

CIPHERTEXT

Introduction

The Battle of Ovado is in full swing. It has just been here where the beetlejumpers clashed with the army of uncompromising dragonflies. The beetlejumpers are ready to give a blow, which can change the tide of the battle. The aviation base has just received a long-awaited message containing exact coordinates of strategic targets to be bombed. For security reasons, the data have been encrypted.

Cipher

The values of C and M parameters have been established before the battle. The former one is used for generating $\{a_n\}$ and $\{s_n\}$ sequences, defined as follows:

- $a_1 = a_2 = 1$
- $\forall_{n \geq 1} a_{n+2} = C \cdot a_{n+1} + a_n$
- $\forall_n s_n = a_1 + a_2 + a_3 + \dots + a_n$

The ciphertext consists of T natural numbers. Each of them encrypts one result number. In order to restore the original x value, it is necessary to determine the result of the following operation: $s_x \bmod M$.

Problem

Help the beetlejumpers to decipher the message from the headquarters.

Input data

Test data are given in `cipher*.in` files.

The first line of the test contains two natural numbers C and M . The second line contains one natural number T , denoting the number of values the ciphertext is composed of. Each of the following T lines consists of only one x number.

$$\begin{aligned} 1 &\leq C, M \leq 10^{18} \\ 1 &\leq T \leq 1000 \\ 1 &\leq x \leq 10^{18} \end{aligned}$$

Output data

The output data should contain T natural numbers, one in each line.

Example

For the input data:

1 10
5
2
3
4
10
1

The correct answer is:

2
4
7
3
1

Explaining the example

- Subsequent terms of the a_n sequence are: 1, 1, 2, 3, 5, 8, 13, ...
- Subsequent terms of the s_n sequence are: 1, 2, 4, 7, 12, 20, 33, ...

Score

If the answer is correct, then the score for a given set equals 1. Otherwise the score is 0.