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.

**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