ME 538: Homework Set 3
Due Nov 17th, 2014 at 11:59pm
Traveling Salesman Problem

In this homework, you will solve the traveling salesman problem with both A* and an evolutionary algorithm.

Problem definition: a salesman has a set of cities $X=\{x1,x2,...,xN\}$ which must each be visited exactly once. The salesman starts at city $x1$, and must choose a path which results in each city being visited, while minimizing the total distance traveled. Distance between cities is calculated as the standard Euclidian distance. City locations are defined in cities1.csv and cities2.csv.

Homework tasks:
You will solve the traveling salesman problem for two sets of cities, given in the csv files on the course website. Cities1.csv contains locations 10 cities, while cities2.csv contains locations for 20 cities.

1) For the 10 cities case, how many possible routes are there? What about for 20 cities?
2) Implement an A* search algorithm to solve the traveling salesman problem, for both 10 and 20 cities. Comment on the speed of the algorithm as compared to an exhaustive search.
3) Implement an evolutionary algorithm to evolve paths, for both 10 and 20 cities. What is the computational time compared to A*? What about performance? What are the key tradeoffs/differences between A* search and an evolutionary search? What influence does the choice of mutation operator have on performance?