Translating the secret message

Description

Jarjar is an adventurer. This time, Jarjar was tasked on a mission to infiltrate the enemy's country. Citizens in that country consider the people of Jarjar's country to be demonic. However, Jarjar did not want to get carried away with emotions and decided to see life in the enemy's country with his own eyes.

In his research, Jarjar diligently sends coded messages containing the following characters: (, [, {,),], and}. Jarjar's lover, Historia, will receive the message and check whether the message is correct or not. Jarjar's message is true if and only if the Jarjar message is a valid parenthetical string.

Formally, a string of parentheses is valid if and only if:
- is an empty string
- the characters are (), {}, or []
- Can be written in AB form (A followed by B), where A and B are valid parenthetical strings
- Can be written in the form (A), [A], or {A}, where A is a valid parenthetical string

After that, if Jarjar's message is correct, Historia needs to write down all the corresponding pairs of brackets. For example : message () [{}] contains pairs 1 with 2, 3 with 6, and 4 with 5. This means that the brackets in the 1st index are closed by brackets on the 2nd index, the brackets on the 3rd enclosed in parentheses at the 6th index, and so on.

As a good friend, help Historia to translate Jarjar's message

Input

The input contains a message string S. It's guaranteed that string S only consists of the characters $($, $)$, $\{$, $\}$, $[$, and $]$.

Output

The first line contains **"VALID"** (without quotation marks) if Jarjar's message is a valid parentheses string. Next is the second line that contains **N** which is the amount of parentheses pairs. On the next **N** lines, every **i**-th line contains the pair value **Xi** & **Yi** (ordered ascending towards **Xi**). **Xi** and **Yi** are separated by a space, meaning the parentheses at character **Xi** is paired with the character at **Yi**, with the value of **Xi** being less than **Yi**.
Inversely, only **"INVALID"** (without quotation marks) is outputted if Jarjar's message is not a valid parentheses string.

Constraints
$1 \leq |S| \leq 1.000.000$

Example Input 1

```
()[{}]
```

Example Output 1

```
VALID
3
1 2
3 6
4 5
```

Example Input 2

```
)(
```

Example Output 2

```
INVALID
```

Explanation

In the input example 1, the parenthetical string is valid. The character (at the 1st index matches the character). at the 2nd index. The character [at the 4th index matches the character] at the 6th index, and the { at the 4th index matches the character } at the 5th index.

Notice that