College of Computer & Information Science
Northeastern University
CSG399: Approximation Algorithms

Spring 2004
Handout 2
4 February 2003

Problem Set 2

1. In the *longest substring* problem, we are given a set of strings $S = \{s_1, \ldots, s_n\}$ and are asked to determine the longest string s that is a substring of all of the n strings. Is the longest substring problem solvable in polynomial time? Provide an answer by either giving a polynomial-time algorithm or proving that the problem is NP-complete.

2. Exercise 2.9.

3. Consider the following optimization problem called *rectangle covering*.

- **Instance:** A collection of rectangles $I = \{R_1, \ldots, R_n\}$ in the plane such that each rectangle is aligned with the axes; that is, all sides are horizontal or vertical. Note that the rectangles may overlap.
- **Solution:** A collection of points $P = \{p_1, \ldots, p_m\}$ in the plane such that each rectangle in I contains at least one point from P.
- **Goal:** Minimize $|P|$.

Provide the best approximation algorithm you can for the rectangle covering problem. Analyze the approximation ratio and the running time of your algorithm.

4. Exercise 7.1.

5. Exercise 6.2.