1. What is the definition of NP?
2. Is { } in NP?
3. Suppose that $Σ$ is an alphabet. Is $Σ^{\*}$ in NP?
4. A *bijection* is a function that is one-to-one and onto. Two simple graphs $G=(V,E)$ and $H=(W,F)$ are *isomorphic* if $\left|V\right|=\left|W\right|$ and there is a bijection $f :V \rightarrow W$ such that, for every pair of vertices $a$ and $b$ in $V$, $\left\{a,b\right\}\in E \leftrightarrow \left\{f\left(a\right), f\left(b\right)\right\}\in F$. The *Graph Isomorphism Problem* (GIP) is the following decision problem.

**Input.** Simple graphs $G$ and $H$.

**Question.** Are $G$ and $H$ isomorphic?

Show that GIP is in NP.

1. Let DOUBLE-SATPL be the following decision problem.

**Input.** A propositional formula ϕ

**Question.** Do there exist two different truth-value assignments $a$ and $b$ that both make ϕ true?

Show that DOUBLE-SAT is in NP.