1. Problem 2.8 in Textbook (25 points).

2. Problem 2.10 in Textbook (25 points). You may use either definition of NP.

3. (25 points) Show that, if $P = NP$, then every language $A \in P$, except $A = \emptyset$ and $A = \Sigma^*$, is NP-complete. Here $\Sigma$ is the alphabet, and you may assume that it is $\{0, 1\}$.

4. (25 points) A subset of the nodes of a graph $G$ is a dominating set if every other node of $G$ is adjacent to some node in the subset. Let

$$DOMINATING\text{-}SET = \{(G, k)|G \text{ has a dominating set with } k \text{ nodes}\}.$$

Show that it is NP-complete by giving a reduction from $VERTEX\text{-}COVER$. 