

IQ test 2

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 1024 megabytes

Find $\sum_{i=1}^p i^k$ modulo p where p is a prime number.

Input

The first line of input contains a single integer T ($1 \leq T \leq 2000000$) — the number of testcases.

The first and only line of each testcase contains two integers p and k ($2 \leq p \leq 10^9, 0 \leq k \leq 10^9$). p is guaranteed to be a prime number.

Output

Output $\sum_{i=0}^p a^i$ modulo p .

Example

standard input	standard output
2	1
2 3	0
998244353 69420	

Note

In the first test case, we want to find $\sum_{i=1}^2 i^3 = 1^3 + 2^3 = 1 + 8 = 9$ modulo 2, which is 1.