

Interval MST

Input file: *standard input*
Output file: *standard output*
Time limit: 7 seconds
Memory limit: 1024 mebibytes

You are given a sequence of integers $x_1, x_2, \dots, x_n$. Consider the weighted undirected graph G on n vertices, numbered 1 through n , that contains, for every pair of vertices u and v with $u < v$, the edge $\{u, v\}$ of weight $x_v - x_u$.

Note that x is not necessarily sorted, so edge weights may be negative.

For a pair (ℓ, r) with $\ell \leq r$, let $G[\ell, r]$ denote the subgraph of G induced by the vertices $\ell, \ell+1, \dots, r$; that is, the graph on those vertices keeping exactly the edges of G with both endpoints in that range. Define $f(\ell, r)$ as the minimum possible total weight of a spanning tree of $G[\ell, r]$. In particular, $f(\ell, \ell) = 0$.

You are given q pairs (ℓ, r) . Compute $f(\ell, r)$ for each of them.

Input

The first line contains two integers n and q ($1 \leq n, q \leq 2 \cdot 10^5$): the length of the sequence and the number of queries.

The second line contains n integers $x_1, x_2, \dots, x_n$ ($-10^9 \leq x_i \leq 10^9$).

Each of the next q lines contains two integers ℓ and r ($1 \leq \ell \leq r \leq n$) describing one query.

Output

Print q lines. The i -th line must contain a single integer: the answer to the i -th query.

Example

<i>standard input</i>	<i>standard output</i>
3 4	-10
0 10 0	10
1 3	-10
1 2	0
2 3	
2 2	

Note

For the first query, the three edge weights are 10, 0, and -10 . Choosing the edges of weights 0 and -10 gives a spanning tree of total weight -10 .

The second and third queries contain two vertices, so their answers are the weights of their only edges: 10 and -10 , respectively. The final query contains one vertex and therefore has answer 0.