DMPG '16 S4 - MMORPG II

You are playing a MMORPG where abilities are unlocked by points which you earn upon leveling up. Of course, abilities can only be learned in certain orders. For example, the one-handed sword skill must be first learned before learning the dual-wielding skill, and Vorpal Strike is a prerequisite for Starburst Stream. Abilities that have a prerequisite ability are known as advanced abilities, whereas abilities that have no requirements to unlock are called basic abilities. In this particular game, all advanced abilities have **exactly one** prerequisite ability. Naturally, it is guaranteed that the prerequisites are never cyclical — that is, there will never be a case where ability A is the prerequisite for B, ability B is the prerequisite for C, but ability C is also the prerequisite for A.

There are a total of N abilities in the game, numbered from 1 to N. Since you like to be flexible with your build path, you would like to know the number of different orders in which you can unlock the N abilities. As this number can be very large, you would like it modulo $10^9 + 7$.

Constraints

Subtask 1 [10%]

$1 \leq N \leq 8$

Subtask 2 [20%]

$1 \leq N \leq 16$

Subtask 3 [20%]

$1 \leq N \leq 1000$

Subtask 4 [50%]

$1 \leq N \leq 100\,000$

Input Specification

The first line of input will contain N, the total number of abilities to unlock.

The next line will contain N space-separated integers, where the i^{th} number denotes the prerequisite for the i^{th} ability. If it is a basic ability (no prerequisite), this number will be 0.

Output Specification

The number of different orders in which you can unlock all the abilities, modulo $10^9 + 7$.

Sample Input

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4
0 1 1 0
```

Sample Output

```
8
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Explanation for Sample Output

There are a total of 4 abilities, where 1 and 4 are basic abilities and 2 and 3 are advanced abilities that require 1 to be unlocked first. The 8 orders of unlocking the abilities are as follows: $[4, 1, 2, 3]$, $[1, 4, 2, 3]$, $[1, 2, 4, 3]$, $[1, 2, 3, 4]$, $[4, 1, 3, 2]$, $[1, 4, 3, 2]$, $[1, 3, 4, 2]$, and $[1, 3, 2, 4]$.