CSci 3501 Assignment 3
Due Friday, September 18 in class

Problem 1 (12 points). Exercise 2-2 p. 38. As a hint for question **a**, take a look at the loop invariant for the insertion sort. For part **d** prove the worst-case efficiency similarly to the proof for the insertion sort (see pp. 24-25).

Problem 2 (12 points). Write a recursive version of bubblesort in pseudocode. Write and solve the recurrence relation for it (in the worst case). How does it compare to the worst-case of the bubblesort in problem 1?

Problem 3 (8 points). Use the recurrence tree method to solve the following recurrences:

- $T(n) = T(n-2) + n$, the base cases are $T(1) = T(0) = c$ (why do we need two base cases here?)

- $T(n) = T(\frac{n}{2}) + n$, the base case is $T(1) = 1$. Be careful with the summation of the tree values.

Problem 4 (6 points). Use the substitution method to prove that the recurrence $T(n) = 2T(\frac{n}{2}) + n^2$ for $n > 1$ (with the condition $T(n) = \Theta(1)$ for $n = 1$) has the solution $T(n) = \Theta(n^2)$. Show all your work.