CS 300 Data Structures and Algorithms – Spring 2011
Homework #1 (50 points) Due: February 17th 2011 (beginning of class)

1. (5 points) Write a pseudocode statement to add 1 to a number 'num'.

2. (5 points) List all atomic data types and composite data types in C programming language.

3. (5 points) Reorder the following efficiencies from smallest to largest: 2^n, $n!$, n^5, 1000, $n\log(n)$, $\log(n)$

4. (10 points) If the efficiency of the algorithm doIt can be expressed as $O(n) = n^5$, calculate the efficiency of the following program segment:

   for (i = 1; i <= n; i++)
      for (j = 1; j <= n; j++)
         doIt(…)

5. (10 points) An algorithm processes a given input of size n. If n is 4096, the run time is 512 milliseconds. If n is 16384, the run time is 8192 milliseconds. What is the efficiency of the algorithm in big-O notation.

6. Consider the following algorithm:

   algorithm fun2 (x, y)
   1   if (x < y)
     1   return -3
   2   else
     1   return (fun2 (x – y, y + 3) + y)
   3   end if
   end fun2

   What would be returned if fun2 is called as

   (A) (5 points) fun2 (2, 7)   (B) (5 points) fun2 (5, 3)   (C) (5 points) fun2 (15, 3)