AE 5222 – Optimal Control of Dynamical Systems

Homework Submission Cover Page and Statement of Academic Honesty

I, John O'Neill, submit the solution to Homework Problem 9.

My signature below affirms that all of the writing in this submission is my own work. Any reference material that I used to prepare this submission, including text or video resources, but excluding the lecture notes and videos provided on the Canvas site for this course, is properly cited.

To prepare this submission:

■ I verbally collaborated with the following individuals (excluding *Piazza* discussions):

Currently enrolled in AE 5222: Evan Kelly

Not currently enrolled in AE 5222: _____

☐ I did not verbally collaborate with any other individual.

This submission reflects my individual effort and my own understanding of the course content.

I have read and I understand WPI's Academic Honesty Policy, and my conduct in preparing this submission has been in accordance with this Policy.

Signature: _____ **Date:** 04/21/2019

Jack O'Neill
AE 5222
Homework 9

Method

To determine the optimal path of the traveling salesman problem I took on the "brute force" mentality and generated a permutation matrix of all possible city combinations. Since the salesman needed to return to the starting city I added a sixth "stop" which is that path's starting city. There are 120 possible paths. Using the provided distance table I was able to determine the total driving distance of each path, then find the path with the minimum cost.

Results

The optimal sequence of cities the salesman should follow is shown below:

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Buffalo, Albany, Boston, New York, Providence, Buffalo
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This path was calculated using the distance table, along with the assumption that the salesman must always return to the starting city. The cost of this sequence is **1064 miles**.

Discussion

The "brute force" method I used to determine the minimum path was acceptable in this case since the number of nodes was not high. Since the number of possible paths would increase factorally as the number of cities increases, a larger number of nodes would have forced me to use a more efficient method of calculating the path with the minimum cost. Dijkstra's algorithm would have been another way to calculate the minimum cost path, but since the number of cities was low enough I could get away with taking the "brute force" approach.