Ruby Project

1. Installation

- Windows: Go to http://rubyinstaller.org/, and follow the instructions.
  For a quick and easy install, click the “Download” button at the top of the page, and choose desired version under “RubyInstallers”
- Linux/Unix: Go to http://www.ruby-lang.org/en/downloads/, and follow the instructions.

2. Assignment

1) Consider the following BNF for the WHILE programming language.

```
<program>     ::= <stmts>
<stmts>       ::= <stmt> | <stmt> ; <stmts>
<stmt>        ::= skip | identifier := <expr>
                    | if \( <lexpr> \) then \( <stmts> \) else \( <stmts> \)
                    | while \( <lexpr> \) do \( <stmts> \)
<expr>        ::= <term> <exprs> | <term>
<exprs>       ::= <addop> <term> <exprs>  | <addop> <term>
<term>        ::= <factor> <terms> | <factor>
<terms>       ::= \* <factor> <terms>  | \* <factor>
<factor>      ::= integer | identifier | \( <expr> \)
<lexpr>       ::= <lterm> <lexprs> | <lterm>
<lexprs>      ::= and <lterm> <lexprs> | and <lterm>
<lterm>       ::= not <lfactor> | <lfactor>
<lfactor>     ::= true | false | <expr> <relop> <expr>
<relop>       ::= <= | =
<addop>       ::= \+ | \-
```

Write a program that will take a file written in the language and parse it into tokens (variables, operators, etc.). The program should have a getToken() function that, when called, returns the next sequential token (this function will be utilized in the next section). Your parsing method also needs to tack an ‘EOF’ (end of file) token to the end of the list of tokens (this will also be used later).

Notes:

- Separating by whitespace alone will not suffice as there may be instances such as “x:=5”, which consists of three tokens, but will only be counted as one.
- A WHILE identifier consists of letters (only alphabetic characters), digits, and underscores (_) with the restrictions that it must begin with a letter. WHILE comments are indicated by being preceded by (//) and terminated by the end of the line.

2) Create a recursive-descent syntax analyzer for the above language. Use the getToken() method from the previous section to retrieve the tokens at each step. If the ‘EOF’ token is reach with no issue, the program should report that the file is syntactically correct. Otherwise, if an error is found, an appropriate error message should be displayed.