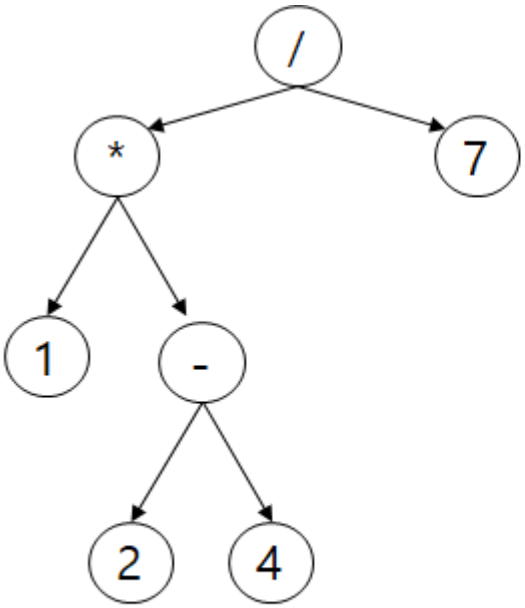
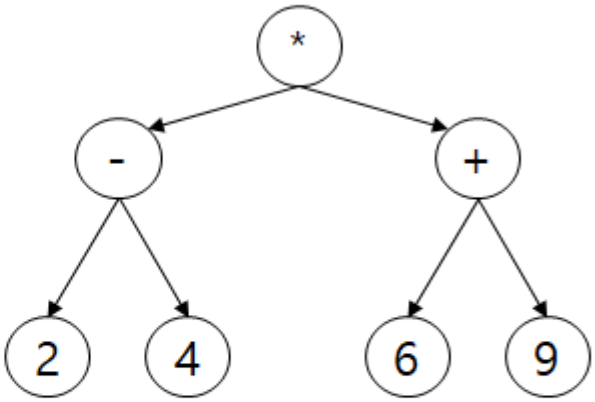
Homework 7 – Due May 7th 23:59 KST

Instructions: Complete the implementation and turn it in before the due date. Any deviations from the instructed deliverable format will result in a deduction of grade. DO NOT COPY OTHER'S WORKS!

In this assignment, you will work with mathematical expressions. The task is to convert the given infix expression into a ***parse tree***. A parse tree is a binary tree whose internal nodes are the operators and whose leaves correspond to operands. The expressions in this assignment will consist of the five basic operators (+-*/^) and positive integers as operands. In addition to these symbols, you will also have to deal with parentheses. Two sample parse trees and their corresponding expressions are shown below:





1*(2-4)/7=-2/7 (2-4)*(6+9)=-30

You are to implement the following five main methods:

- buildTree(String): Build the parse tree that represents the given expression string. The input string is an infix notation consisting of the five operators, parentheses, and numerical operands. Provide a recursive solution, possibly by using helper methods.
- eval(): Perform the evaluation of the expression. That is, do the computation described by the expression.
- toString(): Convert the tree representation back to the original infix string.
- toPostfixString(): Same as above, except return a postfix notation.

In addition to these methods, you have to complete the Node class, as well as the constructor of the main class. See the comments in ParseTree.java.

Rubric: Grading will be based on, but not limited to, the following criteria.

- Documentation (20 points): For each of the five required methods, you should provide extensive descriptions in the header comments. In particular, the descriptions should include the outline of your algorithm in a paragraph. Be sure to mention the base and recursive cases if you choose a recursive implementation. You will lose points for not being clear and exact.
- Correctness (80 points): Your implementation should behave as specified above in an error-free manner. Two or more unhandled exceptions will result in a 0 for correctness.
- Miscellaneous: Do not change the method and class names. Iterative methods should not use recursions.

Deliverable: A single ParseTree.java file not part of any package structures.