

XOR Sum

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

Louis loves integers. He defines the value of a sequence of non-negative integers $A = [a_1, a_2, \dots, a_k]$ as the following formula ($\oplus$ means bitwise exclusive-or):

$$\sum_{i=1}^k \sum_{j=1}^{i-1} a_i \oplus a_j$$

He wants to know how many different sequences A holds the following conditions:

- The length of A is k .
- The value of A is n .
- $0 \leq a_i \leq m$ ($1 \leq i \leq k$).

Two sequences $[a_1, \dots, a_k]$, $[b_1, \dots, b_k]$ are considered different if and only if there exists an index i such that $a_i \neq b_i$. Tell Louis the answer modulo $10^9 + 7$.

Input

The input contains of single line containing three integers n , m , k , ($0 \leq n \leq 10^{15}$, $0 \leq m \leq 10^{12}$, $1 \leq k \leq 18$).

Output

Output the answer modulo $10^9 + 7$.

Examples

standard input	standard output
6 2 3	12
30 6 5	1520

Note

In the first example, vaild sequences are

$[0, 1, 2]$, $[0, 2, 1]$, $[1, 0, 2]$, $[2, 0, 1]$, $[1, 2, 0]$, $[2, 1, 0]$, $[1, 1, 2]$, $[1, 2, 1]$, $[2, 1, 1]$, $[2, 2, 1]$, $[2, 1, 2]$, $[1, 2, 2]$.