Trapping Rain Water

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	1024 megabytes

There is a histogram represented by an integer sequence $a_1, a_2, \cdots, a_n$ of length n. For the i-th bar from left to right, its height is a_i and its width is 1.

We'll perform q modifications to the histogram. The i-th modification can be represented by a pair of integers (x_i, v_i) indicating that we'll increase the height of the x_i-th bar by v_i.

After each modification, answer the following query: Calculate how much water this histogram can trap if a heavy rain pours onto it and fills all the pits as much as possible.

More formally, given an integer sequence $a_1, a_2, \cdots, a_n$ of length n, the i-th modification will increase a_{x_i} by v_i. After each modification, answer the following query: Let $f_i = \max(a_1, a_2, \cdots, a_i)$ and $g_i = \max(a_i, a_{i+1}, \cdots, a_n)$, calculate

$$\sum_{i=1}^{n} (\min(f_i, g_i) - a_i)$$

Input

There are multiple test cases. The first line of the input contains an integer T indicating the number of test cases. For each test case:

The first line contains an integer n ($1 \le n \le 10^5$) indicating the number of bars in the histogram.

The second line contains n integers $a_1, a_2, \cdots, a_n$ ($1 \le a_i \le 10^6$) where a_i indicates the initial height of the i-th bar.

The third line contains an integer q ($1 \le q \le 10^5$) indicating the number of modifications.

For the following q lines, the i-th line contains two integers x_i and v_i ($1 \le x_i \le n$, $1 \le v_i \le 10^6$) indicating that the i-th modification increases the height of the x_i-th bar by v_i.

It is guaranteed that neither the sum of n nor the sum of q of all test cases will exceed 10^6.

Output

For each modification output one line containing one integer indicating how much rain water this histogram can trap.

Example

standard input	standard output
2 6 1 2 3 4 5 6 2 1 2 3 3 5 100 10 1 10 100 1 3 100	1 4 180