COP5555 Fall 2013
Assignment 3

Assigned Sept 27
Due: Wed Oct 16 at 11am

Reminder: The midterm is Oct 9 for on campus students and due by Oct 11 for EDGE students. Three weeks are allowed for this assignment to give you time to study for the midterm.

1. Java container classes may or may not allow null to be inserted. For example, the documentation of boolean add(E e) method in the List interface says: Lists that support this operation may place limitations on what elements may be added to this list. In particular, some lists will refuse to add null elements, and others will impose restrictions on the type of elements that may be added. List classes should clearly specify in their documentation any restrictions on what elements may be added.

   X10 is a more recent class-based object-oriented programming language designed for high-performance, high-productivity computing on high-end computers supporting 10^5 hardware threads and 10^{15} operations per second. Its type system is more sophisticated than Java's.

   a. Read about the X10 type system and describe how an X10 programmer could specify that a List implementation cannot contain null values. The X10 specification can be found at http://x10.sourceforge.net/documentation/languagespec/x10-latest.pdf. The information you are looking for is in chapter 4.
   b. A Java container implementation may "refuse to add null references". What is the difference between Java's "refusing to add" and an X10 specification that does not allow null references.

2. Rename your parser from Assignment 2 to Parser.java and modify it to
   a. generate an AST
      i. Classes for the AST nodes have been provided. Do not change these in this assignment (although in later assignments you will be able to change them)
      ii. See the document for the mapping between concrete syntax and AST nodes.
   b. implement rudimentary error recovery
      i. Error recovery has been implemented already for declarations in the provided ParserExample file. Provide a similar facility for statements. You should implement error recover at the top level and inside language constructs (while loops and if statements) that include lists of statements.

Your class should be called Parser and contain the public methods found in the provided ParserExample file with the given signatures.

Submit two files to e-learning:

A pdf file containing your answers to questions 1.

A jar file called Assignment3.jar containing your implementation of Scanner.java, Parser.java and any other classes you might have added. You do not need to turn in your test cases. **We will recompile and call the public methods from our test program. Do not change the signatures of the public methods or the package declarations or you will break the test script.**