Problem 3699: Number of ZigZag Arrays I

Problem Information

Difficulty: Hard
Acceptance Rate: 27.51%
Paid Only: No
Tags: Dynamic Programming, Prefix Sum

Problem Description

You are given three integers `n`, `l`, and `r`.

A **ZigZag** array of length `n` is defined as follows:

* Each element lies in the range `[l, r]`. * No **two** adjacent elements are equal. * No **three** consecutive elements form a **strictly increasing** or **strictly decreasing** sequence.

Return the total number of valid **ZigZag** arrays.

Since the answer may be large, return it **modulo** `109 + 7`.

A **sequence** is said to be **strictly increasing** if each element is strictly greater than its previous one (if exists).

A **sequence** is said to be **strictly decreasing** if each element is strictly smaller than its previous one (if exists).

Example 1:

Input: n = 3, l = 4, r = 5

Output: 2

Explanation:

There are only 2 valid ZigZag arrays of length `n = 3` using values in the range `[4, 5]`:

* `[4, 5, 4]` * `[5, 4, 5]`

Example 2:

Input: n = 3, l = 1, r = 3

Output: 10

Explanation:

There are 10 valid ZigZag arrays of length `n = 3` using values in the range `[1, 3]`:

* `[1, 2, 1]`, `[1, 3, 1]`, `[1, 3, 2]` * `[2, 1, 2]`, `[2, 1, 3]`, `[2, 3, 1]`, `[2, 3, 2]` * `[3, 1, 2]`, `[3, 1, 3]`, `[3, 2, 3]`

All arrays meet the ZigZag conditions.

Constraints:

* `3 <= n <= 2000` * `1 <= l < r <= 2000`

Code Snippets

C++:

```
class Solution {
public:
int zigZagArrays(int n, int l, int r) {

}
};
```

Java:

```
class Solution {
public int zigZagArrays(int n, int l, int r) {
```

```
}
}
```

Python3:

```
class Solution:
def zigZagArrays(self, n: int, l: int, r: int) -> int:
```