# Problem J. Joined Vessels

Time limit: 3 seconds
Memory limit: 512 megabytes

John is doing physics practice at school. Today he is studying the law of communicating vessels. This law states that if we have a set of communicating containers with a homogeneous liquid, when the liquid settles, it balances out to the same level in all of the containers regardless of their shape and volume.

In the lab, John has a set of $n$ cylindrical vessels with a base area of one square decimeter and a height that we consider to be infinite. The vessels are numbered from 1 to $n$, and vessels $i$ and $i+1$ are communicating via a very thin bridge at a height of $h_i$ decimeters. All these heights are pairwise distinct.

The practice work contains $t$ independent experiments. In each experiment, all vessels are initially empty. In the $i$-th experiment, water is slowly put into vessel $a_i$, and the experiment finishes when any amount of water appears in vessel $b_i$. The result of the experiment is the total volume of water put into vessel $a_i$, measured in liters (or, equivalently, cubic decimeters).

Note that the law of communicating vessels can only be applied to vessels $i$ and $i + 1$ when the water level is at least $h_i$ in both of them. Until then, if the water level reaches $h_i$ in just one of them, it stays constant and any excess water coming into this vessel flows through the bridge into the other one.

Help John check his results!

## Input

The first line of the input contains an integer $n$ — the number of vessels ($2 \le n \le 2 \cdot 10^5$).

The second line contains $n - 1$ integers $h_1, h_2, \ldots, h_{n-1}$ — the heights of communication bridges between consecutive vessels, in decimeters ($1 \le h_i \le 10^9$). These heights are pairwise distinct.

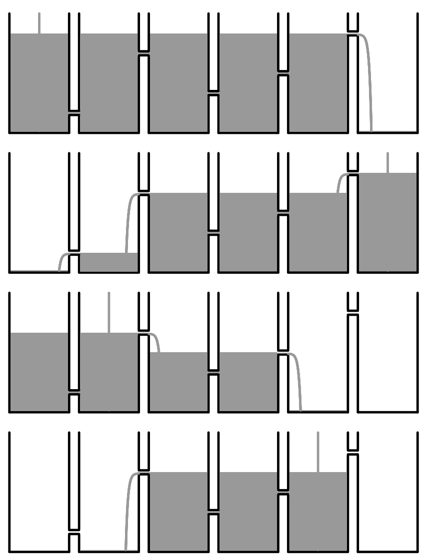
The third line contains an integer $t$ — the number of experiments ($1 \le t \le 2 \cdot 10^5$).

Each of the following $t$ lines contains two integers $a_i$ and $b_i$ — the numbers of the starting vessel and the target vessel in the $i$-th experiment ($1 \le a_i \le n$; $1 \le b_i \le n$; $a_i \ne b_i$).

## Output

For each experiment, in the order of input, output a single integer — the required volume of water, in liters.

## Example

| standard input | standard output | Illustration |
|---|---|---|
| 6<br>1 4 2 3 5<br>4<br>1 6<br>6 1<br>2 5<br>5 2 | 25<br>18<br>14<br>12 |  |