

## Problem Set 10

**Due dates:** Electronic submission of this homework is due on **11/21/2017 before 11:00am** on ecampus, a signed paper copy of the pdf file is due on **11/21/2017** at the beginning of class.

**Name:** (put your name here)

**Resources.** (All people, books, articles, web pages, etc. that have been consulted when producing your answers to this homework)

On my honor, as an Aggie, I have neither given nor received any unauthorized aid on any portion of the academic work included in this assignment. Furthermore, I have disclosed all resources (people, books, web sites, etc.) that have been used to prepare this homework.

**Signature:** \_\_\_\_\_

Read Chapter 34 in our textbook.

**Problem A.** Solve the following subproblems. Make sure that you solve these problems on your own and write the solutions in your own words.

**Problem 1.** (15 points) Solve Exercise 34.2-1 on page 1065.

**Problem 2.** (10 points) Exercise 34.2-10 on page 1066. [Hint: Read Chapter 34.2 and make sure you understand the definition of co-NP.]

**Problem 3.** (15 points) Exercise 34.4-6 on page 1086.

**Problem 4.** (20 points) A partial Latin square of order  $n$  is an  $n \times n$  array in which each entry is either empty or contains an element from  $[n] = \{1, \dots, n\}$ . Each row and each column contains each element from  $[n]$  at most once. Colburn showed that the problem to decide whether a given partial Latin square can be completed to a Latin square is NP-complete. Given this fact, show that

- (a) the problem to decide whether a given  $n \times n$  Futoshiki problem can be solved is NP-complete.
- (b) the problem to decide whether a given  $n^2 \times n^2$  Sudoku problem can be solved is NP-complete.

**Problem 5.** (20 points) Exercise 34.5-2 on page 1100.

**Problem 6.** (20 points) Exercise 34.5-5 on page 1101 [Hint: Reduce SUBSET SUM to SET PARTITION.]

Discussions on piazza are always encouraged, especially to clarify concepts that were introduced in the lecture. However, discussions of homework problems on piazza should not contain spoilers. It is okay to ask for clarifications concerning homework questions if needed.

**Checklist:**

- Did you add your name?
- Did you disclose all resources that you have used?  
(This includes all people, books, websites, etc. that you have consulted)
- Did you sign that you followed the Aggie honor code?
- Did you solve all problems?
- Did you submit the pdf file resulting from your latex file of your homework?
- Did you submit a hardcopy of the pdf file in class?