Task Različitost

Two infinite periodic sequences of integers, a_i and b_i, are given, defined by their periods of lengths n and m, respectively. This means that the natural numbers n and m are given, as well as the numbers $a_1, a_2, \ldots, a_n$ and $b_1, b_2, \ldots, b_m$, for which $a_i = a_{i+n}$ and $b_i = b_{i+m}$ hold for every natural number i.

Additionally, given a natural number k, we define the "diversity" of these two sequences as the sum $a_i \oplus b_i$ for each $i = 1, 2, \ldots, k$. (Here, $\oplus$ denotes the bitwise exclusive OR operation, which produces ones in the positions where the binary digits of the two numbers differ. For example, $5 \oplus 3 = (101)_2 \oplus (011)_2 = (110)_2 = 6$.)

Your task is to calculate the diversity of the given sequences.

Input

In the first line, there are n, m, and k ($1 \leq n, m \leq 2 \cdot 10^5, 1 \leq k \leq 10^{18}$), which are the numbers from the task description.

In the second line, there are n integers $a_1, \ldots, a_n$ ($0 \leq a_i \leq 10^{18}, i = 1, 2, \ldots, n$).

In the third line, there are m integers $b_1, \ldots, b_m$ ($0 \leq b_i \leq 10^{18}, i = 1, 2, \ldots, m$).

Output

Because the answer can be very large, output the remainder of the answer when divided by $10^9 + 7$ in a single line.

Scoring

Subtask	Points	Constraints
1	25	$k \leq 2 \cdot 10^5$
2	13	$n = m$
3	9	$n = 1$
4	43	No additional constraints.

Examples

input

```
3 2 10
1 6 4
5 2
```

output

```
33
```

input

```
10 5 30
5 16 2 10 7 2 4 20 5 12
4 11 14 23 5
```

output

```
435
```