E. Dreamoon and Notepad

time limit per test: 3.5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Dreamoon has just created a document of hard problems using notepad.exe. The document consists of n lines of text, a_i denotes the length of the i-th line. He now wants to know what is the fastest way to move the cursor around because the document is really long.

Let (r, c) be a current cursor position, where r is row number and c is position of cursor in the row. We have $1 \le r \le n$ and $0 \le c \le a_r$.

We can use following six operations in notepad.exe to move our cursor assuming the current cursor position is at (r, c):

1. up key: the new cursor position $(nr, nc) = (max(r - 1, 1), min(a_{nr}, c))$
2. down key: the new cursor position $(nr, nc) = (min(r + 1, n), min(a_{nr}, c))$
3. left key: the new cursor position $(nr, nc) = (r, max(0, c - 1))$
4. right key: the new cursor position $(nr, nc) = (r, min(a_{nr}, c + 1))$
5. HOME key: the new cursor position $(nr, nc) = (r, 0)$
6. END key: the new cursor position $(nr, nc) = (r, a_r)$

You're given the document description (n and sequence a_i) and q queries from Dreamoon. Each query asks what minimal number of key presses is needed to move the cursor from (r_1, c_1) to (r_2, c_2).

Input

The first line contains an integer $n (1 \le n \le 400,000)$ — the number of lines of text.

The second line contains n integers $a_1, a_2, ..., a_n (1 \le a_i \le 10^8)$.

The third line contains an integer $q (1 \le q \le 400,000)$.

Each of the next q lines contains four integers r_1, c_1, r_2, c_2 representing a query $(1 \le r_1, r_2 \le n, 0 \le c_1 \le a_{r1}, 0 \le c_2 \le a_{r2})$.

Output

For each query print the result of the query.

Examples

input
9 1 3 5 3 1 3 5 3 1 4 3 5 3 1 3 3 7 3 1 0 3 3 6 0 7 3

output
2 5 3 2

input
2 10 5

```
1
1 0 1 5
```

output

```
3
```

Note

In the first sample, the first query can be solved with keys: HOME, right.

The second query can be solved with keys: down, down, down, END, down.

The third query can be solved with keys: down, END, down.

The fourth query can be solved with keys: END, down.