



Problem E. Ether Strike

Input file: standard input
Output file: standard output
Time limit: 6 seconds
Memory limit: 1024 megabytes

*An intense dissatisfaction with the world,
and a compulsion to do something about it...*

— Akira Complex, *Ether Strike*

Hikari has collected n glass shards, numbered from 1 to n . Each shard has 64 binary attributes. The k -th bit describes the k -th attribute, so the **attribute value** of a shard is an integer in $[0, 2^{64})$.

Then, m events happen to the “world”. Each event is one of the following:

1. A fracture of the first type has its own attribute value x and affects every shard whose index is in $[l, r]$. If an affected shard differs from the fracture in **more than** d attributes, it is forcibly transformed into a shard with attribute value x .
2. *Hikari* needs to deal with the shards whose indices are in $[l, r]$. You need to tell her the sum of their attribute values.
3. A fracture of the second type has its own attribute value x and affects every shard whose index is in $[l, r]$. Every affected shard is forcibly transformed into a shard with attribute value x .

Input

The first line contains three integers n, m, d ($1 \leq n, m \leq 2 \times 10^5, d = 3$), representing the number of shards, the number of events, and the attribute threshold, respectively.

The second line contains n integers a_i ($0 \leq a_i < 2^{64}$), representing the initial attribute value of each shard.

The next m lines each begin with an integer opt , representing the type of the event:

- If $\text{opt} = 1$, three more integers l, r, x follow ($1 \leq l \leq r \leq n, 0 \leq x < 2^{64}$), describing a fracture of the first type.
- If $\text{opt} = 2$, two more integers l, r follow ($1 \leq l \leq r \leq n$), describing a query from *Hikari*; since the answer is large, you have to output it modulo 2^{64} .
- If $\text{opt} = 3$, three more integers l, r, x follow ($1 \leq l \leq r \leq n, 0 \leq x < 2^{64}$), describing a fracture of the second type.

It is guaranteed that at least one event has $\text{opt} = 2$.

Output

For each query from *Hikari*, output one line containing an integer representing the sum of the attribute values modulo 2^{64} .



Examples

standard input	standard output
6 11 3 0 7 15 56 9223372036854775808 18446744073709551615 2 1 6 1 1 6 0 2 1 6 3 2 5 18446744073709551615 2 1 6 1 1 4 17293822569102704640 2 1 6 1 3 6 18446744073709551615 2 1 6 3 1 3 1 2 1 6	9223372036854775885 9223372036854775871 18446744073709551612 13835058055282163711 16140901064495857660 0
8 10 3 56 0 7 63 9223372036854775808 9223372036854775815 17293822569102704640 15 2 1 8 1 1 4 0 1 1 4 7 2 1 4 1 5 8 17293822569102704640 2 5 8 3 3 6 18446744073709551615 2 1 8 1 1 8 18446744073709551615 2 1 8	17293822569102704788 14 5764607523034234880 16140901064495857667 18446744073709551608

Note

To ensure that the PDF is displayed correctly, several blank lines have been inserted into the last sample. You can download the original sample from Domjudge.

For the first sample, let $H = 2^{63}$, $U = 2^{64} - 1$, and $F = 15 \cdot 2^{60}$.

- Initially, the sequence is $[0, 7, 15, 56, H, U]$.
- In the second event, the numbers of differing attributes are 0, 3, 4, 3, 1, 64, respectively. Since $d = 3$, the sequence becomes $[0, 7, 0, 56, H, 0]$.
- After the fourth event, the sequence is $[0, U, U, U, U, 0]$.
- After the sixth event, the sequence is $[F, F, F, F, U, 0]$.
- After the eighth event, the sequence is $[F, F, U, U, U, U]$.
- After the tenth event, the sequence is $[1, 1, 1, U, U, U]$.

Each query asks for the sum modulo 2^{64} . In particular, the last answer is 0 because $3 + 3(2^{64} - 1) = 3 \cdot 2^{64}$.