<u>**Project Proposal**</u>

Names of Members: Rick Kabuto and Ethan Bown

Project Title: Comparing the efficiency of the Edmonds-Karp to the Dinic's Algorithm

Project type #3: Combine existing algorithms or compare different algorithms with implementation for solving a practical problem.

Topic (or algorithm) you want to address & what you want to accomplish: The topic that we want to discuss revolves around comparing the performance of the Edmonds-Karp and Dinic's algorithms when solving the network maximum flow problem. Maximum flow refers to the greatest path from a source node S to a sink node T in a flow network without violating any capacity constraints on the edges. Solving this type of problem can be helpful for solving transportation and traffic flow optimization such as finding the highest number of vehicles that can move from one point to another without congestion. Another real world use for this algorithm is through data and telecommunications networks, specifically in finding the maximum way to transfer data from a source to a destination. From this, these algorithms are fundamental in network flow optimization, with each algorithm being efficient in their certain scenarios. Our goal is to understand and compare each algorithm to find the optimal case when to use either one. One example application to compare these algorithms concerns modeling a car traffic problem in a real world scenario and finding the maximum number of cars from a starting to an ending destination with the least congestion possible. Through this example, we would be adjusting the variables such as the number of cars or roads. These changes will illustrate how each algorithm performs under certain conditions, emphasizing the strengths and weaknesses of the respective methods. From this experimentation, we can better understand how to apply different algorithms to solve real world problems.

Role Specification:

Ethan:
- Will implement Dinic's algorithm
- Will write first three pages of report

Rick:

- Will implement Edmonds-Karp algorithm
- Will do the last page and review the paper report
- Will do the slides

References (May add more later):

https://jeffe.cs.illinois.edu/teaching/algorithms/book/11-maxflowapps.pdf

https://en.wikipedia.org/wiki/Edmonds%E2%80%93Karp_algorithm

https://en.wikipedia.org/wiki/Dinic%27s_algorithm