University of California
Santa Barbara
Department of Electrical and Computer Engineering

ECE 256A Fall 2007.

Homework #5.

1. Write project report #2.

You need to write the following:

a. Project title.
b. Project participants.
c. Statement of the problem.
d. Analysis of the problem.
e. Justification of assumptions and simplifications (if any).
f. Status of your work.
g. Explain what experiments you have done or you are planning to do.
h. Any conclusions you might have now.

I expect that this report #2 is at least 4 typed pages long, excluding pictures. Please, respond to all comments (if any) I made on your earlier report.

2. Cutting Stock problem

In a paper mill a manager has to decide how to cut 100-width wide paper rolls. There are orders for 4 different widths as follows:

Quantity Ordered	Order Width (inches)
97	45
610	36
395	31
211	14

When he cuts the 100 inch wide paper roll, he may cut it into one or more of the above order widths. He may, for example cut 2 pieces of 45 inches out of one roll. That will leave him with a 10 inch left-over piece.

Formulate the problem as an integer linear program where the objective function is to minimize the number of rolls that are cut. The constraints in the problem require that he cuts enough rolls to fulfill the orders that the mill has received. (You don’t have to solve the problem, just state the optimization problem and its constraints).

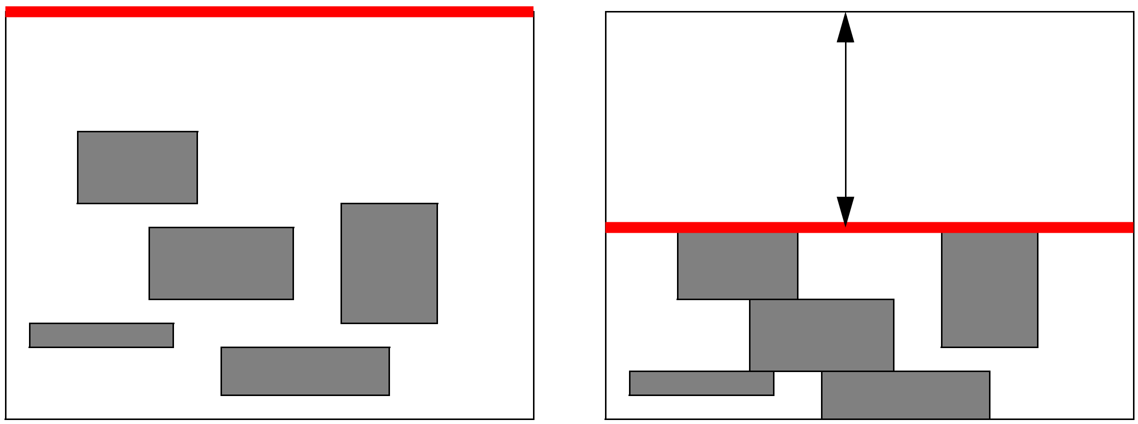
Suggested reading:

a. M.Fleischer, “Simulated Annealing: Past, Present and Future”, Proc. of the 1995 Winter Simulation Conference, pp. 155-161.

b. Ch.Papadimitriou, K.Steiglitz, “Combinatorial Optimization, Algorithms and Complexity”, Prentice Hall 1982, ISBN 0-13-152462-3.

3. Describe a simulated annealing based algorithm to partition a graph. Input: a graph G(V,E), output: V1, V2 such that $V_1 \cap V_2 = 0$, $V_1 \cup V_2 = V$, $\frac{\|V_1\|}{\|V\|} = \frac{1}{2} \pm \Delta$ and the number of edges (v_i, v_j) s.t. $v_i \in V_1$, $v_j \in V_2$ is minimized. Describe, what is the cost function, how it will be adapted and how would you adapt parameters.

4. Suppose that we have n non-intersecting rectangles placed inside a rectangular boundary shown in the figure:



The top boundary is movable and can be pushed down. The rectangles can move in vertical direction. Write an algorithm which determines how far the boundary can move. Make your algorithm as efficient as you can. The rectangles are specified by their bottom left coordinates, height and width.