

COMP 312
Assignment 3
Due at 9:00 am, Tuesday, March 1, 2011
All problems are of equal value.

Reading

Cormen, Leiserson, Rivest and Stein, Chapters 15 and 25.

Practice

CLRS, 15.1-2...5, 15.2-1...6, 15.3-1...6, 15.4-1...4, 15.5-1...3, 15-1, 15-3...12, 25.1-1...10, 25.2-1...9, 25-2.

To Be Handed In

1. CLRS, 15.4-5
2. CLRS, 15-2
3. We are given a $4 \times n$ checkerboard with 4 rows and n columns and a supply of pebbles (at least $2n$). Each square on the board has an integer written on it. We want to place the pebbles on the board so as to maximize the sum of the integers that are covered by pebbles under the constraint that no two pebbles are on adjacent squares. Adjacency is defined by sharing an edge, i.e., each square has 2 adjacent squares if it is a corner, 3 adjacent squares if it is on the side, and 4 adjacent squares otherwise. Describe an algorithm for finding the optimal placement of the pebbles. Analyze the running time of your algorithm.
4. CLRS, 25-1
5. You are given a weighted directed graph with no negative weight cycles. Give an algorithm for finding, for each pair of nodes in the graph, the number of different shortest paths connecting them. Analyze the runtime of your algorithm.