

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 ($1 \leq n \leq 5 \cdot 10^5$) — 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 $0 \leq x_i \leq 1023$.

Output

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

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

Examples

| | |
|------------------------|----------------------|
| input | Copy |
| 3 3 ^ 2 1 | |
| output | Copy |
| 2 3 ^ 2 | |
| input | Copy |
| 3 & 1 & 3 & 5 | |

Codeforces Round #443 (Div. 1)

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output

Copy

```
1
& 1
```

input

Copy

```
3
^ 1
^ 2
^ 3
```

output

Copy

```
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.

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