A. Lineland Mail

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

All cities of Lineland are located on the Ox coordinate axis. Thus, each city is associated with its position x_i — a coordinate on the Ox axis. No two cities are located at a single point.

Lineland residents love to send letters to each other. A person may send a letter only if the recipient lives in another city (because if they live in the same city, then it is easier to drop in).

Strange but true, the cost of sending the letter is exactly equal to the distance between the sender's city and the recipient's city.

For each city calculate two values min_i and max_i, where min_i is the minimum cost of sending a letter from the i-th city to some other city, and max_i is the the maximum cost of sending a letter from the i-th city to some other city

Input

The first line of the input contains integer n ($2 \le n \le 10^5$) — the number of cities in Lineland. The second line contains the sequence of n distinct integers $x_1, x_2, \ldots, x_n$ ($-10^9 \le x_i \le 10^9$), where x_i is the x-coordinate of the i-th city. All the x_i's are distinct and follow in **ascending** order.

Output

Print n lines, the i-th line must contain two integers min_i, max_i, separated by a space, where min_i is the minimum cost of sending a letter from the i-th city, and max_i is the maximum cost of sending a letter from the i-th city.

Examples

input
4 -5 -2 2 7
output
3 12 3 9 4 7 5 12

input
2 -1 1
output
2 2 2 2