ROB 537
Learning Based Control
Fall 2017
HW #2: Search and Optimization
Due 10/16

Use your favorite programming language to implement three search methods:

   a- Simulated annealing
   b- An evolutionary algorithm
   c- An algorithm from class notes or a variant you devise

You will use each of the search algorithms to solve the Traveling Salesman Problem (TSP) where the number of cities and city locations are given in the zipped file *Homework/hw2.data.zip*. There are four data files. The first line in each data file is the number of cities for the problem. The other lines are the coordinates of each city on a grid where the left bottom is (0,0).

First, for each of the city configurations, compute the city to city distance matrix.
For your report:

1- Solve the 15 city TSP problem (*15cities.csv*) using the three algorithms mentioned above. Precisely describe each algorithm you used and your experimental methodology. For all your experiments, record the run time, solution quality and repeatability of each approach (solve the problem at least 10 times and provide statistical results).

2- Repeat the process for data sets *25cities.csv* and *100cities.csv*, and discuss your results.

3- Repeat the experiments for the *25cities.csv*_A. Compare and discuss the results for the two different 25 city problems. Plot the two sets of cities on a map and discuss the impact of city distribution on your results.

4- For all four data sets, how many "solutions" did your algorithms generate during their searches? How many solutions are there for the 15, 25 and 100 city problems? How did the percentage of states searched change as the size of the problem grew? Use tables and/or plots to support your arguments.