

# Homework 08

General comments:

- Do not forget to run some test cases.

## Problem 1 (5 points)

Modify the provided traveler salesman combinatorial algorithm to solve a slightly different problem. You are looking for the shortest route which goes through all cities, while it starts and ends in the same city (the first one), i.e. the close loop route.

Coordinates of cities are provided in the 'cities\_for\_combinatorial\_search.dat' file: the first column of the data file is 'x' coordinate and second one contains 'y' coordinates. The coordinates of the beginning/end route city are in the first string.

What is the sequence of all cities in the shortest route?

What is the total length of the best route?

Provide a plot with visible cities and the shortest route.

## Problem 2 (10 points)

Implement the Metropolis algorithm to solve the above problem. A good way to obtain a new test route is to randomly swap two cities along the route. Tweak the algorithm number of cycles, initial and final temperature ( $kT$ ).

Compare this algorithm solution with the above combinatorial one.

Now load the cities coordinates from the 'cities\_for\_metropolis\_search.dat' file. Find the shortest route for this set of cities.

What is the sequence of cities in the shortest route?

What is the total length of the best route?

Provide a plot with visible cities and the shortest route.