CS 101 Fall 2020 - Quiz 12-B

12/24/2020 - 20 Minutes **Name:** **ID number:**

Problem 1(4×2pts): Follow the below steps, show that this problem is in NP:

Given a set of n cities, and distances between each pair of cities, is there a path visit each city exactly once, and the path has distance at most D, for a given D?

Part(A): Construct the verifier.

Part(B): Briefly explain how your verifier works.

Part(C): Show that the verifier works in polynomial time.

CS 101 Fall 2020 - Quiz 12-B

12/24/2020 - 20 Minutes **Name:** **ID number:**

Problem 2(7pts): Reduction

For the below problem, choose an NP-complete problem A and for any A instance, construct an instance of the below problem. **You need to ensure the yes/no answers to the two instances are the same, but you do not need to prove it.**

We have 3-coloring problem in class and we've also reduced 3-coloring problem to 4-coloring problem in homework. Now consider 6-coloring problem: Given an undirected graph G, can the nodes be colored in 6 colors so that no adjacent nodes have the same color? Please reduce 4-coloring problem to 6-coloring problem.