Problem H. Rainbow Graph

Input file: `standard input`
Output file: `standard output`

A graph without loops or multiple edges is known as a simple graph.

A vertex-colouring is an assignment of colours to each vertex of a graph. A proper vertex-colouring is a vertex-colouring in which no edge connects two identically coloured vertices.

A vertex-colouring with n colours of an undirected simple graph is called an n-rainbow colouring if every colour appears once, and only once, on all the adjacent vertices of each vertex. Note that an n-rainbow colouring is not a proper colouring, since adjacent vertices may share the same colour.

An undirected simple graph is called an n-rainbow graph if the graph can admit at least one legal n-rainbow colouring. Two n-rainbow graphs G and H are called isomorphic if, between the sets of vertices in G and H, a bijective mapping $f : V(G) \to V(H)$ exists such that two vertices in G are adjacent if and only if their images in H are adjacent.

Your task in this problem is to count the number of distinct non-isomorphic n-rainbow graphs having $2n$ vertices and report that number modulo a prime number p.

Input

The input contains several test cases, and the first line contains a positive integer T indicating the number of test cases which is up to 1000.

For each test case, the only line contains two integers n and p where $1 \le n \le 64$, $n + 1 \le p \le 2^{30}$ and p is a prime.

We guarantee that the numbers of test cases satisfying $n \ge 16$, $n \ge 32$ and $n \ge 48$ are no larger than 200, 100 and 20 respectively.

Output

For each test case, output a line containing "`Case #x: y`" (without quotes), where `x` is the test case number starting from 1, and `y` is the answer modulo p.

Example

standard input	standard output
5 1 11059 2 729557 3 1461283 4 5299739 63 49121057	Case #1: 1 Case #2: 1 Case #3: 2 Case #4: 3 Case #5: 5694570

Note

If you came up with a solution such that the time complexity is asymptotic to $p(n)$, the number of partitions of n, or similar, you might want to know $p(16) = 231$, $p(32) = 8349$, $p(48) = 147273$ and $p(64) = 1741630$.

The following figures illustrate all the non-isomorphic rainbow graphs mentioned in the first four sample cases.

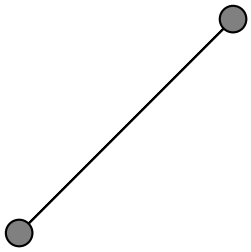


Figure 1: the non-isomorphic 1-rainbow graph with 2 vertices

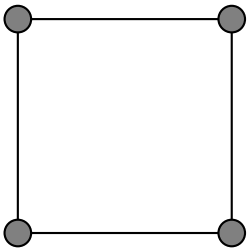


Figure 2: the non-isomorphic 2-rainbow graph with 4 vertices



Figure 3: the non-isomorphic 3-rainbow graphs with 6 vertices

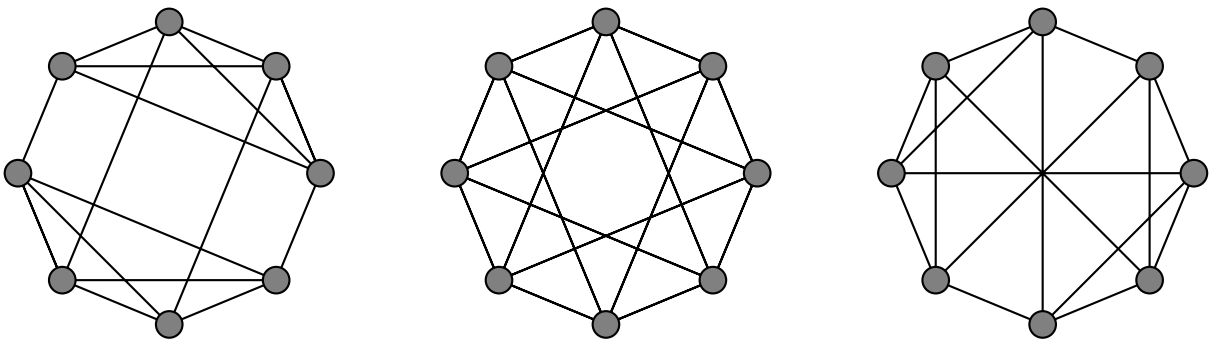


Figure 4: the non-isomorphic 4-rainbow graphs with 8 vertices