A. Short Program

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Petya learned a new programming language CALPAS. A program in this language always takes one non-negative integer and returns one non-negative integer as well.

In the language, there are only three commands: apply a bitwise operation AND, OR or XOR with a given constant to the current integer. A program can contain an arbitrary sequence of these operations with arbitrary constants from 0 to 1023. When the program is run, all operations are applied (in the given order) to the argument and in the end the result integer is returned.

Petya wrote a program in this language, but it turned out to be too long. Write a program in CALPAS that does the same thing as the Petya's program, and consists of no more than 5 lines. Your program should return the same integer as Petya's program for all arguments from 0 to 1023.

Input

The first line contains an integer n ($1 \le n \le 5 \cdot 10^5$) — the number of lines.

Next n lines contain commands. A command consists of a character that represents the operation ("&", "|" or "^" for AND, OR or XOR respectively), and the constant x_i $0 \le x_i \le 1023$.

Output

Output an integer k ($0 \le k \le 5$) — the length of your program.

Next k lines must contain commands in the same format as in the input.

Examples

input
3 | 3 ^ 2 | 1
output
2 | 3 ^ 2

input
3 & 1 & 3 & 5
output
1 & 1

input
3 ^ 1 ^ 2 ^ 3

output
0

Note

You can read about bitwise operations in https://en.wikipedia.org/wiki/Bitwise_operation.

Second sample:

Let x be an input of the Petya's program. It's output is $((x\&1)\&3)\&5 = x\&(1\&3\&5) = x\&1$. So these two programs always give the same outputs.