COP4530 – Data Structures, Algorithms and Generic Programming
Recitation 5
Date: September 21rd and 25th, 2009

Lab topic:
   1) **Solve practice problems related to complexity analysis**
   2) **Take Quiz**

1. Find the computational complexity for the following FOR-loops:

```
for (i = (n - 1); i >= 0; i--)
  {
        for (j = 1; j <= i; j++)
        {
              if (numbers[j-1] > numbers[j])
              {
                     temp = numbers[j-1];
                     numbers[j-1] = numbers[j];
                     numbers[j] = temp;
              }
        }
  }
```

2. Prove, using induction, that $2n^2 + 3n + 1 < 4n^2$ for all n > 2.

3. Assuimg that f$_1$(n) is O(g$_1$(n)) and f$_2$(n) is O(g$_2$(n)), find a counter example that refutes the following statement:

$$f_1(n) - f_2(n) \text{ is } O(g_1(n) - g_2(n))$$

4. Prove that n-1 is big-Theta(n), directly from the definition of big-Theta.

5. Let f(n) and g(n) be asymptotically non-negative functions. Using the basic definition of big-Theta, show that max(f(n),g(n)) is big-Theta (f(n) + g(n)).