1. Suppose you have algorithm $A_1$ with worst-case running time bound $p(n)$ and algorithm $A_2$ with worst-case running time bound $q(n)$. Suppose algorithm $A_3$ consists of applying $A_2$ to the output of $A_1$. Give a worst-case time bound for $A_3$.

2. Show that 3-SAT problem is in NP appealing to the definition of the NP class.

3. Finding a vertex cover of a graph, is a problem of finding a set of vertices of minimum size such that each edge in the graph is covered with at least one vertex. Formulate a decision version of the vertex cover problem.

4. Suppose $A$ and $B$ are two different decision problems and furthermore assume that problem $A$ is polynomial-time reducible to problem $B$. If problem $B$ is NP-complete, is problem $A$ NP-complete? Justify your answer.