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COSC 2436 Programming Fundamentals III

Due 9-16-2023

Program 1

import java.util.Scanner;  
import java.util.Stack;  
  
public class ExpressionConverter {  
   
   
   
 public static String infixToPostfix(String infix) {  
 StringBuilder postfix = new StringBuilder();  
 Stack<Character> stack = new Stack<>();  
   
 for (char c : infix.toCharArray()) {  
 if (Character.isLetterOrDigit(c)) {  
 postfix.append(c);  
 } else if (c == '(') {  
 stack.push(c);  
 } else if (c == ')') {  
 while (!stack.isEmpty() && stack.peek() != '(') {  
 postfix.append(stack.pop());  
 }  
 stack.pop(); // Pop '('  
 } else {  
 while (!stack.isEmpty() && precedence(c) <= precedence(stack.peek())) {  
 postfix.append(stack.pop());  
 }  
 stack.push(c);  
 }  
 }  
   
 while (!stack.isEmpty()) {  
 if (stack.peek() == '(') {  
 return "Invalid infix expression";  
 }  
 postfix.append(stack.pop());  
 }  
   
 return postfix.toString();  
 }  
   
 public static String postfixToInfix(String postfix) {  
 Stack<String> stack = new Stack<>();  
   
 for (String token : postfix.split("\\s+")) {  
 if (token.matches("[a-zA-Z0-9]+")) {  
 stack.push(token);  
 } else {  
 String operand2 = stack.pop();  
 String operand1 = stack.pop();  
 String expression = "(" + operand1 + " " + token + " " + operand2 + ")";  
 stack.push(expression);  
 }  
 }  
   
 return stack.pop();  
 }  
   
 public static int precedence(char operator) {  
 switch (operator) {  
 case '+':  
 case '-':  
 return 1;  
 case '\*':  
 case '/':  
 return 2;  
 case '^':  
 return 3;  
 }  
 return -1;  
 }  
  
  
 public static void main(String[] args) {  
 Scanner scanner = new Scanner(System.in);  
  
 while (true) {  
 System.out.print("What expression would you like to convert your expression to? (infix, postfix, or quit) ");  
 String choice = scanner.nextLine().trim().toLowerCase();  
  
 if (choice.equals("quit")) {  
 break;  
 } else if (choice.equals("postfix")) {  
 System.out.print("Enter infix expression: ");  
 String infix = scanner.nextLine();  
 String postfix = infixToPostfix(infix);  
 System.out.println("Postfix expression: " + postfix);  
 } else if (choice.equals("infix")) {  
 System.out.print("Enter postfix expression: ");  
 String postfix = scanner.nextLine();  
 String infix = postfixToInfix(postfix);  
 System.out.println("Infix expression: " + infix);  
 } else {  
 System.out.println("Invalid choice. Please enter 'infix', 'postfix', or 'quit'.");  
 }  
 }  
  
 System.out.println("Exiting the program.");  
 }  
}

