COMP 312
Assignment 2
Due at 9:00 am, Thursday, September 24, 2009
All problems are of equal value.

Reading

Cormen, Leiserson, Rivest and Stein, Chapter 4 (also section 2.3).

Practice

CLRS, 2.3-3, 4.1-1, 4.1-2, 4.1-5, 4.3-1, 4.3-2, 4.3-3, 4.3-4, 4-1 (a,c,e,g), 4-2, 4-4, 4-7, 7-3.

To Be Handed In

1. Create a recurrence (of the form solved by the Master theorem) whose solution would be $\Theta(n^4/\log^3 n)$.
2. CLRS, 4-1 (b), (d), (f), (h)
3. Give asymptotically tight bounds for the solutions of the following recurrences:
   (a) $T(n) = T(n-a)+T(a)+cn$ where $a \geq 1$ and $c > 0$ are constants.
   (b) $T(n) = T(\alpha n) + T((1-\alpha)n) + cn$ where $0 < \alpha < 1$ and $c > 0$ are constants.
4. CLRS, 4-6
5. Express the running time (as a function of the length of y only, i.e., assume that x is fixed for this analysis and compute the asymptotic running time as the size of y increases) of the following pseudo-code algorithm as a recurrence and solve it. Assume x and y are positive integers and the addition of two integers requires constant time. What does the algorithm do?

   $M(x, y)$:
   if $y = 0$ return 0 else
   return $M(2x, \lfloor y/2 \rfloor) + x \cdot (y \bmod 2)$