

Task: FIB

Fibonacci representations

CEOI 2018, day 2. Available memory: 256 MB.

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Let us define the sequence of Fibonacci numbers as:

$$\begin{aligned}F_1 &= 1 \\F_2 &= 2 \\F_n &= F_{n-1} + F_{n-2} \text{ for } n \geq 3\end{aligned}$$

The first few elements of the sequence are 1, 2, 3, 5, 8, 13, 21, ...

For a positive integer p , let $X(p)$ denote the number of different ways of expressing p as a sum of **different** Fibonacci numbers. Two ways are considered different if there is a Fibonacci number that exists in exactly one of them.

You are given a sequence of n positive integers a_1, a_2, \dots, a_n . For a non-empty prefix a_1, a_2, \dots, a_k , we define $p_k = F_{a_1} + F_{a_2} + \dots + F_{a_k}$. Your task is to find the values $X(p_k)$ modulo $10^9 + 7$, for all $k = 1, \dots, n$.

Input

The first line of the standard input contains an integer n ($1 \leq n \leq 100\,000$). The second line contains n space-separated integers a_1, a_2, \dots, a_n ($1 \leq a_i \leq 10^9$).

Output

The standard output should contain n lines. In the k -th line, print the value $X(p_k)$ modulo $(10^9 + 7)$.

Example

For the input data:

4
4 1 1 5

a correct result is:

2
2
1
2

Explanation of the example: We have the following values p_k :

$$\begin{aligned}p_1 &= F_4 = 5 \\p_2 &= F_4 + F_1 = 5 + 1 = 6 \\p_3 &= F_4 + F_1 + F_1 = 5 + 1 + 1 = 7 \\p_4 &= F_4 + F_1 + F_1 + F_5 = 5 + 1 + 1 + 8 = 15\end{aligned}$$

The number 5 can be expressed in two ways: as $F_2 + F_3$ and simply as F_4 (that is, $2 + 3$ and 5 , respectively). Hence, $X(p_1) = 2$.

Then we have $X(p_2) = 2$ because $p_2 = 1 + 5 = 1 + 2 + 3$.

The only way to express 7 as a sum of different Fibonacci numbers is $2 + 5$.

Finally, 15 can be expressed as $2 + 13$ and $2 + 5 + 8$ (two ways).

Grading

The test set is divided into the following subtasks with additional constraints. Tests in each of the subtasks consist of one or more separate test groups. Each test group may contain one or more test cases.

| Subtask | Constraints | Points |
|---------|---|--------|
| 1 | $n, a_i \leq 15$ | 5 |
| 2 | $n, a_i \leq 100$ | 20 |
| 3 | $n \leq 100$, a_i are squares of different natural numbers | 15 |
| 4 | $n \leq 100$ | 10 |
| 5 | a_i are different even numbers | 15 |
| 6 | no additional constraints | 35 |