PROBLEM 6

Robot Writing

Time and memory limits: 1 second, 256 MB

You are programming a robot that walks along a row of N tiles. Each tile has an integer value written on it, and the ith tile has the value T_i.

The robot can start on any tile. It will then perform M steps, where each step involves performing the following 3 actions in order:

1. The robot records the value of the tile it is currently standing on.
2. The robot moves exactly one tile either left or right (if the robot is on the 1st tile, it must move right, and if it is on the last tile, it must move left).
3. After moving, if the value on the new tile is less than the value on the tile it just moved from, the robot swaps these two tiles.

The **output** of the robot is the sequence of M numbers that it records, in order. An example is shown below.

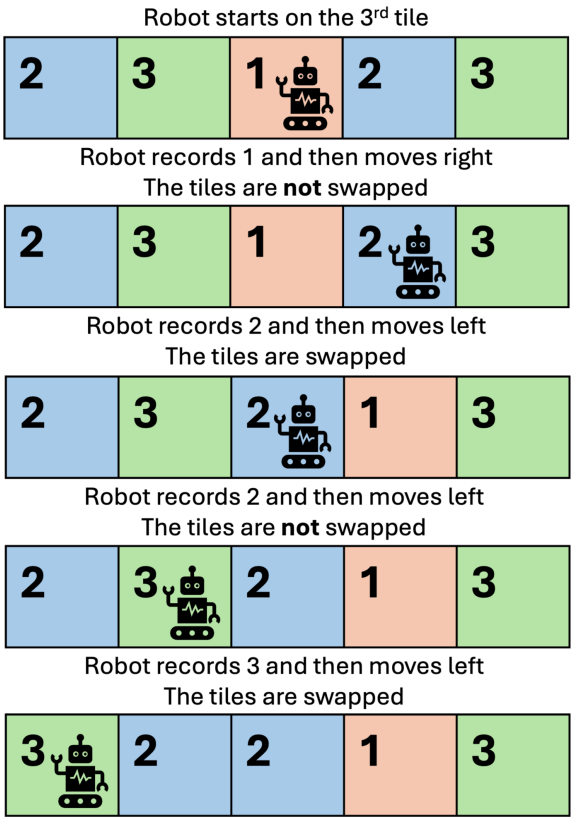

Figure 1: An example with $N = 5$ tiles. The tiles initially have $T_1 = 2$, $T_2 = 3$, $T_3 = 1$, $T_4 = 2$ and $T_5 = 3$. The robot starts on the 3rd tile and has $M = 4$ steps where it moves right, then left, then left, and then left. The output of the robot is $1, 2, 2, 3$.

You have a target sequence S of M integers. You would like to choose where the robot starts and whether it moves left or right for each step, so that its output is your target sequence. Is it possible to do this?

Subtasks and constraints

Your program will be graded using many secret tests. Every test follows some rules:

- $2 \leq N \leq 200\,000$.
- $1 \leq M \leq 200\,000$.
- $1 \leq T_i \leq 200\,000$ for all i.
- $1 \leq S_i \leq 200\,000$ for all i.

The secret tests are divided into subtasks. Your program must correctly solve **every test** within a subtask to earn the marks for that subtask:

- For Subtask 1 (20 marks), $N, M \leq 1000$ and $T_i = i$ for all i.
- For Subtask 2 (20 marks), $N, M \leq 1000$ and the values of T are distinct. That is, $T_i \neq T_j$ for all $i \neq j$.
- For Subtask 3 (20 marks), the values of T are distinct. That is, $T_i \neq T_j$ for all $i \neq j$.
- For Subtask 4 (20 marks), $N, M \leq 1000$.
- For Subtask 5 (20 marks), no special rules apply.

Input

Your solution must read input and print output. We recommend using the solution templates (which you can find on the competition website) to help you with input and output.

The input follows a specific format:

- The 1st line contains the integer N.
- The 2nd line contains N integers, describing the tiles. The ith of these is T_i.
- The 3rd line contains the integer M.
- The 4th line contains M integers, describing the target sequence. The ith of these is S_i.

Output

Your program must output `YES` if it is possible for the robot to output the target sequence, and `NO` otherwise.

Sample input 1

```
5
2 3 1 2 3
4
1 2 2 3
```

Sample output 1

```
YES
```

Sample input 2

```
4
1 2 3 4
6
2 2 2 3 4 4
```

Sample output 2

```
YES
```

Sample input 3

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

Sample output 3

```
NO
```

Sample input 4

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

Sample output 4

```
NO
```

Explanation

- The 1st sample case corresponds to the example at the start of the statement.
- In the 2nd sample case, if the robot starts at the 2nd tile and moves left, then right, then right, then right, then left, and then right, it will output the target sequence.
- In the 3rd and 4th sample cases, it is impossible for the robot to output the target sequences.