Thomas

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

You are given an integer n. Find the largest set of distinct binary strings of length n such that no two strings in the set differ at exactly one index.

For example, for $n = 5$, the strings 10001 and 11001 could not both be in the set, because they only differ in their second positions.

Input

The first and only line of the input contains one integer n ($1 \leq n \leq 15$) — the size of the binary strings in the set.

Output

The first line of output should contain a single integer k ($0 \leq k \leq 2^n$) — the number of strings in your set.

Each of the next k lines should contain a single binary string of size n — one of the strings in your set. No two of these strings should be equal, or differ in exactly one position.

If there are multiple solutions, you may print any.

Examples

standard input	standard output
1	1 0
2	2 00 11

Note

In the first sample case, we choose the set $\{0\}$, and in the second sample case, we choose the set $\{00, 11\}$. Neither of these sets contain two strings that differ in exactly one position, and we can show that they are both of maximal size for their given n.