

Problem 2954: Count the Number of Infection Sequences

Problem Information

Difficulty: Hard

Acceptance Rate: 36.14%

Paid Only: No

Tags: Array, Math, Combinatorics

Problem Description

You are given an integer n and an array `sick` sorted in increasing order, representing positions of infected people in a line of n people.

At each step, **one** uninfected person **adjacent** to an infected person gets infected. This process continues until everyone is infected.

An **infection sequence** is the order in which uninfected people become infected, excluding those initially infected.

Return the number of different infection sequences possible, modulo 10^9+7 .

Example 1:

Input: $n = 5$, `sick = [0,4]`

Output: 4

Explanation:

There is a total of 6 different sequences overall.

* Valid infection sequences are `[1,2,3]`, `[1,3,2]`, `[3,2,1]` and `[3,1,2]`. * `[2,3,1]` and `[2,1,3]` are not valid infection sequences because the person at index 2 cannot be infected at the first step.

****Example 2:****

****Input:**** n = 4, sick = [1]

****Output:**** 3

****Explanation:****

There is a total of 6 different sequences overall.

* Valid infection sequences are `[0,2,3]`, `[2,0,3]` and `[2,3,0]`. * `[3,2,0]`, `[3,0,2]`, and `[0,3,2]` are not valid infection sequences because the infection starts at the person at index 1, then the order of infection is 2, then 3, and hence 3 cannot be infected earlier than 2.

****Constraints:****

* `2 <= n <= 105` * `1 <= sick.length <= n - 1` * `0 <= sick[i] <= n - 1` * `sick` is sorted in increasing order.

Code Snippets

C++:

```
class Solution {
public:
    int numberOfSequence(int n, vector<int>& sick) {

    }
};
```

Java:

```
class Solution {
    public int numberOfSequence(int n, int[] sick) {

    }
}
```

Python3:

```
class Solution:
    def numberOfSequence(self, n: int, sick: List[int]) -> int:
```