Problem 3605: Minimum Stability Factor of Array

Problem Information

Difficulty: Hard
Acceptance Rate: 18.95%
Paid Only: No
Tags: Array, Math, Binary Search, Greedy, Segment Tree, Number Theory

Problem Description

You are given an integer array `nums` and an integer `maxC`.

A **subarray** is called **stable** if the _highest common factor (HCF)_ of all its elements is **greater than or equal to** 2.

The **stability factor** of an array is defined as the length of its **longest** stable subarray.

You may modify **at most** `maxC` elements of the array to any integer.

Return the **minimum** possible stability factor of the array after at most `maxC` modifications. If no stable subarray remains, return 0.

Note:

* The **highest common factor (HCF)** of an array is the largest integer that evenly divides all the array elements. * A **subarray** of length 1 is stable if its only element is greater than or equal to 2, since `HCF([x]) = x`.

Example 1:

Input: nums = [3,5,10], maxC = 1

Output: 1

Explanation:

* The stable subarray `[5, 10]` has `HCF = 5`, which has a stability factor of 2. * Since `maxC = 1`, one optimal strategy is to change `nums[1]` to `7`, resulting in `nums = [3, 7, 10]`. * Now, no subarray of length greater than 1 has `HCF >= 2`. Thus, the minimum possible stability factor is 1.

Example 2:

Input: nums = [2,6,8], maxC = 2

Output: 1

Explanation:

* The subarray `[2, 6, 8]` has `HCF = 2`, which has a stability factor of 3. * Since `maxC = 2`, one optimal strategy is to change `nums[1]` to 3 and `nums[2]` to 5, resulting in `nums = [2, 3, 5]`. * Now, no subarray of length greater than 1 has `HCF >= 2`. Thus, the minimum possible stability factor is 1.

Example 3:

Input: nums = [2,4,9,6], maxC = 1

Output: 2

Explanation:

* The stable subarrays are: * `[2, 4]` with `HCF = 2` and stability factor of 2. * `[9, 6]` with `HCF = 3` and stability factor of 2. * Since `maxC = 1`, the stability factor of 2 cannot be reduced due to two separate stable subarrays. Thus, the minimum possible stability factor is 2.

Constraints:

* `1 <= n == nums.length <= 105` * `1 <= nums[i] <= 109` * `0 <= maxC <= n`

Code Snippets

C++:

```
class Solution {
public:
int minStable(vector<int>& nums, int maxC) {

}
};
```

Java:

```
class Solution {
public int minStable(int[] nums, int maxC) {

}
}
```

Python3:

```
class Solution:
def minStable(self, nums: List[int], maxC: int) -> int:
```