Hashing

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

To determine whether rooted trees are isomorphic (in this problem, you do not need prior knowledge of tree isomorphism), a common algorithm is to use tree hashing. With a suitable hash function, non-isomorphic rooted trees are likely to yield different hash values, but hash collisions are also difficult to avoid.

There are various implementations of hash functions, but some hash function designs are not very correct. Little C has such a "not very correct"hash function, defined as follows: Let sz_x be the number of points contained in the subtree of x, and son_x be the set of all child nodes of x. For a rooted tree with r as the root, its hash value $h(r)$ is defined as:

$$h(r) = 1 + \sum_{v \in son_r} h(v) \times f(sz_v)$$

where f represents any mapping from the set of positive integers to the set of positive integers, i.e., $f \in \{\varphi : \mathbb{Z}^+ \to \mathbb{Z}^+\}$. In particular, the hash value for a rooted tree with only one node is 1.

Next, Little C defines that for two rooted trees, if for all choices of f, it is impossible to compute different hash values, then the two trees are said to be indistinguishable; otherwise, if there exists a choice of f such that the two trees can compute different hash values, then the two trees are said to be distinguishable.

Little C wants to use this hash function to generate as many **rooted binary trees** as possible, which are rooted trees where each node has at most two child nodes. Little C hopes you can calculate the maximum number of distinguishable rooted binary trees containing n nodes. Of course, the answer may be very large, so Little C has prepared a modulus p for you, and you need to take your result modulo p.

Input

This problem contains multiple test cases. The first line of input contains an integer T ($1 \le T \le 10000$), representing the number of test cases.

For each test case, the input consists of a single line with two integers n, p ($1 \le n \le 3000, 2 \le p \le 10^9+9$), representing the number of nodes in the rooted tree and the modulus provided by Little C.

It is guaranteed that the total sum of n for all test cases does not exceed 10000.

Output

For each test case, output a single line with an integer, representing the result of the answer modulo p.

Example

standard input	standard output
8 1 1000000009 5 1000000009 10 1000000009 15 1000000009 100 1000000009 150 1000000009 1000 1000000009 1500 1000000009	1 6 207 10904 478868953 202933416 152259136 264735211