1. Show that any problem in $NP$ that has nondeterministic time complexity $O(f(n))$ can be solved deterministically in $O(f(n)c^f(n))$ time for some constant $c$.

2. Prove that if $A$ is $NP$-hard, $B$ is $NP$-complete and $A \leq_P B$, then $A$ is $NP$-complete.

3. Given a boolean formula $\phi$, prove that the problem of deciding whether there exists a variable assignment so that $\phi$ evaluates to false is $NP$-complete.

4. Show that the following is a 2-approximation algorithm for traveling salesman problem with triangle inequality: find a minimum spanning tree, perform a full traversal on the tree and keep exactly one arbitrarily chosen visit of each vertex in the traversal.

5. Show that the problem of finding an independent set of size $k$ in an undirected graph with each of its $n$ vertices incident to at least $n - c$ edges is fixed-parameter tractable for a given constant $c$. 