

Infix to Postfix Converter

Objective: To algorithmically convert an arithmetic expression from infix notation to postfix notation.

Background:

Expressions in postfix notation are useful for building expression trees. A postfix expression is processed left-to-right, with the help of a stack, to build the tree.

Expressions are more commonly written in infix notation. We need to convert the infix expression to postfix before we can build the tree.

Assignment:

Download the file **ToPostfix.zip** from Mr Greenstein's web site. Unzip the file and it will create the directory "ToPostfix" with four files, **ArrayStack.java**, **ExprUtils.java**, **Stack.java**, and **ToPostfixTester.java**. The **ArrayStack** class and the **Stack** interface, used in the **SimpleCalc** project, should not be changed. The **ToPostfixTester** class should be used to test your code.

The only operators in this project include the binary operators "+", "-", "*", "/", "%", and "^". There will be no unary operators in the expressions.

You will implement the method **List<String> toPostfix(String expr)**, the infix to postfix converter in the **ExprUtils** class. It is passed a **String** infix expression, and it returns a token list of the expression in postfix notation. Use the **ArrayStack** in a similar way that you implemented method **evaluateExpression** in the **SimpleCalc** project.

For example, the expression "8 + (9 + 5 * (6 % 3 - 7) / (4 + 2))" will produce the following postfix list:

```
[ 8 9 5 6 3 % 7 - * 4 2 + / + + ]
```

Notice there are no parentheses in the list because postfix does not use them.

A sample run:

```
% java ToPostfixTester

Welcome to Infix to Postfix Converter

Expression:    2 * 3 + 4
Postfix: [2, 3, *, 4, +]

Expression:    2 + 3 * 4
Postfix: [2, 3, 4, *, +]

Expression:    7.3 / 4.9 + 6.2 * 3
Postfix: [7.3, 4.9, /, 6.2, 3, *, +]

Expression:    96 + 2.8 * 61.1 - 45.2
Postfix: [96, 2.8, 61.1, *, +, 45.2, -]

Expression:    5 * ( 6 + 7 ) / ( 9 % 2 ) - 1
```

Postfix: [5, 6, 7, +, *, 9, 2, %, /, 1, -]

Expression: $8 / 4 + (2.1 * (5 + 3.3) \% (6 - 1))$

Postfix: [8, 4, /, 2.1, 5, 3.3, +, *, 6, 1, -, %, +]

Thanks for using the converter. Good bye!