

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 sek.**

Memory limit: **256MB**

Examples

Input (calculate.in)	Output (calculate.out)
<code>((((a))))</code> 2 a 1 b 0	1

Input (calculate.in)	Output (calculate.out)
<code>a ~a&a</code> 1 a 1	1

Input (calculate.in)	Output (calculate.out)
<code>~a b&(a b&~a)</code> 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