2-Power Rush

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	1024 megabytes

A multiset of positive integers is called a **good set** if all its elements are powers of 2.

For a non-negative integer N, define $f(N)$ as

$$f(N) = \sum_{T \in S_N} \prod_{i \in T} i$$

where S_N is the set of all good sets whose elements sum to N. Note that the sum of elements in an empty set is defined as 0, and the product of elements in an empty set is defined as 1. Thus, we define $f(0) = 1$.

You are given three non-negative integers T, a and b.

Define N_i as $N_i = (ai + b) \bmod 2^{30}$. Compute the following value

$$\sum_{i=0}^{T-1} (f(N_i) \bmod 998244353) \oplus i$$

where $\oplus$ represents the bitwise XOR operation.

Input

The input is given from Standard Input in the following format:

T a b

- $1 \leq T \leq 10^7$
- $0 \leq a, b < 2^{30}$
- All input values are integers.

Output

Print the answer in a single line.

Examples

standard input	standard output
5 1 0	17
3 1000000000 1000000000	1217611736

Note

In the first example, $N_0 = 0, N_1 = 1, N_2 = 2, N_3 = 3$ and $N_4 = 4$.

- Good sets with a sum of 0 are $\{\}$. Thus, $f(0) = 1$.
- Good sets with a sum of 1 are $\{1\}$. Thus, $f(1) = 1$.
- Good sets with a sum of 2 are $\{1, 1\}$ and $\{2\}$. Thus, $f(2) = (1 \times 1) + (2) = 3$.

- Good sets with a sum of 3 are $\{1,1,1\}$ and $\{1,2\}$. Thus, $f(3) = (1 \times 1 \times 1) + (1 \times 2) = 3$.
- Good sets with a sum of 4 are $\{1,1,1,1\}, \{1,1,2\}, \{2,2\}$ and $\{4\}$.
  Thus, $f(4) = (1 \times 1 \times 1 \times 1) + (1 \times 1 \times 2) + (2 \times 2) + (4) = 11$.

Therefore, the answer is $(1 \oplus 0) + (1 \oplus 1) + (3 \oplus 2) + (3 \oplus 3) + (11 \oplus 4) = 17$.

In the second example, $N_0 = 1000000000, N_1 = 926258176$ and $N_2 = 852516352$.