Problem M: Consequences

When he was young, Charles' biggest wish was to have a pet — a cute cat of course. Sadly, his parents declined his request and wisely advised him to think of the consequences. So Charles focused solely on consequences for years.

He spent a lot of time coming up with logical consequences and thinking about them. Recently, he came up with

$$\big((a \to b) \to a\big) \to a$$

but he still is unsure in which situations the formula holds. That is, for which truth values of the variables a and b does the formula evaluate to true?

He knows that an implication $\alpha \to \beta$ of two formulas α and β is true if the formula α evaluates to false or β evaluates to true. Given a formula of implications Charles comes up with, can you help him finding an assignment of the variables that makes the formula evaluate to true?

Input

The input lists a consequence formula which is satisfiable and at most $100\,000$ characters long. Charles builds consequence formulae by the following rules:

1. Any letter $L \in \{\texttt{a}, \ldots, \texttt{z}, \texttt{A}, \ldots, \texttt{Z}\}$ is a consequence formula. The letters are read case sensitively.
2. If X and Y are consequence formulae, then `(`X `->` Y`)` is a consequence formula as well.

For readability, the outermost parentheses are omitted, e.g. Charles writes `(a -> b) -> a` instead of `((a -> b) -> a)`.

Output

For each letter in the input print precisely one assignment, such that the input formula evaluates to true. Each assignment is a single line containing either L`=0` or L`=1`, where L is as above. The assignments may appear in any order.

Sample Input 1

```
((a -> b) -> a) -> a
```

Sample Output 1

```
a=0
b=1
```

Sample Input 2

```
x -> (y -> z)
```

Sample Output 2

```
x=0
y=0
z=0
```

Sample Input 3

```
(P -> Q) -> P
```

Sample Output 3

```
P=1
Q=0
```

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