Problem J. The Echoes of Chronos

In the year 3142, deep within the rings of Titan, the last archive of pre-Collapse human memory is sealed inside the Chronos Vault. Its entrance is guarded by the Echo Dial, a quantum-entangled lock composed of n chronal rings arranged in a single filament. Each ring displays a phase value in the range 0 to $m-1$, indicating its alignment with the cosmic rhythm. Initially, the i-th ring shows the value a_i.

The Echo Dial can only be adjusted through resonant tuning, governed by the following rules:

- In a single operation, you may choose any phase value $x \in [0, m)$ and simultaneously tune all rings currently displaying x either:
  - forward tuning: $x \to (x+1) \bmod m$, or
  - backward tuning: $x \to (x-1) \bmod m$.
- This operation affects every ring in the entire dial that currently resonates at phase x, regardless of position.

The Oracle of Echoes, the vault's sentient guardian, issues q diagnostic trials. Each trial is given as a query (l, r, v) and asks for the minimum number of resonant tuning operations required to set all rings in positions l through r (inclusive) to phase v.

All trials are hypothetical. The Echo Dial always starts from its original initial state for every query, and no trial alters the actual configuration of the dial. As the last Quantum Archivist, your duty is to answer all q queries efficiently.

Input

The first line contains three integers n, q ($1 \le n, q \le 2 \times 10^5$), and m ($1 \le m \le 10^9$).

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($0 \le a_i < m$), denoting the initial phase of each ring.

Each of the next q lines contains three integers l, r ($1 \le l \le r \le n$) and v ($0 \le v < m$), describing a diagnostic trial.

Output

For each query, output a line containing an integer, denoting the minimum number of operations needed to set all rings in positions $[l, r]$ to phase v, assuming the dial starts from its original state and remains unchanged between queries.

Example

standard input	standard output
4 6 7 2 0 2 5 1 4 3 2 4 6 1 3 1 1 3 5 3 4 0 3 3 2	5 4 2 4 4 0

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