**TASK 1- ASSIGNMENT 2**

In order to convert infix expression to postfix, construct a tree and evaluate the expression. I need to use Stack and Tree structures. I build 2 structures in 2 packages Stack and Binary Tree. The running class is in Assignment2\_Task1 Class.

The program first take input from the user . It check if the expression is valid by checking valid characters, order of parenthesis, operand and operators. It then construct a tree by converting infix expression to postfix order. After constructing a tree, It shows the result of in-order traverse (infix expression) and post-order traverse( postfix expression) and evaluate the expression by using post-order traverse expression.

* REMEMBER TO write check input from user for variable (restricted from 0 to 9)

1. **Example of correct input**

* **Example 1**

*Please enter your expression string:*

*a/b*

*This is valid expression*

*ab/*

*The tree has been built*

*In-order traverse:*

*a / b*

*Post-order traverse:*

*a b /*

*Variable [a] detected. Please give the value from 0...9*

*1*

*Variable [b] detected. Please give the value from 0...9*

*5*

*The result: 0.2*

* **Example 2**

*Please enter your expression string:*

*a+b\*(c+d)-e/4*

*This is valid expression*

*abcd+\*+e4/-*

*The tree has been built*

*In-order traverse:*

*a + b \* c + d - e / 4*

*Post-order traverse:*

*a b c d + \* + e 4 / -*

*Variable [a] detected. Please give the value from 0...9*

*1*

*Variable [b] detected. Please give the value from 0...9*

*2*

*Variable [c] detected. Please give the value from 0...9*

*3*

*Variable [d] detected. Please give the value from 0...9*

*4*

*Variable [e] detected. Please give the value from 0...9*

*4*

*The result: 14.0*

* **Example 3**

Please enter your expression string:

a+5\*(b+c/5)-2\*d

This is valid expression

a5bc5/+\*+2d\*-

The tree has been built

In-order traverse:

a + 5 \* b + c / 5 - 2 \* d

Post-order traverse:

a 5 b c 5 / + \* + 2 d \* -

Variable [a] detected. Please give the value from 0...9

1

Variable [b] detected. Please give the value from 0...9

2

Variable [c] detected. Please give the value from 0...9

3

Variable [d] detected. Please give the value from 0...9

4

The result: 6.0

**2. Example of incorrect input**

**- Validity check**

**+ Check invalid character**

*Please enter your expression string:*

*g+5\*#2-f*

*Invalid character!!!*

**+ Check parenthesis**

*Please enter your expression string:*

*()a+b\*c*

*Invalid character before and after ) parethesis. Invalid Expression*

*Invalid parenthesis!!!*

**+ Check order of operator**

*Please enter your expression string:*

*a-+b\*c+d*

*2 operators next to each other without operand- Invalid Expression*

*Invalid operand and operator!!!*

**+ Check order of operand**

*Please enter your expression string:*

*ab+c\*d*

*2 operands next to each other without operator- Invalid Expression*

*Invalid operand and operator!!!*

**+ Check divide by zero**

Please enter your expression string:

a+b\*5+d/0+e

Divide by 0- Invalid Expression

Invalid operand and operator!!!

**- divide by zero if it occur during expression evaluation**

*Please enter your expression string:*

*2+3\*(a-5)+c/(4-d)+e*

*This is valid expression*

*Variable [a] detected. Please give the value from 0...9*

*1*

*Variable [c] detected. Please give the value from 0...9*

*2*

*Variable [d] detected. Please give the value from 0...9*

*4*

*Variable [e] detected. Please give the value from 0...9*

*5*

*Divide by zero detected while evaluating the expression! Your expression input is not good*