C. Two permutations

time limit per test: 6 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

You are given two permutations p and q, consisting of n elements, and m queries of the form: l_1, r_1, l_2, r_2 $(l_1 \le r_1;\ l_2 \le r_2)$. The response for the query is the number of such integers from 1 to n, that their position in the first permutation is in segment $[l_1, r_1]$ (borders included), and position in the second permutation is in segment $[l_2, r_2]$ (borders included too).

A *permutation* of n elements is the sequence of n distinct integers, each not less than 1 and not greater than n.

Position of number v $(1 \le v \le n)$ in permutation $g_1, g_2, ..., g_n$ is such number i, that $g_i = v$.

Input

The first line contains one integer n $(1 \le n \le 10^6)$, the number of elements in both permutations. The following line contains n integers, separated with spaces: $p_1, p_2, ..., p_n$ $(1 \le p_i \le n)$. These are elements of the first permutation. The next line contains the second permutation $q_1, q_2, ..., q_n$ in same format.

The following line contains an integer m $(1 \le m \le 2 \cdot 10^5)$, that is the number of queries.

The following m lines contain descriptions of queries one in a line. The description of the i-th query consists of four integers: a, b, c, d $(1 \le a, b, c, d \le n)$. Query parameters l_1, r_1, l_2, r_2 are obtained from the numbers a, b, c, d using the following algorithm:

1. Introduce variable x. If it is the first query, then the variable equals 0, else it equals the response for the previous query plus one.
2. Introduce function $f(z) = ((z - 1 + x)\ mod\ n) + 1$.
3. Suppose $l_1 = min(f(a), f(b)), r_1 = max(f(a), f(b)), l_2 = min(f(c), f(d)), r_2 = max(f(c), f(d))$.

Output

Print a response for each query in a separate line.

Examples

input
3 3 1 2 3 2 1 1 1 2 3 3

output
1

input
4 4 3 2 1 2 3 4 1 3 1 2 3 4 1 3 2 1 1 4 2 3

output

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1
1
2
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