COMP170 Fall 2018, HW 10

Due Tuesday November 20th, 12:00pm

Submit via: Gradescope

Please limit each solution to one page whenever possible. You are allowed to consult your textbook and class notes for guidance, but you are not allowed to cruise the internet at large for solutions.

Problem 1

Consider the following language:

\[ \text{DOUBLE-CLIQUE} = \{ (G, k) \mid G \text{ has at least 2 cliques, each of size greater than or equal to } k \} \]

Prove that DOUBLE-CLIQUE is NP-Complete.

Problem 2

For any \( k \), the language \( k \)-COLOR is defined to be the set of (undirected) graphs whose vertices can be colored with at most \( k \) distinct colors, in such a way that no two adjacent vertices are colored the same color. Prove that 4-COLOR is NP-Complete.

Problem 3

“A little bit of everything” 3SAT is the problem of determining whether a boolean formula in conjunctive normal form (having exactly 3 literals in each clause) is satisfiable such that at least one clause has all three literals evaluate to true, at least one clause has exactly two literals evaluate to true, and at least one clause has exactly one literal true.

Prove that “A little bit of everything” 3SAT (LBE) is NP-complete, do a reduction from 3SAT.