# Problem G. Permutant

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|---|---|
| Input file: | *standard input* |
| Output file: | *standard output* |
| Time limit: | 3 seconds |
| Memory limit: | 512 mebibytes |

Consider an $n \times n$ matrix $A$. Let us denote element in $i$-th row and $j$-th column as $A_j^{(i)}$.

You are given a sequence $a_1, \ldots, a_n$ and a permutation $\pi_1, \ldots, \pi_n$ such that the first row is formed by sequence $a_k$:

$$A_k^{(1)} = a_k$$

And any consequent row is formed by applying permutation $\pi_k$ to the previous one:

$$A_k^{(i)} = A_{\pi_k}^{(i-1)}$$

Your task is to calculate $\det A$: the determinant of matrix $A$. Since it may be very large, output it modulo $10^9 + 7$.

## Input

The first line of input contains a single integer $n$ ($1 \le n \le 5000$).

The second line of input contains $n$ integers $a_1, \ldots, a_n$ ($1 \le a_i \le 10^9$).

The third line of input contains $n$ distinct integers $\pi_1, \ldots, \pi_n$ ($1 \le \pi_i \le n$).

## Output

Output a single number which is the answer to the problem.

## Examples

| standard input | standard output |
|---|---|
| 4<br>1 1 1 1<br>4 2 3 1 | 0 |
| 2<br>2 1<br>2 1 | 3 |

## Note

Recall that the determinant can be defined as follows:

$$\det A = \sum_{\sigma \in S_n} \operatorname{sgn}(\sigma) \prod_{i=1}^{n} A_{\sigma_i}^{(i)}$$

Here, $S_n$ is the set of all permutations of $\{1, \ldots, n\}$, and $\operatorname{sgn}(\sigma)$ is the sign of permutation $\sigma$: $-1$ if it has an odd number of inversions and $+1$ if this number is even. An inversion is a pair of indices $(i, j)$ such that $i < j$ but $\sigma_i > \sigma_j$.