Boring Factorials (Ultimate)

Factorial is one of the most attractive word this week, it is proposed to reload a famous [problem](#). Is it so boring ?
As the [reload edition](#) wasn't hard enough, we'll make a challenge edition with harder constraints.

Sameer and Arpit want to overcome their fear of Maths and so they have been recently practicing Maths problems a lot. Aman, their friend has been helping them out. But as it goes, Sameer and Arpit have got bored of problems involving factorials. Reason being, the factorials are too easy to calculate in problems as they only require the residue modulo some prime and that is easy to calculate in linear time. So to make things interesting for them, Aman - The Mathemagician, gives them an interesting task. He gives them a prime number *P* and an integer *N* (not so) close to *P*, and asks them to find ***N! modulo P***. He asks *T* such queries.

Input

The input contains several lines. Probably, you'll can't process all ; please exit your program before the time limit.
Warning : To allow more input, its presentation is different than in other BORING* problems.
On each line, your are given two integers *D* (delta), and *P* a prime number.

Output

For as many test cases you can, you have to print *(P-D)! modulo P*.

Example

Input: **warning**, it's different from other BORING* input.
```
3 5
6 11
50 71
[...]
```

Output:
```
2
10
6
[...]
```

Constraints

$0 <= D <= 10^6$
$1 < P < 10^{100}$, a prime number

For your information : With Python3, my "brute force" got 435 points, my first code for (BORING1/2) got 1631 points ; my new BORING3 code got 2772 (edit 4041) points to be challenged.
There's is only 300000 lines : is this limit reachable ??? ;-) Have fun.