Power Factor Sum Sum (hard)

Here is a mixed edition of Divisor Summation Powered and Amazing Factor Sequence (medium).

The powered factor sequence

For ***k*** an integer number, we define our powered factor sequence with:

$a_k[0] = 0; a_k[1] = 1$, and

for $n > 1, a_k[n] = a_k[n - 1] + sum(\{x^k \mid 0 < x \leq n \text{ and } n \% x = 0\})$.

Input

First line of input contains an integer ***T***, the number of test cases.

Each of the next ***T*** lines contains three integers ***n, k, m***.

Output

For each test case, print $a_k[n]$ on a single line.
As the answer could be a big number, you just have to output it modulo ***m***.

Example

Input:
3
3 1 10
4 2 55
5 3 97

Output:
8
37
43

Constraints

0 < T < 101
0 < n < 10^9
0 < k < 11
1 < m < 10^17

Numbers ***n, k, m*** are uniform-randomly chosen.
For your information, there's two input files, the first one is 'easy' with n≤100.
My (1kB)-python code get AC around 2.4s. I have a much slower basic PIKE AC (19s).