Problem H
Longest Symmetry

Time Limit: 2 seconds

There are N houses numbered $1, 2, \ldots, N$ on a number line. House i is located at coordinate X_i. It is guaranteed that $X_i < X_{i+1}$ for every i $(1 \leq i \leq N-1)$.

For integers a, b with $1 \leq a < b \leq N$, we say that the consecutive houses $a, a+1, \ldots, b$ form a *symmetric interval of houses* if the following condition holds:

- For every $i = 0, 1, \ldots, b-a$, $X_a + X_b = X_{a+i} + X_{b-i}$ holds.

You are given Q queries. Process them in order.

- In the i-th query, you are given integers l_i, r_i $(1 \leq l_i < r_i \leq N)$. Among all pairs of integers (s, t) satisfying $l_i \leq s < t \leq r_i$ such that the consecutive houses $s, s+1, \ldots, t$ form a symmetric interval of houses, output the maximum possible width $X_t - X_s$ of the interval.

Input

The input consists of a single test case of the following format:

N
$X_1\ X_2\ \ldots\ X_N$
Q
$l_1\ r_1$
$l_2\ r_2$
$\vdots$
$l_Q\ r_Q$

The first line contains an integer N, representing the number of houses $(2 \leq N \leq 2 \times 10^5)$.

The second line contains N integers $X_1, X_2, \ldots, X_N$, representing the coordinates of the houses $(-10^9 \leq X_i \leq 10^9)$. It is guaranteed that $X_i < X_{i+1}$ for every i $(1 \leq i \leq N-1)$.

The third line contains an integer Q, representing the number of queries $(1 \leq Q \leq 2 \times 10^5)$.

Each of the following Q lines contains two integers l_i and r_i, representing the left and right endpoints of the range specified in the i-th query $(1 \leq l_i < r_i \leq N)$.

Output

For each query, output the maximum possible width.

Sample Input	Sample Output
7 -5 -2 0 4 6 9 12 5 1 7 2 6 3 7 4 7 3 6	14 8 6 6 4