Please typeset your answers.

1) (Exercises 34.2-9 and 10) Prove that $P \subseteq \text{co-NP}$. Use this result to show that if $NP \neq \text{co-NP}$, then $P \neq NP$.

2) (Exercise 34.2-7) Show that the Hamiltonian-path problem can be solved efficiently on directed acyclic graphs. Give an efficient algorithm for the problem.

3) Show that given an undirected graph whose edge connectivity is 2, finding a subgraph with the least number of edges whose edge connectivity is 2 is NP-complete.

4) (Exercise 34.5-5) The set-partition problem takes as input a set $S$ of numbers. The question is whether the numbers can be partitioned into two sets $A$ and $A' = S - A$ such that $\sum_{x \in A} x = \sum_{x \in A'} x$. Show that the set-partition problem is NP-complete.

5) (Exercise 34.5-8) In the half 3-CNF satisfiability problem, we are given a 3-CNF formula $\phi$ with $n$ variables and $m$ clauses, where $m$ is even. We wish to determine whether there exists a truth assignment to the variables of $\phi$ such that exactly half the clauses evaluate to 0 and exactly half the clauses evaluate to 1. Prove that the half 3-CNF satisfiability problem is NP-complete.