

## Problem I. Binary Matrices

Input file: *standard input*  
Output file: *standard output*  
Time limit: 2 seconds  
Memory limit: 512 mebibytes

Little Vitechka recently learned to program. Now he is writing a library for working with matrices  $8 \times 8$  over the field  $Z_2$ . He writes such a matrix as one unsigned 64-bit integer. In the  $(8 \cdot (i - 1) + j)$ -th bit starting from the lower ones, he stores the number written in the matrix at the intersection of  $i$ -th row and  $j$ -th column. For example, he writes the matrix

$$\begin{pmatrix} 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

as number 270.

Vitechka wrote functions **sum**( $a, b$ ) and **multiply**( $a, b$ ) which return sum (element-wise) and product of two matrices. To test the functions, Vitechka uses the following function:

```
calc (n, x, p, q) {  
  ans = 0;  
  do n times {  
    x = x * p + q;  
    lhs = x;  
    x = x * p + q;  
    rhs = x;  
    ans = sum(ans, multiply(lhs, rhs));  
  }  
  return ans;  
}
```

In this pseudocode, “+” and “\*” are the usual operations with unsigned 64-bit integers.

Now Vitechka want to know the result of this function on specific data.

### Input

The first line contains four integers  $n, x, p$  and  $q$  ( $1 \leq n \leq 10^7, 0 \leq x, p, q \leq 10^{18}$ ). It is guaranteed that in all tests except the examples, the numbers  $x, p$  and  $q$  are generated uniformly at random.

### Output

On a single line, print one integer: the answer for the problem.

### Examples

standard input	standard output
1 0 1 1804	5632
2 111111111111111111 222222222222222222 333333333333333333	12247126853369549893

**Note**

In the first example, we calculate the product

$$\begin{pmatrix} 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix} \times \begin{pmatrix} 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}.$$