CISC181H Spring 2009 Lab08

- Write a program for each of the following problems. Be sure to save every separate program. All programs must be properly commented and indented (see Assignment Standards on the class website). Ask your TA for guidance.

Programs

1. Define a class Rat for rational numbers. A Rat has an integer numerator and an integer denominator. Define a constructor with appropriate defaults. Define a method in Rat for multiplication and test it.

2. We discussed three ways of passing parameters: by value, by address-value, and by reference. Write and demonstrate three functions that try to "swap" values of two integer variables in main(). Of course, one of them won't work.

3. Show a parent class and a child class that have the same method, print(). Show that a pointer of the parent's type can point to an instance of the child type. Use that pointer to demonstrate the child class version of print. Then show how code in the child class scope can call the print() from the parent class. Don't use the keyword virtual more than once.

4. Work in your project teams for (at least) this part of the lab.

   Write a 2D "Drop" program. In this program, you will have a circular dropping object. This object will be created where the user clicks the mouse. If it is already created, relocate it to where the mouse is clicked. Represent the dropping object as a class (it has a constructor, a movement operator, current location parameters, etc). The object will drop until it hits one of two obstacles: a plane (represented by a line) or a circle. Have some collision detection for these two obstacles. Extra credit: have the circle "bounce" with decreasing power when it hits the plane, instead of simply stopping. You may consider your dropping object a point (as compared to a circular area), but the circular obstacle is treated as a circular area (Think: how do you test to see if a point is within a circle?)

5. Explain the word "idempotent" in the context of C++.

You should have a total of 4 programs named lab08.1.cc to lab08.4.cc, plus any makefiles and written answers specified above. Make a single script file (see lab00 for the instructions) where you cat, compile, and run lab code in its final form.

Submit all 4 program files *and* your script on WebCT by midnight before your next lab. Give the paper version of the complete script file **only** on paper to your TA at the **beginning** of your next lab. Note: Cat, compile, and run each program in order - do *not* cat all programs, then compile, etc.