Probabilistic Algorithms
Homework 4

P1. (100 points)

Implement the non-linear simplex (Nelder-Mead) algorithm for the function

$$L(\mathbf{d}) = \sum_{i=1}^{p/2} t_i^4 + \mathbf{d}\mathbf{B}\mathbf{d}^T,$$

where $\mathbf{d} = (d_1, ..., d_p) \in R^p$, p is an even number and $\mathbf{B}$ is a symmetric matrix with 1's diagonals and 0.5 elsewhere.

P2. (50 points bonus)

Consider a TPS instance defined by n nodes with coordinates $(x_i, y_i) \in R^2$ (see the file data131.txt on Moodle) where the distance between two nodes is given by the corresponding euclidian distance. Implement the following heuristic (denoted **Nearest neighbor**)

Step 1 . Select randomly a node i. Set $c = 1$ (the length of the tour). Set $\sigma(c) = i$ (the nodes of the tour).

Step 2 While $c < n$

  - Let be $j = \sigma(c)$ the last added node in the tour.

  - Select the closest neighbor of node j not yet added to the tour. Let be k this neighbor. Set $c = c + 1$ and $\sigma(c) = k$.

Represent graphically the cities and the solution generated by this heuristic.
Remark: to read the file, call MATLAB function `importdata('data131.txt')`