Problem G. Sorted Array Transformation

Time limit 2000 ms
Mem limit 262144 kB

You are given an array $a_1, a_2, \ldots, a_n$, which is sorted in non-descending order. You decided to perform the following steps to create array $b_1, b_2, \ldots, b_n$:

1. Create an array d consisting of n arbitrary **non-negative** integers.
2. Set $b_i = a_i + d_i$ for each b_i.
3. Sort the array b in non-descending order.

You are given the resulting array b. For each index i, calculate what is the minimum and maximum possible value of d_i you can choose in order to get the given array b.

Note that the minimum (maximum) d_i-s are **independent** of each other, i. e. they can be obtained from different possible arrays d.

Input

The first line contains the single integer t ($1 \le t \le 10^4$) — the number of test cases.

The first line of each test case contains a single integer n ($1 \le n \le 2 \cdot 10^5$) — the length of arrays a, b and d.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^9$; $a_i \le a_{i+1}$) — the array a in non-descending order.

The third line contains n integers $b_1, b_2, \ldots, b_n$ ($1 \le b_i \le 10^9$; $b_i \le b_{i+1}$) — the array b in non-descending order.

Additional constraints on the input:

- there is at least one way to obtain the array b from the a by choosing an array d consisting of **non-negative integers**;
- the sum of n doesn't exceed $2 \cdot 10^5$.

Output

For each test case, print two lines. In the first line, print n integers $d_1^{min}, d_2^{min}, \ldots, d_n^{min}$, where d_i^{min} is the minimum possible value you can add to a_i.

Secondly, print n integers $d_1^{max}, d_2^{max}, \ldots, d_n^{max}$, where d_i^{max} is the maximum possible value you can add to a_i.

All d_i^{min} and d_i^{max} values are independent of each other. In other words, for each i, d_i^{min} is just the minimum value among all possible values of d_i.

Sample 1

Input	Output
4 3 2 3 5 7 11 13 1 1000 5000 4 1 2 3 4 1 2 3 4 4 10 20 30 40 22 33 33 55	5 4 2 11 10 8 4000 4000 0 0 0 0 0 0 0 0 12 2 3 15 23 13 3 15

Note

In the first test case, in order to get $d_1^{min} = 5$, we can choose, for example, $d = [5, 10, 6]$. Then $b = [2 + 5, 3 + 10, 5 + 6] = [7, 13, 11] = [7, 11, 13]$.

For $d_2^{min} = 4$, we can choose $d = [9, 4, 8]$. Then $b = [2 + 9, 3 + 4, 5 + 8] = [11, 7, 13] = [7, 11, 13]$.