CSCC24 Winter 2018 – Assignment 5
Due: April 6 Friday, 18:00 (6PM)
https://markus.utsc.utoronto.ca/cscc24w18/
You may form a group of 2 students to do this assignment.
This Assignment is worth 10% of the course grade.

All of the following count: Correctness, simplicity, DRY (don't repeat yourself), efficiency, style.

1. [8 marks] Implement an interpreter for the language defined as follows.

   The abstract syntax is defined by the `Term` type in the starter code. For your convenience, several parser functions are included to parse strings and files to `Term`'s so you can use them to enter complex test cases. The grammar and the parser have been improved so that now `5-6` is a subtraction, and `ifx == 0` is a comparison rather than a syntax error. (The price is that `-6` is now `Neg (Num 6)`.)

   The semantics is defined by the following points:

   - Evaluation strategy: Eager evaluation or call by value for the most part, including `Let`, `App`, comparison, and arithmetic. The exceptions are in the next point.
   - `Cond` and the two boolean binary operators `And` and `Or` are short-circuiting. They always evaluate their respective first operands; however:

     In `Cond`, if the test evaluates to true, evaluate the then-branch but not the else-branch. The opposite if the test evaluates to false.

     In `And`, if the first operand evaluates to false, do not evaluate the second operand.

     In `Or`, if the first operand evaluates to true, do not evaluate the second operand.
   - Semantics of `Let`: Like `let*` in Scheme. A later equation sees the variables bound by earlier equations, and recursion is unsupported. For example, think of

     ```
     let { x=2+3; y=x+4 } in x+y
     ```

     as

     ```
     let { x=2+3; } in let { y=x+4; } in x+y
     ```
   - `Div` and `Mod` have the same meaning as Haskell's `div` and `mod`, Python's `//` and `%`.
   - It is assumed that operands have the correct types, variables are bound, and divisors are non-zero. If a violation is detected during evaluation, the interpreter aborts. While there is no requirement on error messages in this case, for you own sake you will like to write helpful messages.
   - Most other unspecified aspects follow common conventions, e.g., `Plus` means adding two integers.

(End of questions.)