1. What is the definition of a polynomial-time mapping reduction from language $A$ to language $B$?
2. What is the definition of notation $A \leq \_{p}B$?
3. Suppose that $A \in $ P and $A \leq \_{p} B$. Can you conclude that $B \in $P?
4. Suppose that $B \in $P and $A \leq \_{p} B$. Can you conclude that $A \in $ P?
5. Suppose that P = NP. Show that, for every $A \in $NP, $A \leq \_{p} \left\{1\right\}.$
6. Give an example of a decision problem that is not in NP. Justify your answer.
7. SATPL is the following decision problem.

**Input.** A propositional formula ϕ.

**Question.** Does there exist a truth-value assignment $a$ that makes ϕ true? That is, is it possible to choose values for the propositional variables in ϕ so that ϕ is true?

Show that SATPL $\leq \_{p}$ DOUBLE-SATPL by giving a polynomial-time mapping reduction from SATPL to DOUBLE-SATPL. (DOUBLE-SATPL is defined in exercise set 0911.) (**Hint.** Add an extra variable.)