Growing Vegetables is Fun 5

Bitaro, who has been enjoying gardening for many years, is planning to grow a plant called Bita-radish starting this spring.

Bitaro has prepared $2N$ Bita-radish seedlings. The seedlings are numbered from 1 to $2N$, and Bitaro plans to arrange them in this order for cultivation. The **size** of seedling i ($1 \leq i \leq 2N$) is A_i. Bitaro wants every seedling to get enough sunlight, so the sizes of the seedlings satisfy the following conditions:

- $A_1 \leq A_2 \leq \cdots \leq A_N \leq A_{N+1}$.
- $A_{N+1} \geq A_{N+2} \geq \cdots \geq A_{2N-1} \geq A_{2N} \geq A_1$.

Note that seedling 1 is the smallest and seedling $N + 1$ is the largest.

Bitaro has also prepared N red flowerpots and N blue flowerpots, each of which also has a certain **size**. The size of the j-th ($1 \leq j \leq N$) red flowerpot is B_j, and the size of the k-th ($1 \leq k \leq N$) blue flowerpot is C_k. Bitaro plants one Bita-radish seedling in each of these total $2N$ flowerpots, and arranges the flowerpots in a row so that seedlings $1, 2, \ldots, 2N$ are in this order.

Considering the appearance, the $2N$ flowerpots must be arranged in a **beautiful order**. Here, a beautiful order means an arrangement of flowerpots such that there exist consecutive N flowerpots with the same color. More precisely, an arrangement of flowerpots is said to be a beautiful order if and only if there exists an integer l between 1 and $N + 1$ inclusive such that the colors of the flowerpots planted with seedlings $l, l + 1, \ldots, l + N - 1$ are all the same.

When a seedling of size y is planted in a flowerpot of size x, the **difficulty** of cultivation for that pair is the absolute value $|x - y|$. Bitaro's **workload** in growing Bita-radish is the maximum difficulty of cultivation among the $2N$ pairs of flowerpots and seedlings.

Write a program which, given the information about the Bita-radish seedlings and flowerpots, finds the minimum possible value of Bitaro's workload when planting the seedlings so that the flowerpots are arranged in a beautiful order.

Input

The input is given from Standard Input in the following format:

N
$A_1\ A_2\ \cdots\ A_{2N}$
$B_1\ B_2\ \cdots\ B_N$
$C_1\ C_2\ \cdots\ C_N$

Output

Print a single value — the minimum possible value of Bitaro's workload when planting the seedlings so that the flowerpots are arranged in a beautiful order — in a single line to Standard Output.

Constraints

- $1 \leq N \leq 300\,000$.
- $1 \leq A_i \leq 10^9$ $(1 \leq i \leq 2N)$.
- $1 \leq B_j \leq 10^9$ $(1 \leq j \leq N)$.
- $1 \leq C_k \leq 10^9$ $(1 \leq k \leq N)$.
- $A_1 \leq A_2 \leq \cdots \leq A_N \leq A_{N+1}$.
- $A_{N+1} \geq A_{N+2} \geq \cdots \geq A_{2N-1} \geq A_{2N} \geq A_1$.
- All input values are integers.

Subtasks

1. (4 points) $N \leq 5$.
2. (5 points) $N \leq 10$.
3. (21 points) $N \leq 2\,000$.
4. (37 points) All values of A_i are distinct. Additionally, $A_N < A_{2N}$ holds.
5. (33 points) No additional constraints.

Sample Input and Output

Sample Input 1	Sample Output 1
2 1 2 6 3 2 5 4 3	2

In this sample input, Bitaro can achieve a workload of 2 by planting the seedlings as follows:

- Plant seedling 1 in the first red flowerpot. The difficulty of cultivation for this pair is $|2 - 1| = 1$.
- Plant seedling 2 in the second blue flowerpot. The difficulty of cultivation for this pair is $|3 - 2| = 1$.
- Plant seedling 3 in the first blue flowerpot. The difficulty of cultivation for this pair is $|4 - 6| = 2$.
- Plant seedling 4 in the second red flowerpot. The difficulty of cultivation for this pair is $|5 - 3| = 2$.

The colors of the flowerpots planted with seedlings 2 and 3 are both blue, so the flowerpots are arranged in a beautiful order.

It is impossible to achieve a workload less than 2 when planting the seedlings so that the flowerpots are arranged in a beautiful order. Therefore, the output is 2.

This sample input satisfies the constraints of all subtasks.

Sample Input 2	Sample Output 2
9 1 2 3 4 5 6 7 8 9 18 17 16 15 14 13 12 11 10 2 7 4 1 7 6 4 10 6 6 8 9 3 7 1 9 5 4	8

This sample input satisfies the constraints of subtasks $2, 3, 4$ and 5.

Sample Input 3	Sample Output 3
7 13 16 18 18 21 22 22 23 23 21 19 17 15 14 14 14 20 19 22 17 25 24 15 18 25 24 19 11	3

This sample input satisfies the constraints of subtasks $2, 3$ and 5.