

Problem C

Covid-19

Time limit: 3 seconds

In December 2019, Covid-19 spread worldwide on the earth. An important parameter to the Covid-19 is R_0 (R naught). R_0 is the basic reproduction number that is used to measure the transmissibility of infectious agents. R_0 is relative to the duration of infectivity and the likelihood of transmission of infection per contact between a susceptible person and an infectious individual.

Assume the duration of infectivity to Covid-19 is two weeks. Once a person is infected, there will be R_0 persons infected after two weeks. Doctor Alice wants to calculate how many persons will be infected after $2N$ weeks. For simplification, we assume that there will be $1 + R_0 + R_0^2 + R_0^3 + \dots + R_0^N$ after $2N$ weeks. Now, give you the value of R_0 and N , can you calculate the number? In order to check your answer easily, please modulo this number by a given prime number D .

For example, let $D = 5$, $R_0 = 2$, and $N = 5$. We calculate the infected number as $1 + R_0 + R_0^2 + R_0^3 + \dots + R_0^N = 1 + 2 + 4 + 8 + 16 + 32 = 63$. So we have to output 3 because $63 \bmod 5 = 3$.

Technical Specification

1. $1 \leq D \leq 2 \times 10^9$ is a prime number.
2. $1 \leq R_0 \leq 10^{1024}$
3. $1 \leq N \leq 10^{1024}$

Input Format

The first line contains an integer $T (\leq 60)$ representing the number of test cases. For each test case, there are 3 integers D , R_0 , and N .

Output Format

For each test case, please output the infected number modulo D .

Sample Input

```
5
5 2 5
7 6 4
5 7 6
3 7 5
2 6 8
```

Sample Output for the Sample Input

```
3
1
2
0
1
```