

Xor Partitions

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 1024 megabytes

A sequence of integers a_1, a_2, \dots, a_n is given. A partition of the sequence a_1, a_2, \dots, a_n is defined as a set of its contiguous intervals, such that each element belongs to exactly one interval.

The xor of a contiguous interval of this sequence is defined as the bitwise xor of the numbers in this interval. The value of a partition of the sequence is defined as the product of xors of the intervals. Calculate the sum of the values of all possible partitions of the sequence a_1, a_2, \dots, a_n . As this number can be very large, it is sufficient to provide its remainder when divided by $10^9 + 7$.

Input

The first line of the input contains a single integer n ($1 \leq n \leq 3 \cdot 10^5$) representing the length of the sequence.

The second line contains n integers a_1, a_2, \dots, a_n ($0 \leq a_i \leq 10^{18}$) representing the sequence.

Output

The output should contain a single integer, which is the remainder when the sum of the values of all possible partitions of the given sequence is divided by $10^9 + 7$.

Example

standard input	standard output
4 7 3 1 2	170

Note

Possible partitions of the sequence are:

- $[7, 3, 1, 2]$ – with a value of 7,
- $[7, 3], [1, 2]$ – with a value of $4 \cdot 3 = 12$,
- $[7], [3, 1, 2]$ – with a value of $7 \cdot 0 = 0$,
- $[7, 3, 1], [2]$ – with a value of $5 \cdot 2 = 10$,
- $[7, 3], [1], [2]$ – with a value of $4 \cdot 1 \cdot 2 = 8$,
- $[7], [3], [1, 2]$ – with a value of $7 \cdot 3 \cdot 3 = 63$,
- $[7], [3, 1], [2]$ – with a value of $7 \cdot 2 \cdot 2 = 28$,
- $[7], [3], [1], [2]$ – with a value of $7 \cdot 3 \cdot 1 \cdot 2 = 42$.

The sum of the values of the partitions is $7 + 12 + 0 + 10 + 8 + 63 + 28 + 42 = 170$.