Problem E
Exponentiation

Time limit: 3 seconds
Memory limit: 1024 megabytes

Problem Description

Exponentiation is a mathematical operation that involves raising a base number to a certain exponent to obtain a result. In the expression a^n, where a is the base and n is the exponent, it means multiplying a by itself n times. The result of this operation is called the *exponentiation* of a to the n-th power. For examples, $2^3 = 2 \times 2 \times 2 = 8$ and $5^2 = 5 \times 5 = 25$. In these examples, 2 is the base, 3 is the exponent in the first case, and 5 is the base, and 2 is the exponent in the second case. Exponentiation is a fundamental operation in mathematics and is commonly used in various contexts, such as solving equations, and cryptography.

In many cryptographic algorithms, particularly those based on number theory like RSA (Rivest-Shamir-Adleman) and Diffie-Hellman, modular exponentiation is a fundamental operation. Modular exponentiation involves raising a base to an exponent modulo a modulus. This operation is computationally intensive but relatively easy to perform, even for very large numbers.

Let $x + \frac{1}{x} = \alpha$ where α is a positive integer. Please write a program to compute $x^\beta + \frac{1}{x^\beta} \bmod m$ for given positive integers β and m.

Input Format

The input has only one line, and it contains three space-separated positive integers α, β and m.

Output Format

Outout $x^\beta + \frac{1}{x^\beta} \bmod m$. If there are multiple solutions, you may output any of them in the range from 0 to $m - 1$.

Technical Specification

α, β and m are positive integers less than 2^{64}. You may assume $x^\beta + \frac{1}{x^\beta}$ is an integer.

Sample Input 1

```
1 2 3
```

Sample Output 1

```
2
```

Sample Input 2

```
5 4 321
```

Sample Output 2

```
206
```

Sample Input 3

```
3 3 333
```

Sample Output 3

```
18
```

Sample Input 4

```
8 8 888
```

Sample Output 4

```
626
```

Note

x can be a complex number. For example, x is either $\frac{1+\sqrt{3}i}{2}$ or $\frac{1-\sqrt{3}i}{2}$ if $\alpha = 1$. However, $x^\beta + \frac{1}{x^\beta}$ is always an integer in this problem.