Lab 14

1. Show that TSP is NP-complete. (Hint: use the relationship between TSP and HamiltonianCycle discussed in the slides. You may assume that the HamiltonianCycle problem is NP-complete.)

2. True/False. Explain.
   a. If Problem A is polynomial reducible to B and A is in NP, then B is in NPH.
   b. If Problem A is polynomial reducible to Problem B, then B is polynomial reducible to A.
   c. If someone can find a polynomial time algorithm to solve one of the NP-Complete problems, then all NP-complete problems can be solved in polynomial time.
   d. Suppose A is an NP-complete problem and A is polynomial reducible to B. Then B is also NP-complete.

3. Show that the worst case for VertexCoverApprox can happen by giving an example of a graph G which has these properties:
   a. G has a smallest vertex cover of size *s*
   b. VertexCoverApprox outputs size 2*s as its approximation to optimal size.

4. The decision problem formulation of the Vertex Cover problem is this: Given a positive integer *k*, and a graph *G*, is there a vertex cover for *G* having size $\leq k$? Show that this decision problem belongs to *NP*.