

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. Below is another variation of the Knapsack problem.
Given a set $S = \{s_0, s_1, \dots, s_{n-1}\}$ of items, weights $\{w_0, w_1, \dots, w_{n-1}\}$, values $\{v_0, v_1, \dots, v_{n-1}\}$, a max weight W , and a min value V , find a subset T of S whose total value is no less than V and total weight is at most W .

Show that the SubsetSum problem is polynomial reducible to this Knapsack problem.

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 *NPPat* Adrian Limosnero.