Pinnacle

There are N towers of cubes in a row, numbered 1 to N from left to right. The ith tower has a_i cubes in it. A row of towers is a *mountain* if it can be split into two (possibly empty) halves where:

- The left half forms a non-decreasing sequence, and
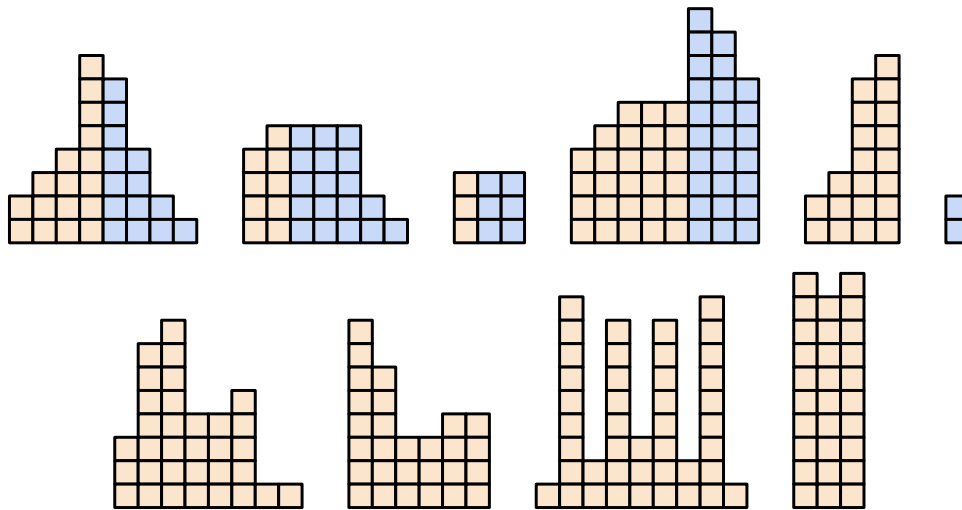- The right half forms a non-increasing sequence.

Figure 1: Six examples of mountains are shown in the top row. For clarity, the left half in each example is shaded orange while the right half is shaded blue. In the two rightmost examples, one of the halves is empty. Four examples that aren't mountains are shown in the bottom row.

You are tasked with considering Q scenarios: In the ith scenario, what is the fewest cubes you must add to turn the towers $l_i, l_i + 1, \ldots, r_i - 1, r_i$ into a mountain? You cannot remove any cubes.

Subtasks and Constraints

For all subtasks:

- $2 \le N \le 100\,000$.
- $1 \le Q \le 100\,000$.
- $1 \le a_i \le 1\,000\,000\,000$, for all i.
- $1 \le l_i \le r_i \le N$, for all i.

Additional constraints for each subtask are given below.

Subtask	Points	Additional constraints
1	10	$Q = 1$, $l_1 = 1$ and $r_1 = N$.
2	15	$Q = N$ and $a_1 = 1\,000\,000\,000$. $l_i = 1$ and $r_i = i$ for all i.
3	30	$Q = N$. $l_i = 1$ and $r_i = i$ for all i.
4	20	$a_i \le 10$ for all i.
5	25	No additional constraints.

Input

- The first line of input contains the two integers N and Q.
- The next line of input contains the integers $a_1, a_2, \ldots, a_N$.
- The following Q lines describe the scenarios. The ith such line contains l_i and r_i.

Output

Output Q lines. On the ith line, print the answer to the ith scenario.

Note: Your solution may involve integers which are large. Consider using 64-bit integers ('long long' in C++) in your solution.

Sample Input 1

```
14 4
2 7 5 2 4 3 3 8 6 4 9 1 4 2
9 14
2 8
8 10
5 13
```

Sample Output 1

```
5
18
0
11
```

Sample Input 2

```
8 8
5 2 3 2 4 6 3 4
1 1
1 2
1 3
1 4
1 5
1 6
1 7
1 8
```

Sample Output 2

```
0
0
1
1
5
9
9
10
```

Explanation

The sample inputs are shown on the following page.

