CS 4308 – Concepts of Programming Languages - Spring 2025

Assignment 1 Develop a program for Complex Number operations.

1. Review Arithmetic of Complex Numbers.
2. Indicate the various formulas needed, document these.
3. The compiling and running Java or C++ programs must be done on the command line. Do not use an IDE; you may use any text editor. Use the Command Line window, or the Terminal window (on Linux or MacOS).
   1. Define (and implement) one or more classes that includes the following operations (Note: do not use the complex libraries in Java or C++):
      1. Addition
      2. Subtraction
      3. Multiplication
      4. Division
   2. The program must create one or more complex numbers, perform the various arithmetic operations indicated above, and then display results.
   3. Write a short report that documents all work done, including the overall design, explanation of the implementation, the input data used to run the program, the output of the program. Submit an archive with the source code, the input and output data files, and the document report.
4. Note: do not include ‘hard-coded’ input data in the source code; use input statements.

Do not use hard-coded input values. Include the input and output when running the program. The source code must be well structured and organized with appropriate comments. Include the documentation in the report (see ‘submission\_report.pdf’) .

1. Investigate the general principles and goals of a **system programming language**. Provide two or three examples of system programming languages.
2. Solve Problem Set #3 - Page 157 (163) from the Textbook
3. Solve Problem Set #7d - Page 163 from the Textbook.

**Submit your assignment in a report format. See ‘submission\_report.pdf’ and ‘Rubrics\_for\_grading.pdf ’.**

**Problem Set #3 - Page 157 (163) from the Textbook**

Rewrite the BNF of Example 3.4 to give + precedence over \* and force + to be right associative.

**5. Problem Set #7d - Page 163 from the Textbook**

Using the grammar on Example 3.4, show a parse tree and a leftmost derivation for the following statement. A = B \* (C \* (A + B))