

CS 3510: Design and Analysis of Algorithms
Fall 2008

Home work 1 // Due: Friday, August 29, 2008

1. (20 points) This is from exercise 0.4, pages 9-10 of the text.
Do parts (a) (0 points), (b) (5 points), (d) (5 points), and (e) (10 points).
For parts (d) and (e), assume (c).
For part (e), assume that $M(n) = \Theta(n^a)$, where $1 \leq a \leq 2$.
2. (5 points) Exercise 2.4, page 71 of the text.
3. (10 points) Exercise 2.23 (b), page 75 of the text.
4. (15 points) Exercise 2.27 (a), (b), page 76 of the text.

5. (15 points)

We are given a sequence of n distinct numbers a_1, \dots, a_n . Recall that an inversion is a pair (i, j) with $i < j$ and $a_i > a_j$. Call a pair (i, j) a *significant inversion* if $i < j$ and $a_i > 2a_j$. Give an $O(n \log n)$ algorithm to count the number of significant inversions in an input sequence.