TRAINING COMPETITION FOR THE BULGARIAN EXTENDED NATIONAL TEAM
Bankya, 20 June 2025
Group A

Task AT3. HELICOPTER

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The English word helicopter is adapted from the French word hélicoptère, coined by Gustave Ponton d'Amécourt in 1861, which originates from the Greek helix, genitive helikos (meaning: "helix, spiral, whirl, convolution") and pteron (meaninig: "wing").

There exist n skyscrapers, arranged in a line, indexed from 1 to n. Each skyscraper is a_i meters high. You own a helicopter, which can do the following horizontal moves:

- Move from the being over the i-th to being over the $(i+1)$-th skyscraper. (If such exists.)
- Move from being over the i-th to being over the $(i-1)$-th skyscraper. (If such exists.)
- Remains over the same skyscraper as before.

as well as the following vertical moves:

- Move up by 1 meters. This move costs 4 fuel units.
- Move down by 1 meters. This move costs 1 fuel units.
- Remain at the same elevation. This move costs 2 fuel units.

Note that you do a vertical move and a horizontal one together. While being over the i-th skyscraper your elevation should be equal or greater than a_i. You are tasked with carrying out q deliveries – beginning from the top of the s_i-th skyscraper, fly using your helicopter to the top of the t_i-th skyscraper. Find the minimal fuel units needed to finish each delivery.

Input

The first line on the standard input contains only n – the number of skyscrapers. The second line consists of n numbers – $a_1, a_2, \ldots, a_n$ – the heights of the skyscrapers. The third line contains only the number of queries q. Each of the following q lines contain the description of a single delivery – s_i and t_i.

Output

Output Q lines, where the j-th line denotes the minimum fuel required on the j-th delivery.

Constraints

- $1 \leq n, q \leq 200\,000$
- $1 \leq a_i \leq 10^9$
- $1 \leq s_i \neq t_i \leq n$

Subtasks

Subtask	Points	Required subtasks	Additional constraints
0	0	–	The example test.
1	5	–	$s_i + 1 = t_i$
2	6	–	$a_i = i$
3	18	–	$n, q, a_i \leq 100$
4	24	3	$n, q \leq 1000$
5	13	–	$s_i = 1$
5	34	$0 - 5$	–

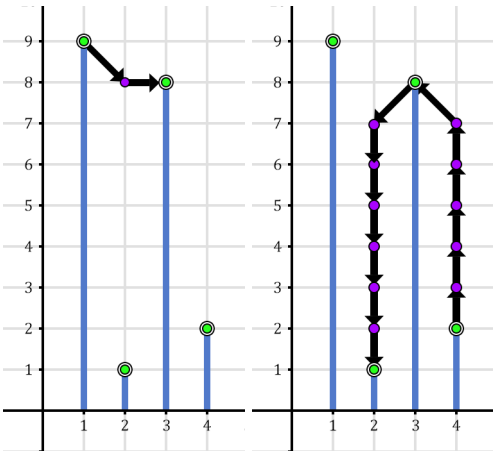
The points for a subtask are given only if all tests for it and the required subtasks are passed successfully.

Example

Input	Output
4 9 1 8 2 2 1 3 4 2	3 31
9 1 2 3 2 1 2 3 2 1 4 1 9 4 6 2 6 5 2	18 4 9 9

Explanation

The following pictures explain the movement of the helicopter for the two queries in example input 1.



To describe the moves in both solution, let's use the following notation (a, b) where $a \in \{\texttt{u}, \texttt{d}, \texttt{s}\}$ represents the vertical move of the helicopter (`u` is up, `d` is down, `s` is staying at the same elevation). In a similar manner $b \in \{-1, 0, +1\}$ represents the change to the index of the skyscraper the helicopter is flying over.

The route taken in the first query is $(d, +1) \to (s, +1)$ and costs $2 + 1 = 3$ fuel units. The route taken in the second query is:
$(u, 0) \to (u, 0) \to (u, 0) \to (u, 0) \to (u, 0) \to (u, -1) \to (d, -1) \to (d, 0) \to (d, 0) \to (d, 0) \to (d, 0) \to (d, 0) \to (d, 0)$

Thus the optimal cost for this query is $6 \times 4 + 7 \times 1 = 31$ fuel units.