CS / MCS 401 Week #4 Exercises (Fall 2007)

G. Find a solution to each recurrence below that is exact when n is a power of 2, and a good approximation otherwise.

a) $C(n) = C(n/2) + 2n + 3$, $C(1) = 1$.

b) $C(n) = 2C(n/2) + n \lg(n)$, $C(1) = 0$.

c) $C(n) = 4C(n/2) + 3n^2$, $C(1) = 0$.

Page 86, Exercise 4.4, parts (a), (c), (e), (h).

(For those parts where the Master Theorem, or the extension to the Master theorem given in class, is applicable, quote it to obtain a solution of the form $T(n) = \Theta(g(n))$, where $g(n)$ is as simple as possible (i.e., $g(n)$ should not be $3n^2$ or n^2+2n; use n^2 instead). When you quote the Master theorem, give the values of a, b, $E = \log_b(a)$, and $f(n)$; see page 73 of the text, or the handout on the Master Theorem.). If the Master Theorem is not applicable, solve the recurrence directly, again obtaining a solution of the form $T(n) = \Theta(g(n))$.

H. Consider the recurrence

$$C(n) = C(0.8n) + C(0.5n) + C(0.2n) + n,\ \ C(1) = 1,$$

ignoring the fact that $0.8n$, $0.5n$, and $0.2n$ may not be integers. If the recurrence has a solution of the form

$$C(n) = a\,n^b + c\,n + d$$

for some real numbers a, b, c, and d, what must the value of b be? Compute your answer to two decimal places.