
csce750 — Analysis of Algorithms
Fall 2019 — Homework 08

Assigned: December 3

Due: never

This optional assignment covers material from the lectures from Chapter 34 and 35, in preparation for the final exam. Solutions to some of these problems will be posted shortly before the final exam.

Page 1060: Exercise 34.1-1, 34.1-6

Page 1065: Exercise 34.2-1, 34.2-3

Page 1077: Exercise 34.3-2

Page 1086: Exercise 34.4-6

Not in book: Show, using a reduction from VERTEX COVER, that CLIQUE is NP-hard. (The CLIQUE problem is defined in Section 34.5.)

Not in book: Consider this problem:

KARP-LETTERS:

Instance: A list of strings of varying lengths, consisting of upper- and lower-case letters.

Question: Is there a way to select a letter from each string without choosing both versions of any letter?¹

Either prove that $\text{KARP-LETTERS} \in P$, or prove that KARP-LETTERS is NP-complete. (Hint: Only one of these options can be completed correctly.²) For an NP-completeness proof, you may reduce from any problem identified as NP-hard in the lecture or in either textbook.

Page 1103: Problem 34-3

Exercise 35.1-1

Exercise 35.2-5

¹For example, if the input strings are 'Abc', 'BC', 'aB', and 'ac', the correct answer is 'Yes', because we can choose 'A' from the first string, 'B' from the second, 'B' from the third, and 'c' from the fourth. If the strings are 'AB', 'a', and 'b', then the correct answer is 'No'.

²...unless $P = NP$.