSquareGame(self, n):
"""
:type n: int
:rtype: bool
"""
```

JavaScript:

```
/**
* @param {number} n
* @return {boolean}
*/
var winnerSquareGame = function(n) {

};
```

TypeScript:

```
function winnerSquareGame(n: number): boolean {

};
```

C#:

```
public class Solution {
public bool WinnerSquareGame(int n) {

}
}
```

C:

```
bool winnerSquareGame(int n) {

}
```

Go:

```
func winnerSquareGame(n int) bool {

}
```

Kotlin:

```
class Solution {
fun winnerSquareGame(n: Int): Boolean {

}
}
```

Swift:

```
class Solution {
func winnerSquareGame(_ n: Int) -> Bool {

}
}
```

Rust:

```
impl Solution {
pub fn winner_square_game(n: i32) -> bool {

}
}
```

Ruby:

```
# @param {Integer} n
# @return {Boolean}
def winner_square_game(n)

end
```

PHP:

```
class Solution {

/**
```

```
* @param Integer $n
* @return Boolean
*/
function winnerSquareGame($n) {

}
}
```

Dart:

```
class Solution {
bool winnerSquareGame(int n) {

}
}
```

Scala:

```
object Solution {
def winnerSquareGame(n: Int): Boolean = {

}
}
```

Elixir:

```
defmodule Solution do
@spec winner_square_game(n :: integer) :: boolean
def winner_square_game(n) do

end
end
```

Erlang:

```
-spec winner_square_game(N :: integer()) -> boolean().
winner_square_game(N) ->
.
```

Racket:

```
(define/contract (winner-square-game n)
(-> exact-integer? boolean?)
)
```

Solutions

C++ Solution:

```
/*
* Problem: Stone Game IV
* Difficulty: Hard
* Tags: dp, math
*
* Approach: Dynamic programming with memoization or tabulation
* Time Complexity: O(n * m) where n and m are problem dimensions
* Space Complexity: O(n) or O(n * m) for DP table
*/

class Solution {
public:
bool winnerSquareGame(int n) {

}
};
```

Java Solution:

```
/**
* Problem: Stone Game IV
* Difficulty: Hard
* Tags: dp, math
*
* Approach: Dynamic programming with memoization or tabulation
* Time Complexity: O(n * m) where n and m are problem dimensions
* Space Complexity: O(n) or O(n * m) for DP table
*/

class Solution {
public boolean winnerSquareGame(int n) {

}
```

```
}
```

Python3 Solution:

```
"""
Problem: Stone Game IV
Difficulty: Hard
Tags: dp, math

Approach: Dynamic programming with memoization or tabulation
Time Complexity: O(n * m) where n and m are problem dimensions
Space Complexity: O(n) or O(n * m) for DP table
"""

class Solution:
def winnerSquareGame(self, n: int) -> bool:
# TODO: Implement optimized solution
pass
```

Python Solution:

```
class Solution(object):
def winnerSquareGame(self, n):
"""
:type n: int
:rtype: bool
"""
```

JavaScript Solution:

```
/**
* Problem: Stone Game IV
* Difficulty: Hard
* Tags: dp, math
*
* Approach: Dynamic programming with memoization or tabulation
* Time Complexity: O(n * m) where n and m are problem dimensions
* Space Complexity: O(n) or O(n * m) for DP table
*/

/**
```

```
* @param {number} n
* @return {boolean}
*/
var winnerSquareGame = function(n) {

};
```

TypeScript Solution:

```
/**
* Problem: Stone Game IV
* Difficulty: Hard
* Tags: dp, math
*
* Approach: Dynamic programming with memoization or tabulation
* Time Complexity: O(n * m) where n and m are problem dimensions
* Space Complexity: O(n) or O(n * m) for DP table
*/

function winnerSquareGame(n: number): boolean {

};
```

C# Solution:

```
/*
* Problem: Stone Game IV
* Difficulty: Hard
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* Approach: Dynamic programming with memoization or tabulation
* Time Complexity: O(n * m) where n and m are problem dimensions
* Space Complexity: O(n) or O(n * m) for DP table
*/

public class Solution {
public bool WinnerSquareGame(int n) {

}
}
```

C Solution:

```
/*
* Problem: Stone Game IV
* Difficulty: Hard
* Tags: dp, math
*
* Approach: Dynamic programming with memoization or tabulation
* Time Complexity: O(n * m) where n and m are problem dimensions
* Space Complexity: O(n) or O(n * m) for DP table
*/

bool winnerSquareGame(int n) {

}
```

Go Solution:

```
// Problem: Stone Game IV
// Difficulty: Hard
// Tags: dp, math
//
// Approach: Dynamic programming with memoization or tabulation
// Time Complexity: O(n * m) where n and m are problem dimensions
// Space Complexity: O(n) or O(n * m) for DP table

func winnerSquareGame(n int) bool {

}
```

Kotlin Solution:

```
class Solution {
fun winnerSquareGame(n: Int): Boolean {

}
}
```

Swift Solution:

```
class Solution {
func winnerSquareGame(_ n: Int) -> Bool {
```

```
}
}
```

Rust Solution:

```
// Problem: Stone Game IV
// Difficulty: Hard
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//
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impl Solution {
pub fn winner_square_game(n: i32) -> bool {

}
}
```

Ruby Solution:

```
# @param {Integer} n
# @return {Boolean}
def winner_square_game(n)

end
```

PHP Solution:

```
class Solution {

/**
* @param Integer $n
* @return Boolean
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function winnerSquareGame($n) {

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Dart Solution:

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