Powers of permutations X39049_en

Given an n, a *permutation* of $\{0, 1, \ldots n-1\}$ is a sequence where each of the numbers $0, 1, \ldots n-1$ occurs exactly once. For example, if $n = 3$, the sequences (1 2 0), (2 0 1) and (0 1 2) are permutations of $\{0, 1, 2\}$.
Given two permutations $\sigma = (\sigma_0, \ldots, \sigma_{n-1})$ and $\tau = (\tau_0, \ldots, \tau_{n-1})$ of {0, 1, ... $n - 1$ }, their *product* $\sigma \circ \tau$ is defined as the permutation $\rho = (\rho_0, \ldots, \rho_{n-1})$ such that $\rho_i = \sigma_{\tau_i}$. For example, if $n = 3$, $\sigma = (1\ 2\ 0)$ and $\tau = (2\ 0\ 1)$, then $\sigma \circ \tau = (0\ 1\ 2)$, since:

- $\tau_0 = 2$ and $\sigma_2 = 0$,
- $\tau_1 = 0$ and $\sigma_0 = 1$, and
- $\tau_2 = 1$ and $\sigma_1 = 2$.

Make a program that, given a permutation σ and a natural k, computes the *power* of σ raised to k: $\sigma^k = \overbrace{\sigma \circ \ldots \circ \sigma}^{k)}$. By convention, $\sigma^0 = (0, 1, \ldots, n-1)$.

Input

The input includes several cases. Each case consists in the number n ($1 \le n \le 10^4$), followed by n numbers between 1 and n that describe the permutation σ, followed by the number k ($0 \le k \le 10^9$).

Output

Write the permutation σ^k.

Observation

The expected solution to this problem has cost $O(n \cdot \log k)$. The solutions that have cost $\Omega(n \cdot k)$ can get at most 3 points over 10.
You can add (few) lines of comments explaining what you intend to do.
If needed, you can use that the product of permutations is associative.

Sample input 1

```
3
1 2 0
0

3
1 2 0
2

4
0 2 3 1
1

10
4 3 7 8 0 5 2 1 6 9
5
```

Sample output 1

```
0 1 2
```

```
2 0 1
0 2 3 1
4 7 6 1 0 5 8 2 3 9
```

Problem information

Author: Enric Rodríguez

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