CECS 282 - Homework 3

Complete these problems on a separate sheet of paper. Due February 12 at the start of lecture.

1. Reading from *C++ How to Program*:
   (a) Chapter 6.15
   (b) Chapter 8.1, 8.2, 8.3
   (c) Chapter 8.4
   (d) Chapter 8.5 (skip "C++11" sections)

2. Give two ways in which *pointers* and *references* are either the same or different in C++. Only one of your facts may involve the physical syntax of declaring and accessing a pointer or reference.

3. What is the output of the following C++ code fragment? Draw a stack frame diagram (starting at `main`) and trace the code's operation to support your answer.

```
#include <iostream>
using namespace std;

double Blah(int *p) {
   *p = *p + 5;
   double local = *p / 2;
   return local;
}

int main() {
   int x = 10;
   int *y = &x;
   double z = Blah(y);
   cout << x << endl << z;
}
```

4. Give the output of the following short code fragments. None of the examples below have a syntax error.

   (a)
   ```
   bool b = -1;
   cout << b + 1 << endl;
   ```

   (b)
   ```
   char c = 3;
   cout << 'A' + 2 * c << endl
   ```

   (c)
   ```
   int d = 2.5 - 16 % 3 + 5;
   cout << d << endl;
   ```

   (d)
   ```
   long e = 5;
   cout << (((!e && true) - 1) ?  "iguana" :  "avocado") << endl;
   ```

5. Write a C++ function `DoubleLarger` which takes three integer variables and doubles the largest of the group, *so that the original variables passed as arguments to the method are also changed.* Example usage:

```
int x = 5, y = 8, z = 7;
DoubleLarger(x, y, z);
// at this point, x should be 5, y should be 16, and z should be 7.
```

6. Write a C++ function `SolveQuadratic` which solves a quadratic equation of the form $ax^2 + bx + c = 0$ when given the coefficients a, b, and c. Your function should take three double parameters for the three coefficients, plus two double pointer parameters that you will use to save the two solutions to the equation. You will return an integer indicating the number of real solutions to the equation.

   Your function should not do any input or output; it should only calculate and set the solution variables, and return the numbe of solutions.

Example usage:

```
double xSolution1, xSolution2;
double a, b, c;
// suppose a, b, and c are given values from the user
int numberOfSolutions = SolveQuadratic(a, b, c, &xSolution1, &xSolution2);
```

Test your code to make sure it works in the following scenarios:

a	b	c	`numberOfSolutions`	`xSolution1`	`xSolution2`	Explaination
1	2	1	1	-1	0	For $x^2 + 2x + 1 = 0$, the only solution is $x = -1$
1	0	1	0	0	0	No real solution to $x^2 + 1 = 0$
1	-3	-4	2	4	-1	For $x^2 - 3x - 4 = 0$, the solutions are $x = 4$ and $x = -1$