4_跳格子 - Hopscotch

(15分)

(子任務1: 7分, 子任務2: 8 分)

問題敘述

蛋餅是一位拉麵愛好者，他每天都會吃至少一碗拉麵。但大量拉麵造成的卡路里使得蛋餅對自身的體重感到擔憂，因此他決定每天跳格子來消耗卡路里。

蛋餅花了一點時間找到了一個絕佳的跳格子場地，這個場地由 N 個格子組成，由左至右分別從第一個格子排成一直線到第 N 個格子，而每個格子上都寫著一個數字。

為了確實的消耗卡路里，蛋餅給自己定了一些跳格子的規則：

1. 蛋餅可以選擇任意一個格子起跳。
2. 每次要跳到下一個格子時，蛋餅只能往右跳。
3. 每次要跳到下一個格子前，假設蛋餅所在的格子上寫的數字為 x，並且他打算跳到寫著數字 y 的格子，那麼必須滿足 x 跟 y 的差不超過 2，也就是說 $|x-y| \leq 2$。
4. 蛋餅可以從任意一個格子結束跳格子的過程。

這樣一來，蛋餅就會有非常多種跳格子的方法可以選擇，於是他開始好奇，他到底有多少種方法可以從起跳到結束呢？而這裡他將兩種跳格子方法不一樣定義成「跳過的格子編號集合不一樣」。

但由於方法數可能很多，因此蛋餅只好奇方法數除以 10^9+7 的餘數，請你寫一支程式告訴蛋餅這個數字是多少吧！

註：蛋餅的跳躍力非常強，即使是從第一個格子直接跳到第 N 個格子，他也可以達成，因此不用擔心跳躍的距離會造成問題。

輸入格式

輸入首行有一個正整數 N，代表場地的格子數量。

接下來一行 N 個正整數 $a_1, \ldots, a_N$，代表第 i 個格子上的數字為 a_i。

輸出格式

輸出一個非負整數於一行，代表蛋餅跳格子的方法數除以 10^9+7 的餘數。

資料範圍

- $1 \leq N \leq 5 \times 10^5$
- $1 \leq a_i \leq N$

子任務

- 子任務 1 滿足 $N \leq 3000$
- 子任務 2 沒有特別限制

輸入範例 1

```
4
1 4 4 2
```

輸出範例 1

```
9
```

輸入範例 2

```
4
1 3 2 4
```

輸出範例 2

```
14
```

輸入範例 3

```
30
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

輸出範例 3

```
73741816
```

範例說明

在第一筆範例中，蛋餅可能的跳法為以下九種：

1. a_1
2. a_2
3. a_3

4. a_4
5. $a_1 \to a_4$
6. $a_2 \to a_3$
7. $a_2 \to a_4$
8. $a_3 \to a_4$
9. $a_2 \to a_3 \to a_4$

注意到像是 $a_1 \to a_2$ 是不符合規則的，因為 $|a_1 - a_2| = 3 > 2$，違背了第三條規則。

在第二筆範例中，只有 $a_1 \to a_4$ 是不符合規則的，因此方法數為 $2^4 - 2 = 14$ 種。

在第三筆範例中，蛋餅可以從任一個格子跳到更右邊的任何一個格子，因此實際上蛋餅可能的跳法有 $2^{30} - 1 = 1073741823$ 種。但由於蛋餅只好奇方法數除以 $10^9 + 7$ 的餘數，因此你必須輸出 73741816。

4_Hopscotch

(15 points)

(Subtask 1: 7 points, Subtask 2: 8 points)

Description

Omelet is a ramen lover. He eats at least one bowl of ramen every day. However, the calories from lots of ramen worry Omelet about his weight. Hence, he decides to play hopscotch every day to burn calories.

After spending some time, Omelet found an excellent hopscotch playground. The playground is formed by N cells, which line up from the first cell to the N-th cell from left to right. Each cell has a number written on it.

To burn calories, Omelet set himself some hopscotch rules,

1. Omelet can start the process of hopscotch at any of the cells.
2. Each time Omelet wants to jump to the next cell, he can only jump to the right.
3. Each time Omelet wants to jump to the next cell, assume that the cell he is standing on has a number x written on it, and he wants to jump to the cell with a number y written on it. Then the difference between x and y should not exceed 2. In other words, $|x-y| \leq 2$.
4. Omelet can stop the process of hopscotch at any of the cells.

Thus, Omelet will have many different choices in the processes of hopscotch. So he became curious about how many methods can he jump from the beginning to the end? Here, he defines two different jumping methods as "the sets of the index of two jumped cells are different".

Since the answer may be very large, Omelet is only curious about the remainder of the answer divided by 10^9+7. Please write a program to tell Omelet what the number is!

Note: Omelet's jumping power is extreme. Even if he jumps directly from the first cell to the N-th cell, he can still achieve it, so don't worry that the jumping distance will cause problems.

Input Format

The first line of the input contains a positive integer N, indicating the number of cells in the playground.

The second line of the input contains N positive integers $a_1, \ldots, a_N$, indicating that cell i has a number a_i written on it.

Output Format

Output a non-negative integer in one line, indicating that the remainder of the number of how many methods can Omelet jump from the beginning to the end, divided by 10^9+7.

Constraints

- $1 \leq N \leq 5 \times 10^5$
- $1 \leq a_i \leq N$

Subtasks

- Subtask 1 satisfies that $N \leq 3000$.
- Subtask 2 has no additional constraint.

Input Example 1

```
4
1 4 4 2
```

Output Example 1

```
9
```

Input Example 2

```
4
1 3 2 4
```

Output Example 2

```
14
```

Input Example 3

```
30
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

Output Example 3

```
73741816
```

Example Explanation

In the first example, Omelet has the following nine methods,

1. a_1
2. a_2
3. a_3
4. a_4
5. $a_1 \to a_4$
6. $a_2 \to a_3$
7. $a_2 \to a_4$
8. $a_3 \to a_4$
9. $a_2 \to a_3 \to a_4$

Notice that something like $a_1 \to a_2$ does not follow the rules since $|a_1 - a_2| = 3 > 2$, which violates the third rule.

In the second example, only $a_1 \to a_4$ does not follow the rules. Hence, the answer is $2^4 - 2 = 14$.

In the third example, Omelet can jump to any cells to the right on every cell. Hence, Omelet has $2^{30} - 1 = 1073741823$ methods to jump. However, since Omelet is only curious about the remainder of the answer divided by $10^9 + 7$, you should output 73741816.