Fall 1996 **CMSC 251: Homework 3** Samir Khuller

Due in class: Oct 1.

(1) Describe in pseudo-code a procedure for implementing "Three-Way-Merge-Sort". We divide the input into three (approximately) equal size pieces, sort each one recursively and then merge them.

Write a recurrence for $T(n)$ that is the worst case running time for this algorithm. Solve the recurrence by expansion.

(2) Prove the first three transitivity properties on page 30 (for Θ, O, Ω).

(3) Suppose we have two algorithms A and B. The running time of A is $3n^2 + f(n)$ where $f(n)$ is a linear function in n. The running time of B is $20n \log n + 3n + 6$. Explain clearly why it is not important to explicitly know what the function $f(n)$ is when we want to compare the asymptotic behaviour of the two algorithms.

Under what conditions do we really need to know function $f(n)$ to compare the running times of the two algorithms.

(4) Problem 1.3-7 (page 16).