

COMP 1603 Programming III

2016/2017 Semester 2

Assignment 3

Date/Time Due: Monday 3rd April, 2017 by 10 PM

Submission: Submit via My Elearning.

Only 1 submission allowed.

Ensure that you place your name, student ID, course code, email address and assignment number in documentation at the top of your file.

Description

An arithmetic expression is a string that can consist of **single digit** operands, parentheses, and the operators +, -, *, /, and ^. x^n denotes x^n where n is a non-negative integer.

Write a program **expressions.cpp** that repeatedly reads **infix** expressions from a data file **input.dat** and

1. **Converts each expression to its postfix** equivalent. Print the original expression followed by the postfix (Reverse Polish Notation) form.
E.g.
Infix: 3 + 4
Postfix: 3 4 +
2. **Evaluate each postfix** expression from (1) and print the value of the evaluated expression.
E.g.
Postfix: 3 4 +
Evaluation: 7

Input

Each line of the **input.dat** data file contains an arithmetic expression. One or more **spaces may separate operands and operators**. The last line in the data file contains a '\$' only.

Data to be used (input.dat):

$4 * 2^{(2 * 3)} = 265$
 $4 * (8 - 6)^{(9 - 5)} - 8 * 2 = 48$
 $4 * (7 - 6) / (9 - 5) - 8 * 8$
 $(8 + 6 * 5) / (8 - 3 * 2) = 19$
 $4 * (8 - 3)^{((7 - 5))} - 8 * 8$
 $(9 - 7) * ((5 - 4 * 2) / 3 / 5) * 2 = -4/5$
 $(8 / 2 / 2) - 3^2 = -7$
\$

Division

Note that the '/' operator performs **floating point division and not integer division**. Therefore $5/2 = 2.5$ (it is incorrect to calculate $5/2$ as 2)

Output

Send all output to a text file **report.txt**.

Error handling

There is only one possible error that can occur in an expression: **unbalanced parentheses**. Print a specific message if parentheses do not match.

Examples:

(1+2)) Error: more right than left parentheses

((1-5) Error: more left than right parentheses

If an expression has a parentheses mismatch, move on to the next expression after printing the error message. **Do not attempt to convert to postfix or evaluate.**

A stack must be used to check mismatched parentheses.

Submission

Zip **expressions.cpp**, **input.dat** and **report.txt** and submit via My Elearning.