COP5555 Fall 2013
Assignment 2

Assigned Sept 13
Due: Wed Sept 25 at 11am

These questions concern object lifetime in Java and C++.

1. In Java, all instances of objects are allocated on the heap with the **new** keyword. They can be reclaimed by the garbage collector after no more references to the objects exist. In C, instances of objects may be allocated on the heap with the **new** keyword, or they may be allocated on the stack. Objects allocated on the stack are reclaimed when they are no longer in scope. Objects on the heap are reclaimed when explicitly deleted using the **delete** keyword. For each of the three cases, (Java object allocated on the heap, C++ object allocated on the heap, C++ object allocated on the stack) describe a scenario where each of the following could occur, or explain why it can't happen.
    a. A memory leak
    b. A dangling reference
2. C++ has a notion of *smart pointers*. Briefly describe what these are and why they are useful.
3. Java has a notion of *weak references*. Briefly describe what these are and why they are useful. What about *soft references*.
4. Implement a recursive descent parser for the attached grammar using the given SimpleParser.java as a starting point. Use your Scanner from Assignment 1 to recognize tokens. Errors detected while parsing should throw a SyntaxException. For input that is allowed by the grammar, the parse method should simply return normally. A few Junit tests have been provided to help you get started.

Submit two files to e-learning:

A pdf file containing your answers to questions 1-3.

A jar file called Assignment2.jar containing your implementation of Scanner.java, SimpleParser.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 these methods or the package declarations or you will break the test script.**

Make sure that your jar file contains your java source code. Starting with this assignment, students who submit jar files containing only class files, or make other errors due to failure to follow instructions will receive a 0 for that part of the assignment.