

# 13272 Bracket Sequence

You are given a bracket sequence  $B$ . The bracket sequence may contain 4 types of brackets:

1. Round brackets ( or )
2. Curly brackets { or }
3. Square brackets [ or ]
4. Angle brackets < or >

For each position in the bracket sequence  $B$ , you need to output the length of the longest balanced contiguous bracket sequence starting from (and including) that particular position.

Formally, a bracket sequence  $T$  is balanced if

- $T$  is empty
- $T$  is  $(P)$ ,  $[P]$ ,  $\{P\}$ ,  $\langle P \rangle$  where  $P$  is a balanced bracket sequence
- $T$  is  $PQ$  where  $P$  and  $Q$  are balanced bracket sequences.

For example, for  $B = (<>)><$ , the answer is '4 2 0 0 0 0'.



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## Input

First line of the input will contain a single positive integer  $T$  ( $T \leq 10$ ) denoting the number of test cases. Hence  $T$  cases follow. Each case is a single line of non-empty bracket sequence, containing only 8 types of characters '(', ')', '{', '}', '[', ']', '<', '>'. Each of these bracket sequences will not contain more than  $10^5$  characters.

If it helps, most of the judge data is produced randomly. First a random bracket sequence (not necessarily balanced) of certain length is generated. Say it is  $X$ . Then we change  $X$  by replacing some substring of it with a random balanced bracket sequence several times.

## Output

For each test case, output case number (no trailing space after 'Case x:'), followed by the answers in separate line. There is **NO** empty line between cases. For details, please see the sample.

## Sample Input

```

5
()
<>
(<>)><
()()
{[[}

```

**Sample Output**

Case 1:

2

0

Case 2:

2

0

Case 3:

4

2

0

0

0

0

Case 4:

4

0

2

0

Case 5:

0

0

0

0