Reading Material

We will talk about polynomial time reductions between problems and the complexity classes P and NP. You should read KT Chapter 8:

- section 8.0
- section 8.1
- section 8.3 (except the proof of 8.10)
- section 8.4 (only the introduction and the subsection A General Strategy for Proving New Problems NP-Complete).

Exercises

1. **NP**  Solve exercise KT 8.1.

2. **Customer Analysis**  Solve exercise KT 8.2.

3. **Summer Camp**  Solve exercise KT 8.3.

4. **Resource Reservation**  Solve exercise KT 8.4.

5. **Clique**  For an undirected graph $G = (V, E)$ a clique is a subset $V' \subseteq V$ of the vertices such that all vertices in $V'$ are neighbors, i.e., for all $v, w \in V'$, $y \neq w : (v, w) \in E$. We say that $G$ has a $k$-clique if $|V'| = k$.

Consider the following problem:

**Input:** An undirected graph $G = (V, E)$ and a natural number $k$.

**Output:** YES if the graph $G$ has a $k$-clique, and NO otherwise.

5.1 Show that Clique set is in NP.

5.2 Show that Clique is NP-complete by giving a reduction from Independent Set.