Extremely Dangerous Virus

HackerRank

A recent lab accident resulted in the creation of an extremely dangerous virus that replicates so rapidly it's hard to predict exactly how many cells it will contain after a given period of time. However, a lab technician made the following observations about its growth per millisecond:

- The probability of the number of virus cells growing by a factor of a is 0.5.
- The probability of the number of virus cells growing by a factor of b is 0.5.

Given a, b, and knowing that initially there is only a single cell of virus, calculate the *expected number* of virus cells after t milliseconds. As this number can be very large, print your answer modulo $(10^9 + 7)$.

Input Format

A single line of three space-separated integers denoting the respective values of a (the first growth factor), b (the second growth factor), and t (the time you want to know the expected number of cells for).

Constraints

- $1 \leq t \leq 10^{18}$
- $1 \leq a, b \leq 100$
- it is guaranteed that expected value is integer

Output Format

Print the expected number of virus cells after t milliseconds modulo $(10^9 + 7)$.

Sample Input

```
2 4 1
```

Sample Output

```
3
```

Explanation

Initially, the virus has one cell. After a millisecond, with probability 0.5, its size is doubled and, with probability of the other 0.5 in the sample space, its size grows by 4 times. Thus, the expected number of virus cell after 1 millisecond is $0.5 \cdot 2 \cdot 1 + 0.5 \cdot 4 \cdot 1 = 3 \ \% \ (10^9 + 7) = 3$. Thus, we print 3 on a new line.