Problem D
Fern Market

POTYCZKI ALGORYTMICZNE

The 3rd Universal Cup, Stage 40: Potyczki. Limits: 1024 MB, 3 s. *21.06.2025*

A fern market will be open over the next n days in Bytown. The price of a fern on the i-th day is predetermined as a_i bytalars. Each day, you can decide to either buy or sell a fern at the given price, but (due to logistical issues) you can only buy or sell at most one fern per day. You can also choose to do nothing on any day. Naturally, you cannot sell ferns if you do not have any at that moment. However, you can store an unlimited number of ferns and wait for a good time to sell them. You have substantial savings and will not run out of funds for fern investments. You do not own any ferns at the start of day 1, and you also want to end up with no ferns left after the market closes on day n.

Define $f(a_1, a_2, \ldots, a_n)$ as the maximum possible profit (in bytalars) from trading ferns if you plan their purchase and sale optimally in advance. Then, for any natural number n, let $g(n)$ be the sum of $f(p)$ for all $n!$ permutations p of integers from 1 to n.

You are given two natural numbers k and m, where m is a prime number. Output the remainders from the division of each of the values $g(1), g(2), \ldots, g(k)$ modulo m.

Input

The first and only line of the input contains two integers k and m ($1 \le k \le 7\,000$; $10^8 + 7 \le m \le 10^9 + 7$; m is prime), as described in the problem statement.

Output

The output should consist of k lines. The i-th line should contain the remainder of the value $g(i)$ modulo m.

Example

For the input data:	the correct result is:

`4 1000000007`	`0`
	`1`
	`8`
	`64`

Explanation: If $n = 1$, the market lasts only one day. Since you start without any ferns and want to end without any ferns, you cannot make any transactions.

If $n = 2$, there are two possible price sequences: $[1, 2]$ and $[2, 1]$. In the first case, you can buy a fern for one bytalar and then sell it for two bytalars, making a profit of one bytalar. Thus, $f(1, 2) = 1$. In the second case, you cannot make any profit, i.e., $f(2, 1) = 0$.

For $n = 3$, there are six possible price sequences:

- $f(1, 2, 3) = 2$,
- $f(1, 3, 2) = 2$,
- $f(2, 1, 3) = 2$,
- $f(2, 3, 1) = 1$,
- $f(3, 1, 2) = 1$,
- $f(3, 2, 1) = 0$.

In the first three cases, you can buy a fern for one bytalar and then sell it for three bytalars. In the fourth case, you can buy a fern for two bytalars and sell it for three. In the fifth case, you can buy a fern for one bytalar and sell it for two. In the last case, you cannot make any profit.

Note that you can store more than one fern. For example, $f(2, 1, 4, 3) = 4$ because you can buy ferns on the first and second days, and then sell them on the third and fourth days.