Inverse Problem

Input file:	`standard input`
Output file:	`standard output`
Time limit:	45 seconds
Memory limit:	1024 megabytes

Consider the following task. You are given a tree (a connected undirected graph without cycles) with n ($n \geq 1$) vertices. You need to count the number of correct colorings of its vertices with n colors. A coloring is considered correct if every two vertices separated by at most two edges have different colors. We consider two colorings different if there exists a vertex that has different colors in both of these colorings. As this number can be quite large, you should give its remainder when divided by $10^9 + 7$.

Your task is to solve the inverse problem – given a number r from the interval $[1, 10^9 + 6]$, find any tree with the smallest number of vertices for which the answer to the above problem is the number r. It can be proven that for each possible number r from the given range, there exists at least one such tree.

Input

In the first line of standard input, there is one integer t ($1 \leq t \leq 10$), representing the number of test cases.

In the next t lines, there is one integer each. The number in the i-th of these lines is r_i ($1 \leq r_i \leq 10^9 + 6$).

All values of r_i are pairwise distinct.

Output

The output should contain t blocks: the i-th of these blocks should contain an answer for the i-th test case.

The block describing a tree should begin with a line containing a single positive integer n_i – the number of vertices in your tree.

In the next $n_i - 1$ lines of the block, there should be two integers each. The numbers in the j-th of these lines, $a_{i,j}$ and $b_{i,j}$ ($1 \leq a_{i,j}, b_{i,j} \leq n_i$), should indicate the existence of an edge connecting the vertices with numbers $a_{i,j}$ and $b_{i,j}$. The tree's vertices are numbered with integers from 1 to n_i. If there are multiple trees with the minimum number of vertices for which the remainder of the division of the number of colorings by $10^9 + 7$ is r_i, you can print any of them.

Example

standard input	standard output
4 2 360 1 509949433	2 1 2 5 1 2 2 3 3 4 3 5 1 10 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9 10

Note

In the last test case, the number of tree colorings is 1509949440, which gives 509949433 modulo $10^9 + 7$.