

C. The Weaving Looms of Margilan (looms)

Time limit: 1.5 second

Memory limit: 256 MiB

The legendary silk masters of Margilan have stretched N silk threads side by side on a colossal weaving loom. The threads are numbered from 1 to N , and the initial "tension value" of each thread is represented by the sequence A_1, A_2, \dots, A_N .

Due to the delicate mechanics of the loom, if a thread in the middle becomes too loose compared to its adjacent neighbors, the apprentices can perform a special tightening maneuver. Specifically, if the inequality $2A_i \leq A_{i-1} + A_{i+1}$ strictly holds for a thread i ($1 < i < N$), the apprentices can update its tension value as follows:

$$A_i \leftarrow A_{i-1} + A_{i+1} - A_i$$

Since the threads at the edges (1 and N) are anchored securely to the wooden frame, this operation cannot be applied to them. This maneuver can be performed any number of times and in any order, as long as the condition is met.

The headmaster wishes to **maximize** the total tension of the loom (i.e., the sum of all elements in the sequence, $\sum A_i$).

However, the master's pursuit of perfection does not end there. Over the course of Q days, the master will alter the foundational tension of exactly one thread each day. For each query, you will be given the values X and V , indicating that the tension of thread A_X is permanently changed to V .

Your task is to determine the **maximum total tension** the loom can reach after the apprentices optimally apply their tightening maneuvers, both for the initial configuration and immediately after each of the Q daily updates.

Input

The first line contains two integers N and Q , representing the number of threads and the number of days, respectively.

The second line contains N space-separated integers A_1, A_2, \dots, A_N , representing the initial tension values of the threads.

Each of the following Q lines contains two integers X and V , representing the daily update where the tension of thread A_X is set to V .

Output

Your output should consist of $Q + 1$ lines. On the first line, print the maximum total tension achievable for the initial array. On the subsequent Q lines, print the new maximum total tension achievable immediately after each update.

Constraints

- $3 \leq N \leq 2 \cdot 10^5$
- $0 \leq Q \leq 2 \cdot 10^5$
- $1 \leq A_i, V \leq 10^8$
- $1 \leq X \leq N$

Scoring

- **Subtask 1 (7 points):** $N \leq 10$ and $Q = 0$
- **Subtask 2 (12 points):** $N \leq 2000$ and $Q = 0$
- **Subtask 3 (21 points):** $N \leq 2 \cdot 10^5$ and $Q = 0$
- **Subtask 4 (24 points):** $N, Q \leq 2000$
- **Subtask 5 (36 points):** No additional constraints.

Examples

standard input	standard output
4 2	22
2 1 4 7	20
2 3	29
1 5	

Explanation

Example 1 (Initial State): The initial thread tensions are $[2, 1, 4, 7]$. The apprentices check the second thread ($i = 2$). The condition holds because $2 \times 1 \leq 2 + 4$ ($2 \leq 6$). They apply the tightening maneuver: $A_2 \leftarrow 2 + 4 - 1 = 5$. The new array becomes $[2, 5, 4, 7]$.

Next, they check the third thread ($i = 3$). The condition holds because $2 \times 4 \leq 5 + 7$ ($8 \leq 12$). They apply the maneuver again: $A_3 \leftarrow 5 + 7 - 4 = 8$. The array becomes $[2, 5, 8, 7]$.

No other valid maneuvers can be applied. The maximum total tension is $2 + 5 + 8 + 7 = 22$.