6502 Geometric Ornaments

Mankind has been decorating its objects, its buildings, and itself throughout all of history and back into prehistory. Geometric ornaments are the essential elements of such decoration. We see them every day and everywhere around us. Soohwan, who is a famous computational geometer, has realized that geometric ornaments are very precise geometric constructions and they are usually built on a base of grids and multiple subgrids. Recently, he initiated an ambitious research project on the automatic generation of geometric ornaments.

Among various grids, the rectangular grid and the circular grid have attracted his attention. An $m \times n$ *rectangular grid* is a graph that can be embedded in the plane so that its vertices and edges form a rectangular grid with n vertices appearing in each of m rows and m vertices appearing in each of n columns. More precisely, the $m \times n$ rectangular grid is the graph whose vertex set is $\{v_j^i : 0 \leq i \leq m-1, 0 \leq j\ len-1\}$ and whose edge set is $\{(v_j^i, v_q^p) : |i-p| + |j-q| = 1\}$. The $m \times n$ *circular grid* is obtained from the $m \times n$ rectangular grid by adding so-called wraparound edges (v_{n-1}^i, v_0^i) for every $0 \leq i \leq m-1$. The 2×6 rectangular grid and the 2×6 circular grid are shown in Figures 1 and 2, respectively.

Some geometric ornaments form spanning trees of the underlying grid, as shown in Figures 1 and 2. Here, a *spanning tree* of a grid refers to a tree, a connected graph without cycles, composed of all the vertices and some edges of the grid. Soohwan wants to enumerate all different *labeled* spanning trees of the $2 \times n$ grid, where the vertices are distinguished from one another by names. (Each vertex is assigned a unique name in a labeled graph to distinguish it from all other vertices.) The two spanning trees of the 2×6 circular grid given in Figure 2 should be counted separately. To support his project, you are to write a program to count the numbers of labeled spanning trees of the $2 \times n$ rectangular grid and of the $2 \times n$ circular grid.

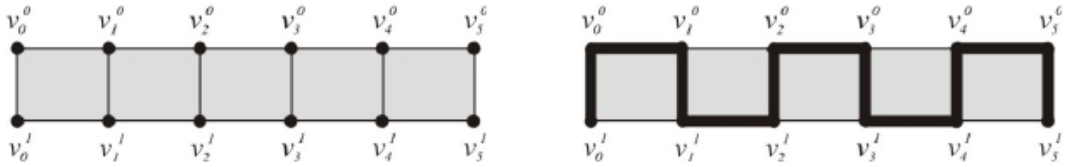

Figure 1. A 2×6 rectangular grid and one of its labeled spanning trees.

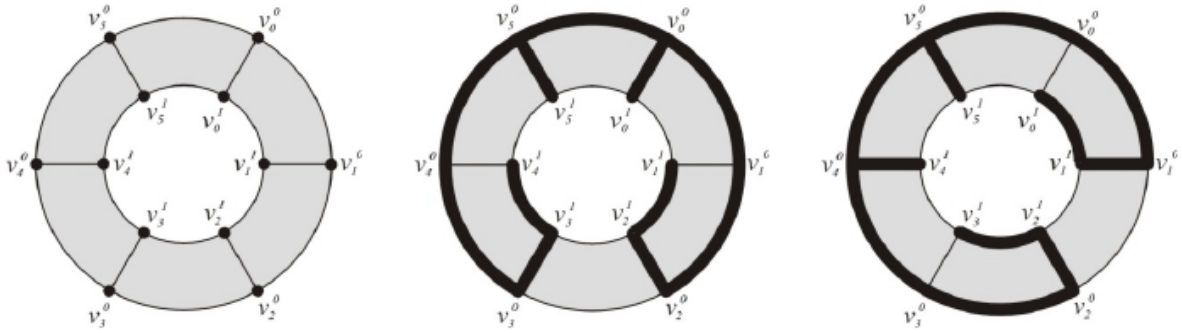

Figure 2. A 2×6 circular grid and its two different labeled spanning trees.

Input

Your program is to read from standard input. The input consists of T test cases. The number of test cases T is given in the first line of the input. Each test case consists of a single line containing an

integer n, indicating that the dimension of the underlying grid is $2 \times n$, where $3 \leq n \leq 50,000$.

Output

Your program is to write to standard output. Print exactly one line for each test case. The line should contain two integers, R_n modulo 10,007 and C_n modulo 10,007, where R_n and C_n are respectively the numbers of labeled spanning trees of a $2 \times n$ rectangular grid and of a $2 \times n$ circular grid.

The following shows sample input and output for three test cases.

Sample Input

```
3
3
4
10
```

Sample Output

```
15 75
56 384
1211 9033
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