CS 213
Homework Assignment 2

Given: January 29, 2009 **Due:** February 05, 2009

This assignment is due by the end of the class on the due date. Unless all problems carry equal weight, the point value of each problem is shown in [ ]. To receive full credit all your answers should be carefully justified. Each solution must be the student's own work. Assistance should be sought or accepted only from the course staff. Any violation of this rule will be dealt with harshly.

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1. Problem 6 on page 68 of the Kleinberg-Tardos book.

2. Solve the following recurrences using the method of expansion (iteration). You may want to check your answers using the Master method whenever possible. For all recurrences, assume that $T(n)$ is a constant for $n \leq 2$ and n is an exact power of 2.

A. $T(n) = T(n/2) + n$

B. $T(n) = 2T(n/2) + 2n$

C. $T(n) = T(\sqrt{n}) + 1$

D. $T(n) = 2T(n-1) + 1$

3. Solve the following recurrences using the Master method or indicate that it cannot be solved using the Master method.

A. $T(n) = 4T(n/2) + n$

B. $T(n) = 3T(n/2) + n \lg n$

C. $T(n) = T(n/3) + n$

D. $T(n) = 9T(n/3) + n^{2.5}$

E. $T(n) = 2T(n/2) + n \lg n$

F. $T(n) = 8T(n/2) + n^3$

4. The input is a set S of n real numbers, and a real number z.

(a) Design $\theta(n \lg n)$ algorithm to determine whether or not there are two elements in S whose sum is exactly z.
(b) Suppose now that the set S is given in a sorted order. Design an algorithm to solve this problem in linear time.