1. What is the definition of an NP-complete problem?
2. Does there exist a decision problem that is not in P $∪$ NP? Justify your answer.
3. Show that DOUBLE-SATPL $\leq \_{p}$ SAT. You are not required to give a polynomial-time mapping reduction from DOUBLE-SATPL to SATPL. But give an air tight argument that such a mapping reduction must exist. (DOUBLE-SATPL is defined in exercise set 0911.)
4. Let $A$ be the set of all natural numbers that are prime. Does there exist a polynomial-time mapping reduction from $A$ to SAT?

1. Suppose $B$ is in NP and $A$ is NP-complete and $A \leq \_{p}B. $Can you conclude that $B$ is NP-complete?
2. Suppose that $A$ is NP-complete and $A ⊆B$. Can you conclude that $B$ is NP-complete? Justify your answer.