Easy Sequence!

Your task is to find the nth term of the following sequence :

$F(n) = [F(n-1)*F(n-2)]^K$ for n>1

F(0), F(1), n and K will be provided as input. ~~Modulus for all calculations is 1000000007.~~ You should print the answer modulo 1000000007 i.e. F(n)%1000000007

Input

Input starts with a line containing an integer $T \leq 5000$ which is the number of test cases in the file. Your program will be run on several input files.

Each test case consists of four space separated integers : F(0), F(1), n and K.

Output

T lines containing one integer each, corresponding to the answers for the T test cases.

Constraints

$0 \leq n \leq 10^{18}$

$0 \leq K \leq 10^9$

$0 \leq F(0), F(1) \leq 10^6$

Example

Input:
1
1 1 2 1

Output:
1