Problem H. Higher Math Lesson

Input file:	higher.in
Output file:	higher.out
Time limit:	2 seconds
Memory limit:	512 megabytes

Henry is sleeping at a boring higher math lesson in National Search University of This and That. When he suddenly wakes up the teacher asks him to solve the following problem. Given an $n \times n$ matrix A of integers Henry must find invertible integer matrices L and R such that the following conditions are satisfied:

- $B = LAR$ is a diagonal matrix;
- there is such j $(0 \le j \le n)$ that $b_{i,i} = 0$ if and only if $i > j$;
- for all i from 2 to j the number $b_{i,i}$ is divisible by $b_{i-1,i-1}$.

An integer matrix C is called invertible if there exist an integer matrix C^{-1} such that $CC^{-1} = I$ where I is a unit matrix.

Henry has been sleeping for most of lessons, so he doesn't know how to do it. So he asks you to help.

Input

The input file contains multiple test cases.

Each test case starts with an integer n — size of a matrix, followed by n lines of n integers each — the given matrix ($2 \le n \le 5$, elements of matrices are from -10 to 10).

Input is followed by a line with $n = 0$. Each input file contains at most 100 test cases.

Output

For each test case print four integer matrices: L, L^{-1}, R and R^{-1}. It is guaranteed that such matrices always exist. Separate matrices by a blank line. If there are several solutions, print any one.

Examples

higher.in	higher.out
3 1 2 3 6 5 4 7 8 9 0	1 0 0 1 1 -1 -13 -6 7 1 0 0 6 7 1 7 6 1 1 -2 1 0 1 -2 0 0 1 1 2 3 0 1 2 0 0 1

In the given example

$$\begin{pmatrix} 1 & 0 & 0 \\ 1 & 1 & -1 \\ -13 & -6 & 7 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 \\ 6 & 5 & 4 \\ 7 & 8 & 9 \end{pmatrix} \begin{pmatrix} 1 & -2 & 1 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$