ASSIGNMENT 6

Problem Statement

In the last assignment, you learnt how to use lex and yacc to create a lexical and syntax analyzer for a calculator. In this assignment, you need to move on to the code generation phase, wherein you have to now output the actual values of an input instead of just identifying whether the syntax of the input is correct or not. You also need to come up with certain error detection and error correction techniques using which you are not only able to identify different kinds of parsing errors, but also correct them with the help of necessary grammar rules.

Problem 1 (10 Marks)

In this problem, you need to return the numerical value of the input.

Listing 1: Sample numerical output

```
1  user > ( 2 - 3 ) ^ 4 * 5 / 6 + 12 - 9
2  calc > 3
```

Problem 2 (10 Marks)

Rewrite your yacc program so that the unary '+' and unary '-' operators are not allowed.

Problem 3 (20 Marks)

Find out the different lexical errors that an input string may contain. Define rules, clearly state them, and identify 5 such lex errors and implement error corrections for them.

Problem 4

Users are prone to entering wrong inputs. Your codes should be able to identify these incorrect ones and correct them if possible.

Problem 4a (10 Marks)

Output the corrected expression.

Listing 2: Error handling

```
1  15 16 + 17
2        -> 15 + 17
3  3+++4
4        -> 3 + 4
```

Problem 4b (10 Marks)

Output the expression evaluation after correction.

Listing 3: Error handling

```
1  15 16 + 17
2        -> 32
3  3+++4
4        -> 7
```

Problem 5 (20 Marks)

In this problem, you will be given input strings of operands and operators (without brackets). You have to parenthesize the string according to the standard precedence and associativity rules and output the parenthesized string.

Listing 4: Sample paranthesized output

```
1  user > 4 * 5 + 6
2  calc > ((4 * 5) + 6)
```

Useful Links

1. Lex Yacc Tutorial

Marking Scheme

- Problems - 80 Marks

- Viva - 20 Marks

Reference Books

Alfred V. Aho, Ravi Sethi, and Jeffrey D. Ullman. 1986. Compilers: Principles, Techniques, and Tools. Addison-Wesley Longman Publishing Co., Inc., Boston, MA, USA.