Alternating Jumps

Pat walks home from school every day. Paving his walk home is a colourful sidewalk made of N segments numbered from 1 to N. Each segment is coloured either red or blue.

Pat starts on segment 1 and must jump to segment N. Each jump from a segment i:

- Must be to a segment j where $j > i$, and
- Must be to a segment whose colour is different to the colour of the segment i. That is, if Pat is on a red segment, he must jump to a blue segment and vice versa.

How many different ways are there for Pat to jump from segment 1 to segment N, subject to the restrictions above? Two ways are different if there is a segment Pat jumps on in one way, but not the other. Give your answer modulo $1\,000\,000\,007$ ($10^9 + 7$).

Subtasks and Constraints

Subtask	Points	Additional constraints
1	30	$2 \leq N \leq 20$
2	40	$2 \leq N \leq 1000$
3	30	$2 \leq N \leq 100\,000$

Input

- The first line of input contains the integer N.
- The second line contains N integers describing the segments. The i-th integer is 0 if the i-th segment is blue, or 1 if it is red.

Output

Output a single integer: the number of ways Pat can jump from segment 1 to segment N (modulo $1\,000\,000\,007$).

Sample Input 1

```
5
1 1 0 0 1
```

Sample Input 2

```
9
0 0 1 1 1 0 1 0 1
```

Sample Input 3

```
3
0 0 0
```

Sample Output 1

```
2
```

Sample Output 2

```
11
```

Sample Output 3

```
0
```

Explanation

In Sample Input 1, Pat has two ways: $1 \to 3 \to 5$ and $1 \to 4 \to 5$.

In Sample Input 2, three of the eleven ways are: $1 \to 5 \to 6 \to 7 \to 8 \to 9$, $1 \to 9$, and $1 \to 6 \to 9$.

In Sample Input 3, there are no red tiles for Pat to jump to from the first segment so he is stuck there. Hence there are zero ways for him to jump to segment N.