

## Problem Set 8

**Due dates:** Electronic submission of this homework is due on **11/20/2018 before 11:00am** on ecampus, a signed paper copy of the pdf file is due on **11/20/2018** 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.]

Make sure that you write the solutions in your own words!

**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?