

Elevator

Kigali Convention Centre has an elevator and N floors, numbered from 0 to $N - 1$. The elevator starts at floor 0.

There is exactly one person waiting on each floor. Whenever the elevator stops at a floor, the person waiting on that floor enters the elevator.

The elevator has only one button inside. If exactly k people press the button, then the elevator moves exactly k floors upward.

At each stop before the trip ends, every person inside the elevator must choose exactly one of the following:

- press the button and stay inside the elevator;
- not press the button and leave the elevator.

Some floors are unsafe. The elevator is not allowed to stop on unsafe floors. It is guaranteed that floors 0 and $N - 1$ are safe.

A valid trip is a sequence of floors

$$0 = s_1 < s_2 < \dots < s_m = N - 1$$

such that every s_i is safe and the elevator can stop at exactly these floors, in this order.

Your task is to find the number of possible valid trips from floor 0 to floor $N - 1$, modulo 1 000 000 007.

Implementation Details

You should implement the following procedure.

```
int count_trips(int N, int[] S)
```

- N : the number of floors.
- S : an array of length N describing which floors are safe. For each $0 \leq i < N$, $S[i]$ is 1 if floor i is safe, and 0 otherwise.
- This procedure should return the number of possible valid trips from floor 0 to floor $N - 1$, modulo 1 000 000 007.
- This procedure is called exactly once for each test case.

Constraints

- $2 \leq N \leq 200\,000$.
- For each $0 \leq i < N$, $S[i]$ is either 0 or 1.
- $S[0] = S[N-1] = 1$.

Subtasks

Subtask	Score	Constraints
1	6	$N = 2$
2	13	$N \leq 20$
3	11	$N \leq 40$
4	21	$N \leq 200$
5	32	$N \leq 2000$
6	17	No additional constraints.

Examples

Example 1

Consider the following call.

```
count_trips(8, [1, 1, 0, 1, 1, 0, 1, 1])
```

This procedure should return 2.

There are two valid trips:

1. $0 < 1 < 3 < 4 < 6 < 7$.
2. $0 < 1 < 3 < 6 < 7$.

Example 2

Consider the following call.

```
count_trips(5, [1, 0, 0, 0, 1])
```

This procedure should return 0, because there is no valid trip.

Example 3

Consider the following call.

```
count_trips(20, [1, 1, 1, 1, 0, 0, 1, 1, 0, 0, 1, 0, 0, 1, 1, 1, 0, 0, 1, 1])
```

This procedure should return 5. The five valid trips are:

1. $0 < 1 < 3 < 6 < 10 < 13 < 15 < 18 < 19$.
2. $0 < 1 < 3 < 6 < 10 < 14 < 18 < 19$.
3. $0 < 1 < 3 < 6 < 10 < 14 < 19$.
4. $0 < 1 < 3 < 6 < 10 < 15 < 18 < 19$.
5. $0 < 1 < 3 < 6 < 10 < 15 < 19$.

Sample Grader

The sample grader reads the input in the following format:

```
N  
S[0] S[1] ... S[N-1]
```

Here, N and S are the arguments passed to `count_trips`.

The sample grader outputs the return value of `count_trips` in the following format:

```
R
```