Challenge Matrix Multiplication II

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	1024 megabytes

As is well known, the APSP (All Possible Shortest Path) problem has a profound connection with min+ matrix multiplication. Today, we want you to solve the following problem:

Given x, construct an **undirected unweighted connected graph** (i.e., all edge weights are 1) such that $\sum_{i=1}^{n}\sum_{j=i+1}^{n} dis(i,j) = x$. Here, $dis(i,j)$ represents the shortest path length between node i and node j.

This problem is certainly very simple... Unfortunately, your resources are limited, so you hope to find a graph with no more than 85 nodes that meets the requirements.

Input

A single test case contains multiple data sets.

The first line of input is the number of data sets T ($1 \leq T \leq 2000$), representing the number of data sets contained in this test case.

For each data set, there is one line with an integer x ($1 \leq x \leq 10^5$), representing the constraint that needs to be satisfied. It is guaranteed that there exists at least one graph with no more than 85 nodes that meets the condition.

Output

For each data set, output the number of nodes n you used on the first line ($2 \leq n \leq 85$). Then output $n-1$ lines, where the i-th line is a binary string of length $n-i$. The j-th character of the i-th line is 1 if and only if there is an edge between node i and node $i+j$.

Example

standard input	standard output
4 1 3 6 8	2 1 3 11 1 4 111 11 1 4 110 10 1