Input File: `register.in`
Output File: `register.out`
Source Code: `register.pas/.c/.cpp`

100 Points
Time Limit: 1.5 s
Memory Limit: 16 MB

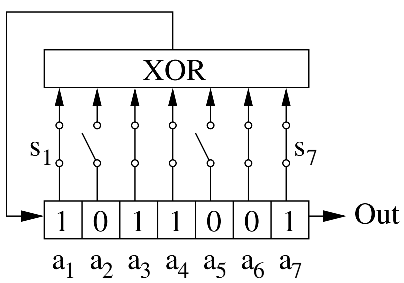
Shift Register

A register of a computer stores N bits for computation. A shift register is a special kind of register, with bit values that can be easily shifted by one position.

Using a feedback shift register, binary pseudo-random numbers can be generated in the following way: A shift register of size N is initially filled with the bit values $a_1, a_2, \ldots, a_N$. At each clock tick, the register outputs the value of the rightmost bit, a_N. The other bit values are shifted by one position to the right. The first position is assigned a new value a_1' as follows:

Each bit of the register is connected to an XOR gate via a switch (see figure below). For each bit i there is a switch s_i (which can be 1 or 0) that determines whether the bit value a_i is forwarded or not to the XOR gate. Let $k_i = s_i \cdot a_i$. The new value a_1' is set to the output value of the XOR gate, XOR$(k_1, \ldots, k_N)$. (Remark: If the number of ones in $k_1, \ldots k_N$ is odd, the value of XOR$(k_1, \ldots, k_N)$ is 1, else 0). Below are the formal definitions:

$$\begin{aligned} a_1' &= \text{XOR}(k_1, \ldots, k_N) \\ a_i' &= a_{i-1} \text{ for } 2 \le i \le N \\ \text{output} &= a_N \end{aligned}$$



tick	a_1	a_2	a_3	a_4	a_5	a_6	a_7	output
0	1	0	1	1	0	0	1	-
1	0	1	0	1	1	0	0	1
2	1	0	1	0	1	1	0	0
3	1	1	0	1	0	1	1	0
4	0	1	1	0	1	0	1	1
5	0	0	1	1	0	1	0	1
6	1	0	0	1	1	0	1	0
7	1	1	0	0	1	1	0	1
8	0	1	1	0	0	1	1	0
9	1	0	1	1	0	0	1	1
10	0	1	0	1	1	0	0	1
11	1	0	1	0	1	1	0	0
12	1	1	0	1	0	1	1	0
13	0	1	1	0	1	0	1	1
14	0	0	1	1	0	1	0	1

In the example above, the value a_1 at tick 1 is calculated as follows:
XOR$(1 \cdot 1, 0 \cdot 0, 1 \cdot 1, 1 \cdot 1, 0 \cdot 0, 1 \cdot 0, 1 \cdot 1) = 0$.

You are given the first $2N$ output values of such a feedback shift register. From those values, you shall try to determine the switch values s_i.

Input

The first line of the input file `register.in` contains the size N of the shift register ($1 \leq N \leq 750$). The second line contains $2N$ numbers 0 or 1, which are the first $2N$ output bit values of the shift register.

Output

The output file `register.out` consists of exactly one line. If there is a switch setting that produces the given register output values, output the switch values s_i of any such switch setting, starting with s_1. If there are no such switch settings, output the number -1 only.

Examples

register.in	register.out
7 1 0 0 1 1 0 1 0 1 1 0 0 1 1	1 0 1 1 0 1 1

register.in	register.out
3 0 0 0 1 1 1	-1