

ECE 537 - Foundations of Computing
Prof. Sen
Homework #6
Due: Thursday, October 18, 2007 in class

1. Problem 4.1-1 in the Cormen et. al text.
2. Problem 4.1-6 in the Cormen et. al text.
3. Problem 4-1 (at the end of the chapter) in the Cormen et. al text.
4. For each of the following recurrences, find the closed-form solution. Feel free to use the Master Method, but before applying it, you should check to make sure that the conditions of the Master Theorem are satisfied.

(a) $T(n) = 4T(\frac{n}{2}) + n$

(b) $T(n) = 4T(\frac{n}{2}) + n^2$

(c) $T(n) = 4T(\frac{n}{2}) + n^2 \lg n$

(d) $T(n) = 4T(\frac{n}{2}) + n^3$

(e) $T(n) = 5T(\frac{n}{2}) + n^2 \lg n$

(f) $T(n) = 3T(\frac{n}{4}) + n \lg n$

(g) $T(n) = 2T(\frac{n}{2}) + \frac{n}{\lg n}$

(h) $T(n) = 4T(\frac{n}{2}) + \frac{n}{\lg \lg n}$

(i) $T(n) = 2T(\frac{n}{2}) + n \lg \lg n$

(j) $T(n) = 2T(\frac{n}{4}) + \sqrt{n}$

(k) $T(n) = 2T(\frac{n}{4}) + n^{0.51}$

(l) $T(n) = 8T(\frac{n}{3}) + n!$

(m) $T(n) = T(\frac{n}{2}) + \lg n!$

5. Use generating functions to find closed forms for the following sums:

(a) $\sum_{i=0}^n a^i$

(b) $\sum_{i=0}^n ia^i$

(Note: $t_n = \sum_{i=0}^n a(i)$ can be rewritten as $t_n = \sum_{i=0}^{n-1} a(i) + a(n) = t_{n-1} + a(n)$.)