Fibo and non fibo(Hard)

The problem is simple. Find (a^b) % MOD.

where , a = Nth non-fibonacci number , b = Nth fibonacci number.

Consider fibonacci series as 1,1,2,3,....

Input

First line contains T , the number of test cases. Each next T lines contains two numbers N and M where M is a prime number.

Output

Print T lines of output where each line corresponds to the required answer.

Example

Input:

3

3 1000000007

2 13

1 13

Output:

49

6

4

Explanation

For N=3 : 3rd non fibo number =7, 3rd fibo number=2. ans= (7^2) % 1000000007=49

For N=2 : 2nd non fibo number =6, 2nd fibo number=1. ans=(6^1) % 13=6

For N=1 : 1st non fibo number =4, 1st fibo number=1. ans= (4^1) % 13 =4

If you are getting TLE here you may tru easy version of this.POWFIB

Constraints

1<=T<=50000

1<=N<=1e16

2<=M<=1e18[M is a Prime number]

NOTE:: My best time with c++ with fully optimized code is 1.18s.

Have fune :)