

2533. Number of Good Binary Strings Premium

Medium

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Hint

You are given four integers `minLength`, `maxLength`, `oneGroup` and `zeroGroup`.

A binary string is **good** if it satisfies the following conditions:

- The length of the string is in the range `[minLength, maxLength]`.
- The size of each block of consecutive `1`'s is a multiple of `oneGroup`.
 - For example in a binary string `00110111100` sizes of each block of consecutive ones are `[2,4]`.
- The size of each block of consecutive `0`'s is a multiple of `zeroGroup`.
 - For example, in a binary string `00110111100` sizes of each block of consecutive zeros are `[2,1,2]`.

Return *the number of **good** binary strings*. Since the answer may be too large, return it **modulo** `109 + 7`.

Note that `0` is considered a multiple of all the numbers.

Example 1:

Input: `minLength = 2, maxLength = 3, oneGroup = 1, zeroGroup = 2`
Output: `5`
Explanation: There are 5 good binary strings in this example: "00", "11", "001", "100", and "111". It can be proven that there are only 5 good strings satisfying all conditions.

Example 2:

Input: `minLength = 4, maxLength = 4, oneGroup = 4, zeroGroup = 3`
Output: `1`
Explanation: There is only 1 good binary string in this example: "1111". It can be proven that there is only 1 good string satisfying all conditions.

Constraints:

- `1 <= minLength <= maxLength <= 105`
- `1 <= oneGroup, zeroGroup <= maxLength`

Seen this question in a real interview before? 1/5

Yes

No

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Hint 1

If we maintain DP(i, x) where i denotes the length and x denotes the last written integer (0 or 1), then it is not hard to solve in O(maxLength * max(zeroGroup, oneGroup)).

Hint 2

Notice that from DP(i, 0) we only have a transition to DP(j, 1) where (j - i) mod oneGroup == 0 and j > i. Similarly with DP(i,1). So we can use prefix sum to optimize our DP and solve it in O(maxLength).

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