Increasing Sequence

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

Given a non-negative integer sequence a of length n and a constant value k.

Determine how many integers x satisfy $x \in [0, k]$, such that $a_1 \oplus x, a_2 \oplus x, \ldots, a_n \oplus x$ forms a non-decreasing sequence.

Here, $\oplus$ denotes the XOR operation.

Input

The first line contains a positive integer T ($1 \leq T \leq 2 \cdot 10^5$), indicating the number of test cases.

For each test case, the first line contains two integers n, k ($1 \leq n \leq 2 \cdot 10^5, 0 \leq k \leq 10^{18}$).

The second line contains n non-negative integers $a_1, a_2, \ldots, a_n$ ($0 \leq a_i \leq 10^{18}$).

The sum of n across all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output a single line containing an integer representing the count of integers x that satisfy the conditions.

Example

standard input	standard output
1 4 17 3 2 5 16	4