1. Argue that the problem of finding a minimum spanning tree in an undirected weighted graph is in P.

2. Sketch an explicit (nondeterministic, polynomial) construction to show that the bounded tiling problem is in NP.

3. Let $\Sigma = \{a, b\}$. The TM $M$, with $F = \{q_f\}$, is defined by:
   \[
   \begin{align*}
   \delta(q_0, a) &= (q_0, a, R) \\
   \delta(q_0, b) &= (q_1, b, R) \\
   \delta(q_1, a) &= (q_0, a, R) \\
   \delta(q_1, b) &= (q_f, b, L)
   \end{align*}
   \]
   (a) Transform the question whether string $abb$ is in $L(M)$ into an instance of the bounded tiling problem.
   (b) Show, by applying the transition function of $M$ to the tape, that $abb \in L(M)$.
   (c) Transform this computation of $M$ on input string $abb$ into a solution for the corresponding instance of the bounded tiling problem.

4. Argue that P is closed under complement, union and intersection.

5. Argue that NP is closed under union and intersection.
   Also explain why the proof that P is closed under complement does not carry over to NP.

6. Suppose that some NP-complete language $L_1$ is polynomial-time reducible to $L_2 \in$ NP. Argue that $L_2$ is also NP-complete.

7. Is it possibly impossible to determine whether P = NP holds?