1. The problem SET-COVER asks, given a collection $S_1, \ldots, S_n$ of sets whose union is U, and a natural number k, does there exist a subcollection of at most k of the sets whose union is U?

Instance: Sets $S_1, \ldots, S_n$, and $k \in \mathbb{N}$
Question: Does there exist $C \subseteq \{1, \ldots, n\}$ s.t. $|C| \leq k$ and $\bigcup_{i \in C} S_i = \bigcup_{i=1}^{n} S_i$?

Prove that SET-COVER is **NP**-complete.

2. An independent set in a graph $G = (V, E)$ is a subset $I \subseteq V$ of vertices such that there are no edges between vertices in I, i.e. for all $u, v \in I$, $\{u, v\} \notin E$. The INDEPENDENT-SET decision problem is defined below.

Instance: A graph $G = (V, E)$, and $k \in \mathbb{N}$
Question: Does G have an independent set of size k or larger?

Prove that INDEPENDENT-SET is **NP**-complete.

3. Prove that CLIQUE is **NP**-complete.