E. Little Elephant and Shifts

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

The Little Elephant has two permutations a and b of length n, consisting of numbers from 1 to n, inclusive. Let's denote the i-th $(1 \le i \le n)$ element of the permutation a as a_i, the j-th $(1 \le j \le n)$ element of the permutation b — as b_j.

The *distance* between permutations a and b is the minimum absolute value of the difference between the positions of the occurrences of some number in a and in b. More formally, it's such minimum $|i - j|$, that $a_i = b_j$.

A *cyclic shift* number i $(1 \le i \le n)$ of permutation b consisting from n elements is a permutation $b_i b_{i+1} \dots b_n b_1 b_2 \dots b_{i-1}$. Overall a permutation has n cyclic shifts.

The Little Elephant wonders, for all cyclic shifts of permutation b, what is the distance between the cyclic shift and permutation a?

Input

The first line contains a single integer n $(1 \le n \le 10^5)$ — the size of the permutations. The second line contains permutation a as n distinct numbers from 1 to n, inclusive. The numbers are separated with single spaces. The third line contains permutation b in the same format.

Output

In n lines print n integers — the answers for cyclic shifts. Print the answers to the shifts in the order of the shifts' numeration in permutation b, that is, first for the 1-st cyclic shift, then for the 2-nd, and so on.

Examples

input

```
2
1 2
2 1
```

output

```
1
0
```

input

```
4
2 1 3 4
3 4 2 1
```

output

```
2
1
0
1
```