Problem M
DivModulo

Time limit: 3 seconds
Memory limit: 1024 megabytes

Problem Description

Modulo (mod) is a very common operator on integers. For two integers n and d with $d > 0$, $r \equiv (n \bmod d)$ is defined where $0 \le r < d$ and there exists an integer q, such that $n = q \times d + r$. For example, $(200 \bmod 5) \equiv 0$ means that the remainder of 200 divided by 5 is 0. Here is another new operator called DivModulo (dmod) defined as follows. For two integers n and d with $d > 0$, $r \equiv (n \text{ dmod } d)$ is defined where there exists two integers m and h, such that $r \equiv (m \mod d)$, $n = m \times d^h$, and d is not a factor of m. For example, $(200 \text{ dmod } 5) \equiv 3$, since $(200 \text{ dmod } 5) \equiv (8 \times 5^2 \text{ dmod } 5) \equiv (8 \bmod 5) \equiv 3$.

Consider the factorials and the combination function. For an integer $M \ge 0$, the factorial $M!$ is defined as $M! = M \times (M-1) \times (M-2) \times \cdots \times 3 \times 2 \times 1$, and $0! = 1$ is defined. For integers M and N with $0 \le N \le M$, the combination function $C(M, N)$ is defined as $C(M, N) = \frac{M!}{N! \times (M-N)!}$. Now given three integers M, N, D with $D > 0$, please compute $C(M, N)$ dmod D. For example, $(C(9, 2) \text{ dmod } 3) \equiv (36 \text{ dmod } 3) \equiv (4 \times 3^2 \text{ dmod } 3) \equiv (4 \bmod 3) \equiv 1$.

Input Format

Three integers M, N and D are given in one line.

Output Format

Please output $C(M, N)$ dmod D in one line.

Technical Specification

- $1 \le M \le 4 \times 10^{18}$
- $0 \le N \le M$
- $2 \le D \le 1.6 \times 10^7$

Sample Input 1	Sample Output 1
`9 2 3`	`1`

Sample Input 2	Sample Output 2
`5 2 5`	`2`

Sample Input 3	Sample Output 3
`6 3 6`	`2`

Sample Input 4	Sample Output 4
`7654321 1234567 1050`	`210`