CS 3511: Algorithms Honors, Homework 8

Instructor: Prof. Merrick Furst
TAs: Karthik Gopalakrishnan, Pranathi Reddy Tupakula, Jiachen Li

1   Longest Cycle

(10 points) The LONGEST CYCLE problem is defined as follows: Given an undirected graph $G = (V, E)$, find the length of the longest simple cycle in G. Write the decision version of this optimization problem and show that it is NP-complete using reduction from HAMILTONIAN CYCLE, which is a known NP-complete problem of finding whether there exists a simple cycle that visits all vertices in G.

2   Dominating Set

(10 points) The DOMINATING SET problem is defined as follows: Given an undirected graph $G = (V, E)$, find the smallest subset $V^* \subseteq V$ such that every vertex in $V - V^*$ is adjacent to at least one vertex in V^*. Write the decision version of this optimization problem and show that it is NP-complete using reduction from a known NP-complete problem.