CSL356 **Due on :** September 3, 2010

Homework II

1. You are given a line with n points, labeled 1 to n, marked on it. You are also given a set of intervals $I_1, \ldots, I_k$, where interval I_i is of the form $[s_i, e_i]$, $1 \leq s_i \leq e_i \leq n$. Find a set of points X of smallest cardinality such that each interval contains at least one point from X.

2. Give an $O(n)$ time algorithm to solve the knapsack problem discussed in the class.

3. You are given two sets X and Y of n positive integers each. You are asked to arrange the elements in each of the sets X and Y in some order. Let x_i be the i^{th} element of X in this order, and define y_i similarly. Your goal is to arrange them such that $\Pi_{i=1}^{n} x_i^{y_i} = x_1^{y_1} \times x_2^{y_2} \times \cdots \times x_n^{y_n}$ is maximized. Give an efficient algorithm to solve this problem. Prove correctness of your algorithm.