Fibonacci With a Twist

Fibonacci numbers are given by

- $f(n) = f(n-1) + f(n-2)$

with $f(0) = 0$ & $f(1) = 1$.

first number of series ------ 0 1 1 2 3 5 8 13

Now let's have a new series called "Fibonacci Twist" which is given by

- $ft(n) = ft(n-1) + ft(n-2) + (n-1)$

with $ft(0) = 0$ & $ft(1) = 1$.

with first few number in the series ----- 0 1 2 5 10 19 34 59

Now your task is to find $ft(n)$.

Since the number can be Big you have to find the result mod M.

Input

first line having single number 't' -- number of test cases.

next t lines have 2 number each 'n' and 'M'

Output

Single number given the n-th term mod M

Example

Input:
3
5 20
10 77
15 111

Output:
19
45
69

Constraints

- 10 <= t <= 100
- 0 <= n <= 10^9
- 100 <= M <= 10^9

Explanation

1. ft(5) is 19. 19 % 20 = 19
2. ft(10) is 276. 276 % 77 = 45
3. ft(15) is 3177. 3177 % 111 = 69