LAB #10
Let’s Begin C++

Check your grades on BB to make sure they are accurate!!! If not, then contact the TAs or myself!!!! Remember, there is no lab during Thanksgiving Holidays.

You need to use the TAs office hours and class study sessions to get extra help in understanding the material and what is required from an assignment or lab!!!

1. In this course, all our labs involve paired programming. You do not have to keep the same partner for each lab, but you MUST work with someone in each lab, as specified in the student handout.

2. At this time, you need to pair with someone in the lab, and finish the rest of the lab as a pair.

Please make sure you review the template and style guideline for CS 161, and keep a consistent style to your code!!!!
http://classes.engr.oregonstate.edu/eecs/fall2014/cs161-001/program_layout.pdf
http://classes.engr.oregonstate.edu/eecs/fall2014/cs161-001/161_style_guideline.pdf

First C++ Program/Compiling and Executing (4 pts)

3. Write the infamous “hello world” program as your first piece of C++ code.

```cpp
#include <iostream> //C++ Library input and output
using namespace std; //standard namespace for cout, cin, and endl

int main() {
    cout << "Hello World!" << endl; //Print Hello World to the screen
    return 0;
}
```

Compile and execute your C++ “hello world” program. The –o says to create an executable with the output name of hello, instead of a.out, when no –o is supplied.

g++ hello.cpp –o hello
./hello

Another Small C++ Program (4 pts)

4. Let’s practice writing another small C++ program that contains variables, arithmetic expressions, and assignment statements. Let’s implement your buoyancy program in C++.
First, we have to declare variables of specific types before you can use them in your program. For example, you need a weight, radius and force variables, which will all be floating point numbers. Declare these inside of the main curly braces:

```c++
int main() {
    float weight, radius, force;
    ...
}
```

It takes the weight (in pounds) and radius (in feet) of a sphere as input and outputs the buoyant force. Use the following for **inputs and outputs**:

```c++
    cout << “Enter the weight: “;
    cin >> weight;
```

Use $\gamma = 62.4 \text{ lb/ft}^3$ as the specific weight of water, and the volume of the sphere is $\frac{4}{3}\pi r^3$. The buoyant force can be computed by $F_b = V \times \gamma$

where $F_b$ is the buoyant force, $V$ is the volume of the submerged object, and $\gamma$ is the specific weight of the fluid. Remember, integer divided by integer produced integer. You can also bring in the math library in C++, just as in Python for pi and pow:

```c++
#include <cmath>
```

```c++
    force = (4.0/3 * M_PI * pow(radius, 3)) * 62.4;
```

Using this syntax knowledge from C++ and your programming skills from Python, write a functional C++ program to calculate the buoyant force.

```c++
g++ buoyancy.cpp –o buoyancy
./buoyancy
```

**Begin/Get Help w/ Assignment #8 (2 pts)**

5. This is to make sure that you have started and you get any help you need on Assignment #8 before the deadline. Please show the TA that you have started the program and understand what to do for the if statements in C++. If you are doing the extra credit, then this is the time to implement and get help with your loop.

**Things to consider:**

- Your program should work for floats, e.g. use fmod() for floating point mod and pow() for exponent.
- You can take your operator in as an int, character, or string. (Please look at Wednesday 12/3 slides for examples…)

**Make sure you sign-up with a TA for demoing/explaining your Assignment #7 this week before Finals Week. You do not need to demo Assignment #8. We will grade it by running your program on our own!!**

**Extended Learning:** If you want more practice over the Winter Break, then try to convert your grade calculator to C++. You do not need to have functions for this, but if you want an extra challenge, then try using them😊