F. Souvenirs

time limit per test: 3 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

Artsem is on vacation and wants to buy souvenirs for his two teammates. There are n souvenir shops along the street. In i-th shop Artsem can buy one souvenir for a_i dollars, and he cannot buy more than one souvenir in one shop. He doesn't want to introduce envy in his team, so he wants to buy two souvenirs with least possible difference in price.

Artsem has visited the shopping street m times. For some strange reason on the i-th day only shops with numbers from l_i to r_i were operating (weird? yes it is, but have you ever tried to come up with a reasonable legend for a range query problem?). For each visit, Artsem wants to know the minimum possible difference in prices of two different souvenirs he can buy in the opened shops.

In other words, for each Artsem's visit you should find the minimum possible value of $|a_s - a_t|$ where $l_i \le s, t \le r_i, s \ne t$.

Input

The first line contains an integer n ($2 \le n \le 10^5$).

The second line contains n space-separated integers $a_1, ..., a_n$ ($0 \le a_i \le 10^9$).

The third line contains the number of queries m ($1 \le m \le 3 \cdot 10^5$).

Next m lines describe the queries. i-th of these lines contains two space-separated integers l_i and r_i denoting the range of shops working on i-th day ($1 \le l_i < r_i \le n$).

Output

Print the answer to each query in a separate line.

Example

input
8 3 1 4 1 5 9 2 6 4 1 8 1 3 4 8 5 7

output
0 1 1 3