

Delayed Signals (delay)

Giorgio loves playing with *delays* to compose electronic songs! A delay is an electrical component that takes two inputs: a musical signal, which is a sequence S_t for $t = 0 \dots N - 1$ of integer values, and the delay amount, which is also a sequence D_t for $t = 0 \dots N - 1$ of integers (it can change over time!).

As output, the delay component produces the exact same values appearing in the input musical signal, in the correct order, possibly skipping some of them and repeating others, in order to match as much as possible the requested delay. We say that the integer O_t in output at time t has a delay of x if it is equal to the input musical signal S_{t-x} . At every time step t , the delay component chooses the value of x closer to D_t which produces a value coming no earlier than O_{t-1} in the original sequence.

This delayed version of the input musical signal is very useful to create psychedelic echo effects.

Giorgio had a pedal applying delays to his musical tracks, but it just broke and now he wants to replace it with a software version. Help Giorgio compute the output of a delay component!

For example, suppose that the delay amount is fixed to 2 and the input sequence is:

0 5 8 9 7 10 4 1.

Then, the delayed output is:

0 0 0 5 8 9 7 10,

since it reports the same values as the original sequence in order, repeating the first three times and skipping the last two, with every integer in output being produced with the requested delay of two (except for the first with a delay of zero and the second with a delay of one, which are the maximum delays possible).

Suppose now that the delay amount is varying over time: 5 4 3 2 1 0 2 1, with the same input sequence. Then, the most accurate output is:

0 0 0 5 9 10 10 4.

The first three values are 0, with delays 0, 1, and 2 respectively, which is as close as you can get to the requested 5, 4, 3. The following values 5, 9, 10 match exactly the requested delays of 2, 1 and 0 respectively. The following value, 10, has a delay of 1 (instead of the requested 2), which is as much as possible given that you have to respect the order of the original sequence. Finally, 4 conclude the sequence with the requested delay of 1.

Among the attachments of this task you may find a template file `delay.*` with a sample incomplete implementation.

Input

The first line contains the only integer N . The second line contains N integers S_t . The third line contains N integers D_t .



Figure 1: Giorgio's broken delay pedal.

Output






You need to write a single line with N integers O_t : the delayed signal.

Constraints

- $1 \leq N \leq 100\,000$.
- $-10^9 \leq S_t \leq 10^9$ for each $t = 0 \dots N - 1$.
- $0 \leq D_t < N$ for each $t = 0 \dots N - 1$.
- The integers in the input sequence S_t are all distinct.

Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

- **Subtask 1** (0 points) Examples.

- **Subtask 2** (30 points) $N \leq 100$ and $D_t = D_{t'}$ for every t, t' .

- **Subtask 3** (20 points) $N \leq 1000$.

- **Subtask 4** (15 points) $D_t = D_{t'}$ for every t, t' .

- **Subtask 5** (35 points) No additional limitations.


Examples

input	output
8 0 5 8 9 7 10 4 1 2 2 2 2 2 2 2 2	0 0 0 5 8 9 7 10
8 0 5 8 9 7 10 4 1 5 4 3 2 1 0 2 1	0 0 0 5 9 10 10 4