1. What is the definition of Co-NP?
2. Assume that P ≠ NP and NP ≠ Co-NP. Is the Validity Problem for Propositional Logic NP-complete? Explain.
3. Give a polynomial-time reduction from the Hamilton Cycle Problem to the Subgraph Isomorphism Problem (described in exercises 0921).
4. Suppose that a particular university chooses a set of classes to offer in a given term and has time slots in which to schedule classes. Each student selects a set of classses that he or she wants to take.

The Class Scheduling Problem (CSP) is the following decision problem.

**Input.** Positive integer , set of classes , and list of sets where is the set of classes that student wants to take.

**Question.** Does there exist a way to schedule classes into time slots so that no student wants to take two classes that are assigned to the same time slot?

* 1. Prove that CSP is in NP by giving a polynomial-time evidence checker for CSP.
  2. Give a polynomial-time reduction from the Graph Coloring Problem (GCP) to CSP. (**Hint.** Think about what corresponds to a vertex, what corresponds to an edge and what corresponds to a color.)