

# CSE548/AMS542 Fall 2007 Analysis of Algorithms

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Due in class on Friday, Oct. 19th. Each problem (including the extra credit problem) has a maximum of 10 points. (i) You write down the solution clearly. If we can not recognize your writing then you may lose points. (ii) Avoid too many details. A succinct and clean proof is the best. You may use the algorithms we covered in class without referring to the details. (iii) If you discuss some of the problems with other fellow students (at most 3 students per group), write down their names and the problems. If you consult any books/webpages, cite them.

## Homework 4

1. Textbook (Kleinberg & Tardos), page 246, problem 2, 3, 5, 6, 7.
2. Solve recurrences. Give the asymptotic order in big- $\Theta$  notation.
  - (a)  $T(n) = 5T(n/3) + n^2$ .
  - (b)  $T(n) = T(2n/7 + 8) + T(n/3) + n$ .
  - (c)  $T(n) = T(n - 2) + 5/n^2$ .
3. Consider the problem of selecting both the minimum and maximum of  $n$  given numbers using comparisons. The naive solution would be to first find the minimum and the maximum, therefore using nearly  $2n$  comparisons. Now, find an algorithm to find the minimum and maximum with  $\leq 3\lceil n/2 \rceil$  comparisons.
4. (Extra credit) Show in the previous question that any comparison based algorithm will use at least  $\lceil 3n/2 \rceil - 2$  comparisons.

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