Transaction Certificates

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Security is a major concern in the world of finance. In this challenge, the goal is to break up a fairly naive system which tries to encode transactions' history.

The system uses a hash value denoting the certificate of a chain of $n-1$ transactions between bank accounts. A chain of n bank accounts $a_0, a_1, \ldots, a_{n-1}$ denotes that the first transaction was made between accounts with numbers a_0 and a_1, the second transaction between accounts with numbers a_1 and a_2, and so on. The same bank account can appear multiple times in the transaction chain.

The system computes the certificate as:

$$\left(\sum_{i=0}^{n-1} a_i \cdot p^{n-1-i}\right) \bmod m$$

For the given values n, k, p and m, the task is to find out two different chains consisting of $c \cdot n - 1$ transactions, for some integer $c \geq 1$ such that $c \cdot n \leq 10^5$, between accounts numbered with integers in the range $[1, k]$ such that these two chains have the same certificates.

It is guaranteed that for the given input, there always exist at least two different chains with the same certificates.

Input Format

In the first and only line, there are 4 space-separated integers n, k, p, m.

Constraints

- $1 \leq n \leq 10^3$
- $2 \leq k \leq 10^3$
- $2 \leq p \leq 10^5$
- p is prime number
- $2 \leq m \leq 2^{32}$
- m is a power of 2

Output Format

Print exactly two lines, each denoting one of the chains in the answer. In the first line, print $c \cdot n$ space-separated integers denoting the first of the chains. In the second line, print $c \cdot n$ space-separated integers denoting the second of the chains.

Sample Input 0

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3 4 3 16
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Sample Output 0

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1 2 4
4 4 3
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Explanation 0

For $n = 3$, $k = 4$, $p = 3$ and $m = 16$,

- For the numbers 1, 2 and 4, the certificate value equates to $(1 \times 3^{3-1} + 2 \times 3^{3-2} + 4 \times 3^{3-3}) \bmod 16 = 3$.
- For the numbers 4, 4 and 3, the certificate value equates to $(4 \times 3^{3-1} + 4 \times 3^{3-2} + 3 \times 3^{3-3}) \bmod 16 = 3$.

So, the two chains leads to same certificate value.