

Analysis of Algorithms
CS 376, Fall 2020

Problem Set 7

Due **BY THE BEGINNING OF CLASS** Monday, November 23

Please submit this assignment in a file named CS376_PS7_<YourName>.pdf.

- From CLRS, please read Ch. 34.
- As usual, there may be deductions for excessively inelegant solutions (e.g., algos, proofs) to exercises. Answers do not need to be optimally elegant for full credit, but when an excessively inelegant answer misses some central concepts that would result in a cleaner solution, there is room for improvement to the answer, which may entail a deduction. Please feel free to ask me questions about this and how it might apply to your specific HW solutions!
- *A general note for CS376:* When writing up your homework, please write neatly and **explain your answers clearly**, giving all details needed to make your answers easy to understand. Clear communication *is* the point, on every assignment.

In general in CS376, unless explicitly specified otherwise, answers should be accompanied by explanations; as part of this, in general, when you present an algorithm, give an accompanying correctness argument (i.e., proof). Answers without explanations may not receive full credit. Please feel free to ask me any questions about explanations that might come up!

Exercises

1. CLRS 34.2-6 (pg. 1066).
2. CLRS 34.5-6 (pg. 1101).

Optional Exercises

The following exercises **are not to be submitted!** They are purely optional exercises, for those looking to build their algorithm design and analysis skills a little more. If you do work on these exercises, though, I'll be happy to talk with you about them, just let me know!

1. CLRS 34.2-7 (pg. 1066).
2. (a) DNF-SAT is the problem of given a boolean formula in Disjunctive Normal Form (see CLRS pg. 1083), decide if it is satisfiable. Show that DNF-SAT is in P .
(b) Show how to convert any formula that is in CNF to an equivalent formula in DNF.
(c) What is wrong with the following proof that $P = NP$? By part (b) we have that CNF-SAT reduces to DNF-SAT. Since CNF-SAT is NP -complete we have that DNF-SAT is NP -complete (by Lemma 34.8). But by part (a) DNF-SAT is in P and therefore $P = NP$ (by Theorem 34.4).