

2D Gray Code

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

Given n , please output a $2^n \times 2^n$ Gray code matrix.

Gray code is a binary encoding method in which adjacent numbers in binary representation have exactly one digit difference.

In this problem, for any i and j satisfying $1 \leq i, j \leq 2^n$, $a_{i,j}$ and $a_{i,j+1}$, $a_{i,j}$ and $a_{i+1,j}$ should have exactly one digit difference in the binary representation.

At the same time, we also require that each number from 0 to $(2^{2^n}) - 1$ appears exactly once.

Input

A single integer n ($1 \leq n \leq 8$).

Output

Output a $2^n \times 2^n$ Gray code matrix. Note that you should output the result in decimal representation.

Example

standard input	standard output
2	0 1 3 2 4 5 7 6 12 13 15 14 8 9 11 10

Note

This problem uses SPECIAL JUDGE, and any solution that meets the conditions can be accepted.