Add One 3

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

抓住和抓不住的照片 哪张更美
去过和没去过的地方 哪里更远

白鸟过河滩 by ilem

The background story in the Chinese statements is removed due to the translation difficulty >_<

In computer science, the maximum subarray sum problem, also known as the maximum contiguous subarray problem, is the task of finding a contiguous subarray within a one-dimensional array $A_1, A_2, \cdots, A_n$ that has the largest sum. Formally, the task is to find indices i and j such that the following sum is as large as possible:

$$\sum_{i \le k \le j} A_k$$

You can also choose an empty array, which means you have found a subarray with a sum of 0. The value of the maximum subarray sum is denoted as $MSS(A)$. For example, $MSS([-2, 1, 4, -3, 5]) = 7$, $MSS([-5]) = 0$, $MSS([-1, -2]) = 0$.

In the Little Cyan Fish's heart, there is an integer sequence of length n, $a_1, a_2, \ldots, a_n$. You can perform several operations, each time choosing an element a_i and incrementing its value, i.e., updating $a_i \leftarrow a_i + 1$.

The Little Cyan Fish has many questions in his mind. This time, he wants you to answer q queries, each time giving you a range $[l, r]$ and asking how many operations are needed at a minimum to make $a_l, a_{l+1}, \ldots, a_r$ the **unique** maximum subarray sum of the entire sequence. If it is not possible to achieve this with any number of operations, then output -1. Since we consider not selecting a subarray as a solution with a sum of 0, the final unique maximum subarray sum must be greater than 0.

Of course, the Little Cyan Fish will only think in his mind and will not actually take action. Therefore, each query is independent.

Input

There are multiple test cases. The first line of input contains a single integer T ($1 \le T \le 10^5$), indicating the number of test cases. For each test case:

- The first line contains two integers n, q ($1 \le n, q \le 5 \times 10^5$), representing the length of the sequence and the number of queries.
- The next line contains n integers $a_1, a_2, \ldots, a_n$ ($-10^9 \le a_i \le 10^9$).
- The next q lines each contain two integers l, r ($1 \le l \le r \le n$), representing the left and right endpoints of a query.

It is guaranteed that the sum of n across all test data does not exceed 5×10^5, and the sum of q does not exceed 5×10^5.

Output

For each set of test data, output q lines, each containing an integer representing the answer to each query.

Example

standard input	standard output
2 6 6 -1 2 -2 0 1 -1 1 1 1 2 1 3 1 4 1 5 1 6 1 1 0 1 1	-1 2 -1 -1 4 5 1