

Problem F

Fun with Fibonacci

The **Fibonacci sequence** is defined by the following recurrence relation:

$$F_n = F_{n-1} + F_{n-2},$$

with seed values $F_0 = 0$ and $F_1 = 1$.

The first few values of the Fibonacci sequence are 0, 1, 1, 2, 3, 5, 8, 13, 21, ...

Let:

- $G(1, n)$ denotes the n -th Fibonacci number.
- $G(2, n) = G(1, G(1, n))$,
- $G(i, n) = G(1, G(i - 1, n))$.

Calculate $G(k, n) \bmod p$.

Input

The first line of input contains the only integer T — the number of test cases. ($1 \leq T \leq 10^5$).

Each test case consists of one line, containing 3 integers n , k and p , separated by single spaces. ($1 \leq k, n \leq 10^{18}$, $1 \leq p \leq 10^6$).

Output

For each test case, print a single line, containing $G(k, n) \bmod p$.

Sample Input 1

```
10
1 1 1000000
1 2 1000000
1 3 1000000
2 1 1000000
2 2 1000000
2 3 1000000
3 1 1000000
3 2 1000000
3 3 1000000
1000000000000000000 1000000000000000000 1000000
```

Sample Output 1

```
1
1
1
1
1
1
1
2
1
1
890625
```