3201 Final Project Proposal

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Our project will involve an evolutionary algorithm with the following design:

Representation	Permutations: individuals are a list containing city objects, and the order of those cities determines the order they will be visited.
Fitness	Calculated distance sum between each successive city. The goal will be to minimize fitness.
Recombination	Order Crossover - has 100% chance to occur among "fit" individuals
Mutation	Random Swap (may be applied heuristically) - has a 10% chance to mutate
Parent Selection	Tournament Selection
Survival Selection	Mu + Lambda
Population Size	100
Number of Offspring	50 offspring generated, 2 offspring generated per 2 parents
Initialization	Random
Termination Condition	Stagnant for 50 Generations or (number of cities)*10 generations pass

Task Management

Member	**Task**
George Neonakis	Parent Selection, Advanced Techniques Research, Project Planning.
Elliot Moors	Fitness Evaluation, Mutation, Optimization.
Scott Jennings	Code Structure, Crossover Implementation, Writing.

Our advanced technique will be the implementation of a fitness sharing, or "niching" mechanism. This technique groups sub-permutations of a given solution together if their combined fitness exceeds a certain threshold, and preserves these niches (note that swap mutation may be applied within a niche, but will not break the niche). This serves to maintain pieces of the overall path that are more optimal than others, and as an added benefit, helps to optimize runtime. We will further this optimization effort by storing sub-path fitnesses for later reuse to avoid redundant calculations.