Homework 3

Instructions

1. Please review the grading policy outlined in the course information page.

2. You must also write down with whom you worked on the assignment. If this changes from problem to problem, then you should write down this information separately with each problem.

3. Problem numbers (like Exercise 3.1-1) are corresponding to CLRS 4th edition. While the 3rd edition has similar problems with similar numbers, the actual exercises and their solutions are different, so make sure you are using the 4th edition.

Problems

1. (10 pts) Exercise 8.1-3.

2. (15 pts) (3rd edition) Exercise 8.1-4. Suppose that you are given a sequence of n elements to sort. The input sequence consists of n/k subsequences, each containing k elements. The elements in a given subsequence are all smaller than the elements in the succeeding subsequence and larger than the elements in the preceding subsequence. Thus, all that is needed to sort the whole sequence of length n is to sort the k elements in each of the n/k subsequences. Show an $\Omega(n \log k)$ lower bound on the number of comparisons needed to solve this variant of the sorting problem. (Hint: It is not rigorous to simply combine the lower bounds for the individual subsequences.)

3. (5 pts) Exercise 8.2-1.

4. (5 pts) Exercise 8.2-6.

5. (5 pts) Exercise 8.3-1.

6. (10 pts) Exercise 8.3-3.

7. (5 pts) Exercise 8.3-5.

8. (20 pts) Exercise 9.1-1.

9. (15 pts) Exercise 9.3-7.

10. (10 pts) Exercise 9.3-9.

11. (20 pts) Exercise 9.3-10.

12. (10 pts) Exercise 8.4-3.

13. (Extra credit 10 pts) Problem 9-1.

14. (Extra credit 20 pts) Problem 8-1.

15. (Extra credit 20 pts) Problem 8.4.