

6861 Grammar

Bob is one of the best students of the Formal Languages class. Now he is learning about context free grammars in the Chomsky Normal Form (CNF). Such a grammar consists of:

- a set of nonterminal symbols N
- a set of terminal symbols T
- a special nonterminal symbol, called the start symbol S
- a set R of rules of the form $A \rightarrow BC$ or $A \rightarrow a$, where $A, B, C \in N$, $a \in T$.

If $A \in N$, we define $L(A)$, the language generated by A , as follows:

$$L(A) = \{wz | w \in L(B), z \in L(C), \text{ where } A \rightarrow BC \in R\} \cup \{a | A \rightarrow a \in R\}.$$

The language generated by the grammar with start symbol S is defined to be $L(S)$.

Bob must solve the following problem: for a given context free grammar in CNF, on input string x , determine whether x is in the language generated by the grammar, $L(S)$.

Input

The input file contains several test cases, each of them as described below.

It starts with the input string x ($|x| \leq 1000$). Follows the grammar rules, in the form 'ABC' or 'Aa', each on a separate line. We consider that the start symbol is always 'S'.

The input data are correct and terminate with an end of file.

Output

For each test case, the program prints '1' if the string is in the language generated by the grammar, '0' otherwise, on a line by itself. The program prints the result to the standard output from the beginning of a line.

Note: Input/output samples are given in the table below. There are three tests. The first two use the same grammar: SAB, Sa, Ab ($S \rightarrow AB$, $S \rightarrow a$, $A \rightarrow b$). For the first test the input string is a , and the result is 1, while for the second test the input string is ab and the result is 0.

Sample Input

```
a
SAB
Sa
Ab
ab
SAB
Sa
Ab
ab
SAB
Sa
Ab
Ba
```

Sample Output

1
0
0