Problem A

So Easy!

Description

A sequence S_n is defined as:

$$S_n = \left\lceil \left(a+\sqrt{b}\right)^n \right\rceil \%m$$

Where a, b, n, m are positive integers. $\lceil x \rceil$ is the ceil of x. For example, $\lceil 3.14 \rceil = 4$. You are to calculate S_n.

You, a top coder, say: So easy!

Input

There are several test cases, each test case in one line contains four positive integers: a, b, n, m. Where $0 < a, m < 2^{15}$, $(a-1)^2 < b < a^2$, $0 < b, n < 2^{31}$.
The input will finish with the end of file.

Output

For each the case, output an integer S_n.

Sample Input

2 3 1 2013
2 3 2 2013
2 2 1 2013

Sample Output

4
14
4