Commuting functions (commuting)

Two functions $f, g : X \to X$ are *commuting* if and only if *f*(*g*(*x*)) = *g*(*f*(*x*)) for each $x \in X$. For example, functions *f*(*x*) = *x* + 1 and *g*(*x*) = *x* − 2 are commuting, whereas functions *f*(*x*) = *x* + 1 and *g*(*x*) = 2*x* are not commuting.

Each function $h : \mathbb{N}_n \to \mathbb{N}_n$, where $\mathbb{N}_n = \{1, 2, \ldots, n\}$ and *n* is some positive integer can be represented as a *value list* – a list in which the *i*-th element is equal to *h*(*i*). For example, a function $h(x) = \lceil x/2 \rceil$ from $\mathbb{N}_5$ to $\mathbb{N}_5$ has the value list [1,1,2,2,3].

The value lists are ordered lexicographically: list $[a_1 \ldots a_n]$ is smaller than list $[b_1 \ldots b_n]$ if and only if there exists such an index *k* that $a_k < b_k$, and $a_l = b_l$ for any index $l < k$.

The function $f : X \to X$ is *bijective* if for every *y* in *X*, there is exactly one *x* in *X* such that *f*(*x*) = *y*.

Task

Given a bijective function $f : \mathbb{N}_n \to \mathbb{N}_n$, for some given positive *n*, find the function *g* that is commuting with *f* and has the lexicographically smallest possible value list.

Input specification

The first line contains a single integer *n* $(1 \leq n \leq 200\,000)$ – the number of the elements in the value list of bijective function *f*.

The second line of the input contains the value list of the function *f*.

Output specification

The single line of the output must contain *n* integers – the value list of function *g* that commutes with the function *f* and has the lexicographically smallest value list.

Examples

input	output
10 1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1 1 1

input	output
10 2 3 4 5 6 7 8 1 9 10	1 2 3 4 5 6 7 8 9 9