Stack

Alan loves to construct a stack of building bricks. His stack consists of many cuboids with square base. All cuboids have the same height 1. Alan puts the consecutive cuboids one over another.

Recently in math class, the concept of volume was introduced to Alan. Consequently, he wants to compute the volume of his stack now. The lengths of cuboids bases (from top to bottom) are constructed by Alan in the following way:

- Length of edge of the first square is one. i.e. $a_1 = 1$.
- Next, Alan fixes the length of the edge of the second square a_2.
- Next, Alan calculates the length a_n (n > 2) by $2*a_2*a_{n-1} - a_{n-2}$. Do not ask why he chose such a formula; let us just say that he is a really peculiar young fellow.

For example, if Alan fixes $a_2 = 2$, then $a_3 = 7$. If Alan fixes $a_2 = 1$, then $a_n = 1$ holds for all n.

Now Alan wonders if he can calculate the volume of stack of **N** consecutive building bricks. Help Alan and write the program that computes this volume. Since it can be quite large, it is enough to compute the answer modulo given natural number **m**.

Input

The input contains several test cases. The first line contains the number t (t <= 100000) denoting the number of test cases. Then t test cases follow. Each of them is given in a separate line containing three integers a_2, **N**, **m** ($1 <= a_2$, m $<= 10^9$, $2 <= $ **N** $<= 10^9$) separated by a single space.

Output

For each test case compute the volume of stack of **N** consecutive bricks constructed by Alan according to steps 1 to 3 and output its remainder modulo **m**.

Example

Input:
```
3
2 3 100
1 4 1000
3 3 1000000000
```

Output:
```
54
4
299
```

Warning: large input/output data, be careful with certain languages

Warning: A naive algorithm won't terminate in even 2 minutes.