

## Problem Set 2

1. In the *longest substring* problem, we are given a set of strings  $S = \{s_1, \dots, s_n\}$  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  $I = \{R_1, \dots, R_n\}$  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  $P = \{p_1, \dots, p_m\}$  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.