Contest

Season 6 – round 2 – 150 points

In the university have to solve binary expressions, so called propositions . Help to Ivan to make his homework. Write program for calculating propositions.

You can use his notes from his lessons:

The brackets are with the highest priority followed by “~”, ”&” and with lowest priority is “|”.

The symbol “~” means:

~0	1
~1	0

The symbol “&” means:

0&0	0
0&1	0
1&0	0
1&1	1

The symbol “|” means:

0|0	0
0|1	1
1|0	1
1|1	1

Input

The input is read from the file **`calculate.in`**

On the first line of the input you will receive, string from small Latin letters from “a“ to “z” and special signs ”(” , ”)” , ”~” , ”&” and ”|” .

On the next line you will receive the positive integer **N,** the count of the unknown variable in the string.

For each of the following **N** lines you will receive letter and the value **(0 or 1)** of the letter, divided with space.

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Output

The output must be printed in the file **calculate.out**

On the output you must write one or zero, the value of the proposition (**1 or 0)** .

Constraints

The read string will be < 10 000 characters

N < 5

Time limit: **0,5 сек.**

Memory limit: **256MB**

Examples

Input (calculate.in)	Output (calculate.out)
((((a)))) 2 a 1 b 0	1

Input (calculate.in)	Output (calculate.out)
a|~a&a 1 a 1	1

Input (calculate.in)	Output (calculate.out)
~a|b&(a|b&~a) 2 a 1 b 0	0

Explanation

In the last example ~a|b&(a|b&~a) we can replace all of the letters with their real values.
~1|0&(1|0&~1)

Let's calculate the expression in the brackets, because the brackets have the highest priority :
=> we will calculate 1|0&~1 = 1|0&0 = 1|0 = 1

We have reached :
~1|0&(1) = ~1|0&1 = 0|0&1 = 0|0 = 0

Answer:
0