

Problem C. Cyclic Shifts

Input file: **standard input**
Output file: **standard output**
Time limit: 3 seconds
Memory limit: 512 megabytes

We are given a permutation p of the integers 1 to n .

In a given operation we can choose $k > 0$ indices $1 \leq x_1 < x_2 < \dots < x_k \leq n$ and cyclic shift the corresponding indices of the permutation one to the right.

$$p_{x_2} := p_{x_1}, p_{x_3} := p_{x_2}, p_{x_4} := p_{x_3}, \dots, p_{x_k} := p_{x_{k-1}}, p_{x_1} := p_{x_k}$$

Applying this operation for a given k costs $\frac{1}{k}$ dollars.

Your goal is to sort the given array using at most 2 dollars.

* For the purposes of the grader, the exact cost will be computed as $10^{-8} \left\lceil \frac{10^8}{k} \right\rceil$.

Input

The first line of input consists of a single integer n ($1 \leq n \leq 5 \cdot 10^3$).

The second line of each test case contains n integers p_1, p_2, \dots, p_m ($1 \leq p_i \leq n$) — the permutation to sort. It is guaranteed that the p_i will form a permutation.

Output

The first line of output contains a single integer m — the number of operations you used.

Then follow m lines of output.

The $i + 1$ -st line of output contains a binary string of length n s_i . If the j -th character of s_i is 1, then j is an index in the i -th cyclic shift (and the reverse if the j -th character is 0).

Each of the m lines of output must all contain at least one '1'.

Examples

standard input	standard output
3 2 1 3	4 011 110 111 011
4 1 2 3 4	0