Problem 2281: Sum of Total Strength of Wizards

Problem Information

Difficulty: Hard
Acceptance Rate: 28.83%
Paid Only: No
Tags: Array, Stack, Monotonic Stack, Prefix Sum

Problem Description

As the ruler of a kingdom, you have an army of wizards at your command.

You are given a **0-indexed** integer array `strength`, where `strength[i]` denotes the strength of the `ith` wizard. For a **contiguous** group of wizards (i.e. the wizards' strengths form a **subarray** of `strength`), the **total strength** is defined as the **product** of the following two values:

* The strength of the **weakest** wizard in the group. * The **total** of all the individual strengths of the wizards in the group.

Return _the**sum** of the total strengths of **all** contiguous groups of wizards_. Since the answer may be very large, return it **modulo** `109 + 7`.

A **subarray** is a contiguous **non-empty** sequence of elements within an array.

Example 1:

Input: strength = [1,3,1,2] **Output:** 44 **Explanation:** The following are all the contiguous groups of wizards: - [1] from [_**1**_ ,3,1,2] has a total strength of min([1]) * sum([1]) = 1 * 1 = 1 - [3] from [1,_**3**_ ,1,2] has a total strength of min([3]) * sum([3]) = 3 * 3 = 9 - [1] from [1,3,_**1**_ ,2] has a total strength of min([1]) * sum([1]) = 1 * 1 = 1 - [2] from [1,3,1,_**2**_] has a total strength of min([2]) * sum([2]) = 2 * 2 = 4 - [1,3] from [_**1,3**_ ,1,2] has a total strength of min([1,3]) * sum([1,3]) = 1 * 4 = 4 - [3,1] from [1,_**3,1**_ ,2] has a total strength of min([3,1]) * sum([3,1]) = 1 * 4 = 4 - [1,2] from [1,3,_**1,2**_] has a total strength of min([1,2]) * sum([1,2]) = 1 * 3 = 3 - [1,3,1] from [_**1,3,1**_ ,2] has a total strength of min([1,3,1]) * sum([1,3,1]) = 1 * 5 = 5 - [3,1,2] from [1,_**3,1,2**_] has a total strength of

min([3,1,2]) * sum([3,1,2]) = 1 * 6 = 6 - [1,3,1,2] from [_**1,3,1,2**_] has a total strength of min([1,3,1,2]) * sum([1,3,1,2]) = 1 * 7 = 7 The sum of all the total strengths is 1 + 9 + 1 + 4 + 4 + 4 + 3 + 5 + 6 + 7 = 44.

Example 2:

Input: strength = [5,4,6] **Output:** 213 **Explanation:** The following are all the contiguous groups of wizards: - [5] from [_**5**_ ,4,6] has a total strength of min([5]) * sum([5]) = 5 * 5 = 25 - [4] from [5,_**4**_ ,6] has a total strength of min([4]) * sum([4]) = 4 * 4 = 16 - [6] from [5,4,_**6**_] has a total strength of min([6]) * sum([6]) = 6 * 6 = 36 - [5,4] from [_**5,4**_ ,6] has a total strength of min([5,4]) * sum([5,4]) = 4 * 9 = 36 - [4,6] from [5,_**4,6**_] has a total strength of min([4,6]) * sum([4,6]) = 4 * 10 = 40 - [5,4,6] from [_**5,4,6**_] has a total strength of min([5,4,6]) * sum([5,4,6]) = 4 * 15 = 60 The sum of all the total strengths is 25 + 16 + 36 + 36 + 40 + 60 = 213.

Constraints:

* `1 <= strength.length <= 105` * `1 <= strength[i] <= 109`

Code Snippets

C++:

```
class Solution {
public:
int totalStrength(vector<int>& strength) {

}
};
```

Java:

```
class Solution {
public int totalStrength(int[] strength) {

}
}
```

Python3:

```
class Solution:
def totalStrength(self, strength: List[int]) -> int:
```