Question 2 Max. Marks 100.00

Xor sum

You are given an array $A[]$ of size N. Now you are given Q queries to be performed over this array. In each query, you are given 2 space separated integers L and R. For each query, you need to you need to find the summation of the xor-sum of all triplets (i, j, k) of the sub-array $L...R$, where $L \leq i < j < k \leq R$.

In short, you need to find $\sum(A[i] \oplus A[j] \oplus A[k])$, over all triplets (i, j, k) , such that $L \leq i < j < k \leq R$. Print the answer for each query , **Modulo** $10^9 + 7$

Input Format

The first line contains a single integer N.

The next line contains array $A[]$ of N integers.

The next line contains 2 space separated integers Q and 2.

E*ach of the next* Q lines contain*s two space separated integers* L *and* R

Output Format :

Print Q *lines, the* i^{th} *line denoting the answer to the* i^{th} *query,* ***Modulo*** $10^9 + 7$

Input Constraints :

$1 \leq N, Q \leq 10^5$

$1 \leq A[i] \leq 10^{12}$

$1 \leq L \leq R \leq N$

Sample Input

```
4
1 2 3 4
1 2
1 4
```

Sample Output

```
18
```

Explanation

$(1 \oplus 2 \oplus 3) + (2 \oplus 3 \oplus 4) + (1 \oplus 2 \oplus 4) + (1 \oplus 3 \oplus 4) = 18$