The assignment is due next Monday, December 5, before class.

Solve the following exercises from the textbook; note that the book distinguishes between problems and exercises.

1. Make sure that you fully understand the problems SAT, 3-CNFSAT=3-SAT, CLIQUE, VERTEX-COVER, HAM-CYCLE, TSP, SUBSET-SUM, INDEPENDENT SET (cf. Problem 34-1), \( k \)-COLOR (cf. Problem 34-3).

2. Let \( \phi \) be a boolean formula in 3-CNF. An \( \neq \)-assignment to the variables of \( \phi \) is one where each clause contains two literals with unequal truth values. In other words, an \( \neq \)-assignment satisfies \( \phi \) without assigning three true literals in any clause.

   (a) Show that the negation of a \( \neq \)-assignment to \( \phi \) is also a \( \neq \)-assignment.
   (b) Let \( \neq \)SAT be the collection of boolean formulas in 3-CNF that have an \( \neq \)-assignment. Show that \( 3-\text{SAT} \leq_p \neq \text{SAT} \), and that \( \neq \text{SAT} \) is NP-complete. [Hint: Replace each clause \((y_1 \lor y_2 \lor y_3)\) by two clauses \((y_1 \lor y_2 \lor z_i)\) and \((\neg z_i \lor y_3 \lor b)\), where \( z_i \) is a new variable for each clause and \( b \) is a single additional new variable.]

3. Problem 34-3 d,e,f (that is, prove that 3-SAT \( \leq_p \) 3-COLOR).

4. Problem 34-1

   Make sure that you structure your answers well. Please typeset your solutions in \LaTeX{} or turn in a neatly written solution.