Edge Coloring Problem

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

You are given a simple undirected graph with N vertices and $\frac{N(N-3)}{2}$ edges. The graph is represented by N binary strings $S_1, S_2, \ldots, S_N$, where the j-th character of S_i is `1` if there is an edge between vertex i and vertex j, and `0` otherwise. Notably, the i-th character of S_i is always `0`.

The degree of each vertex in the graph is exactly $N-3$.

Now, you need to assign a positive integer to each edge of the graph. This assignment is called **edge coloring** if any two edges sharing a common vertex are assigned distinct integers. The smallest possible maximum integer used in any valid edge coloring is called the **edge chromatic number** of the graph.

Your task is to determine the edge chromatic number of the graph and also find one valid edge coloring that achieves this number.

Input

The input is given in the following format:

$$
\begin{array}{l}
N \\
S_1 \\
S_2 \\
\vdots \\
S_N
\end{array}
$$

- $4 \leq N \leq 300$.
- $S_1, S_2, \ldots, S_N$ are binary strings of length N containing only `0` and `1`.
- The given graph is a simple undirected graph where each vertex has a degree of $N-3$.

Output

Print the edge chromatic number C, followed by a $N \times N$ grid where the cell (i, j) contains the integer $c_{i,j}$ assigned to the edge between vertex i and vertex j. The format should be as follows:

$$
\begin{array}{l}
C \\
c_{1,1}\ c_{1,2}\ \cdots\ c_{1,N} \\
c_{2,1}\ c_{2,2}\ \cdots\ c_{2,N} \\
\vdots \\
c_{N,1}\ c_{N,2}\ \cdots\ c_{N,N}
\end{array}
$$

If there is no edge between vertex i and vertex j, output -1 for $c_{i,j}$. In particular, $c_{i,i}$ should always be -1.

If multiple valid outputs exist, any of them are considered correct.

Examples

<table>
<tr><th>standard input</th><th>standard output</th></tr>
<tr><td>6
011100
101010
110001
100011
010101
001110</td><td>3
-1 2 3 1 -1 -1
2 -1 1 -1 3 -1
3 1 -1 -1 -1 2
1 -1 -1 -1 2 3
-1 3 -1 2 -1 1
-1 -1 2 3 1 -1</td></tr>
<tr><td>5
01001
10100
01010
00101
10010</td><td>3
-1 2 -1 -1 1
2 -1 3 -1 -1
-1 3 -1 1 -1
-1 -1 1 -1 3
1 -1 -1 3 -1</td></tr>
</table>

Note

In the first example, vertex 1 is connected to vertices $2, 3$, and 4. These edges must be assigned distinct integers, so the edge chromatic number is at least 3.

In the example output, the edges connecting vertex 1 to vertices $2, 3$, and 4 are assigned integers $2, 3$, and 1, respectively. All edges sharing a common vertex have distinct integers. The same property holds for all other vertices, satisfying the edge coloring condition, with an edge chromatic number of 3.