FOR14
Algorithms and computer programming with Python
Autumn 2018

Homework 2

The goal of this homework is to help you practice and test your understanding of the concept of data structures and some algorithmic approaches.
All the code to be delivered as part of this homework must be documented with comments explaining the steps you took.

Problem 1: Recall the example of a phone book discussed in the lecture 7. Use a Python dictionary to create a phone book that stores for each person the following: First name, Last name, Phone number, and Address.
For each of the following tasks create a function to add that functionality to your phone book:

- Add a new record to the phone book that avoids to add duplicates.
- Delete a record from the phone book using the combination First name and Last name.
- Check if a person is already in your phone book using the combination First name and Last name.
- Change a specific entry of a record, think of a friend changing the phone number or moving.
- List the people in your phone book ordered by First name.
- List the people in your phone book ordered by Last name.
- Check if there are records having the same phone number and list them.

Problem 2: Provide a python implementation of the following algorithms with detailed comments explaining how those algorithms work.

- A bubble sort algorithm that stops early if it finds that the list has become sorted.(see: Section 5.7 in http://interactivepython.org/runestone/static/pythonds/index.html)
- Selection sort (see: Section 5.8 in http://interactivepython.org/runestone/static/pythonds/index.html)
- Insertion sort (see: Section 5.9 in http://interactivepython.org/runestone/static/pythonds/index.html)

Probelm 3: Use the template file 'benchmark.py' posted in canvas to measure the average time that it takes to a particular implementation to sort a list, keep on mind that the list has to be big enough to have noticeable times. Compare the average times for the implementations you developed in Problem 2 and say which of your implementations works the fastest on average.