

Problem C. Intergalactic ship

Input file: **standard input**
Output file: **standard output**
Time limit: **2 seconds**
Memory limit: **256 megabytes**

You are given a sequence a of n integer numbers a_1, a_2, \dots, a_n .

In addition, you are given a set S of q updates. Each update is defined by three numbers l, r , and x . An update consists of the operation xor with the number x applied to all the numbers in the segment $[l, r]$ of the sequence a . Formally, for each $l \leq i \leq r$ the following substitution is performed:

$$a_i := a_i \oplus x$$

For a set of updates S , let's define $K(S)$ as the sum of $sum(i, j)^2$ over all possible segments of the sequence a after applying all updates from the set S to the given sequence:

$$K(S) = \sum_{1 \leq i \leq j \leq n} sum(i, j)^2$$

where $sum(i, j)$ is defined as the sum of elements in the segment $[i, j]$:

$$sum(i, j) = \sum_{x=i}^j a_x$$

Your task is to find the sum over all 2^q subsets of the given set of updates S . Formally, if P is the set of all subsets of the set S of q updates, you have to find the following:

$$\sum_{subset \in P} K(subset)$$

Input

The first line of input contains single integer n ($1 \leq n \leq 1000$) — the number of elements in the sequence.

The second line contains n space-separated integer numbers a_1, a_2, \dots, a_n ($0 \leq a_i < 128$ for each $1 \leq i \leq n$) — the given sequence.

The third line contains single integer q ($1 \leq q \leq 10^5$) — the number of updates.

Each of the next q lines contains three space-separated integer numbers l, r , and x ($1 \leq l \leq r \leq n$, $0 \leq x < 128$) — descriptions of the updates.

Output

Output single integer — answer to the problem. As soon as the answer may be very large, output it modulo $10^9 + 7$.

Scoring

This problem consists of nine subtasks:

1. $1 \leq n \leq 10, 1 \leq q \leq 10, 0 \leq a_i, x < 128$, for all $1 \leq i \leq n$. Scored 4 points.
2. $1 \leq n \leq 100, 1 \leq q \leq 10, 0 \leq a_i, x < 128$, for all $1 \leq i \leq n$. Scored 5 points.
3. $1 \leq n \leq 100, 1 \leq q \leq 100000, 0 \leq a_i, x < 32$, for all $1 \leq i \leq n$. It is guaranteed that length of all update segments is equal to 1. Scored 6 points.
4. $1 \leq n \leq 1000, 1 \leq q \leq 500, 0 \leq a_i, x < 128$, for all $1 \leq i \leq n$. It is guaranteed that all update segments do not intersect pairwise. Scored 9 points.
5. $1 \leq n \leq 30, 1 \leq q \leq 20, 0 \leq a_i, x < 32$, for all $1 \leq i \leq n$. Scored 8 points.
6. $1 \leq n \leq 30, 1 \leq q \leq 5000, 0 \leq a_i, x < 32$, for all $1 \leq i \leq n$. Scored 11 points.
7. $1 \leq n \leq 300, 1 \leq q \leq 300, 0 \leq a_i, x < 128$, for all $1 \leq i \leq n$. Scored 19 points.
8. $1 \leq n \leq 500, 1 \leq q \leq 100000, 0 \leq a_i, x < 128$, for all $1 \leq i \leq n$. Scored 30 points.
9. $1 \leq n \leq 1000, 1 \leq q \leq 100000, 0 \leq a_i, x < 128$, for all $1 \leq i \leq n$. Scored 8 points.

Examples

standard input	standard output
2 1 3 1 1 2 2	52
5 1 2 3 4 5 0	1001

Note

The xor operation is the bitwise exclusive OR.

In the first sample, there are $2^1 = 2$ possible sequences after applying updates — with applying the single given operation and without. In both sequences the resulting sums are equal to 26.

In the second sample, set S is empty, the set of all subsets consists of a single element \emptyset — empty set, i.e. there are no updates and you have to find $K(\emptyset)$ for the given sequence a .