- The initial row of towers is shaded in orange.
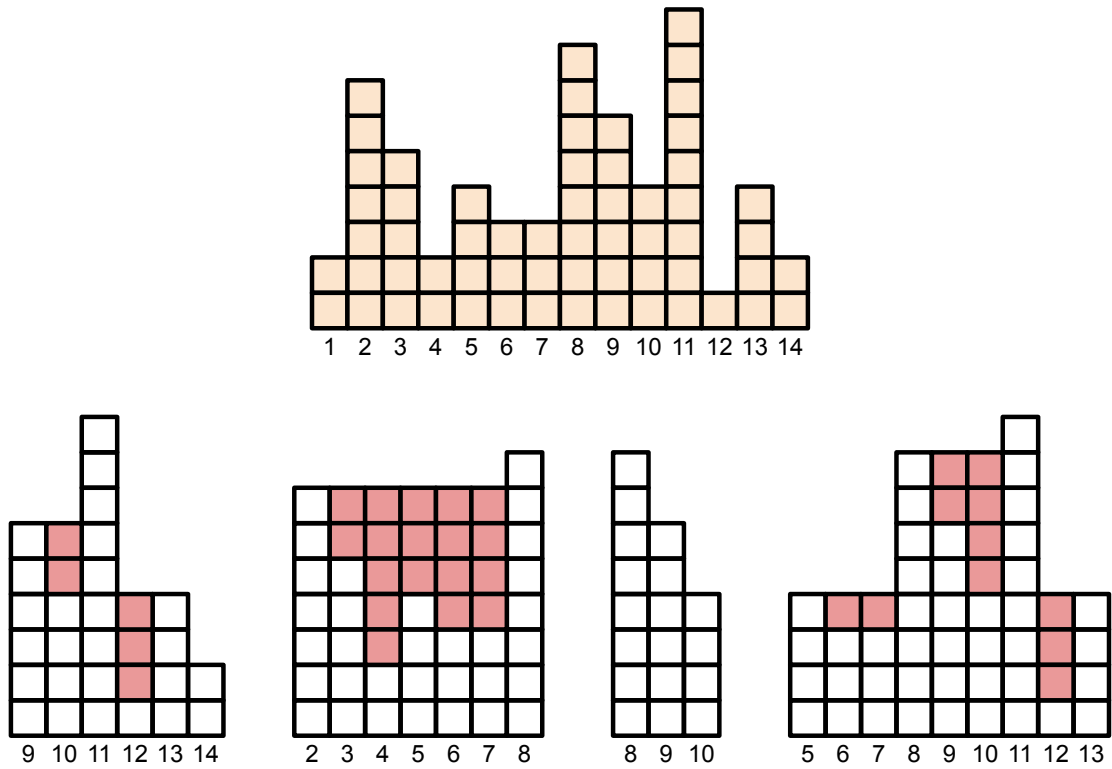- For each scenario, the added cubes (if any) are shaded in red.
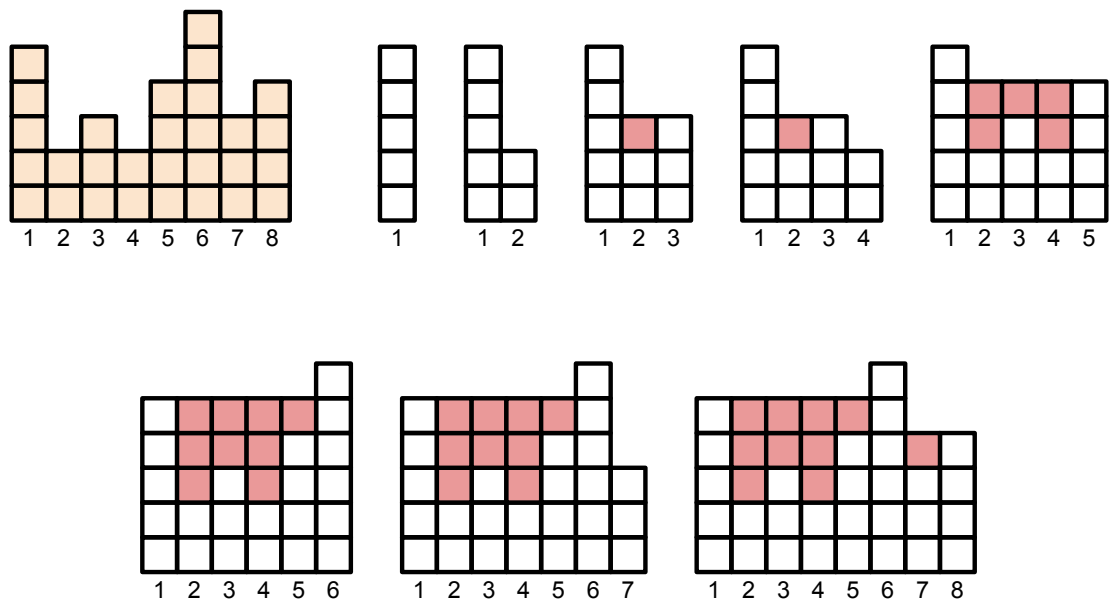
Figure 2: Sample Input 1

Figure 3: Sample Input 2