F. Product transformation

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Consider an array A with N elements, all being the same integer a.

Define the product transformation as a simultaneous update $A_i = A_i \cdot A_{i+1}$, that is multiplying each element to the element right to it for , with the last number A_N remaining the same. For example, if we start with an array A with $a = 2$ and $N = 4$, then after one product transformation $A = [4,\ 4,\ 4,\ 2]$, and after two product transformations $A = [16,\ 16,\ 8,\ 2]$.

Your simple task is to calculate the array A after M product transformations. Since the numbers can get quite big you should output them modulo Q.

Input

The first and only line of input contains four integers N, M, a, Q ($7 \le Q \le 10^9 + 123$, $2 \le a \le 10^6 + 123$, , is prime), where is the multiplicative order of the integer a modulo Q, see notes for definition.

Output

You should output the array A from left to right.

Example

input
2 2 2 7
output
1 2

Note

The multiplicative order of a number a modulo Q , is the smallest natural number x such that $a^x \ mod \ Q = 1$. For example, .