COMP 314: Algorithms and Complexity
Lab work 1: Sorting

1 Purpose

Implementation, testing and performance measurement of sorting algorithms.

2 Tasks

Students are required to accomplish the following tasks preferably in Python.

1. Implement the following sorting algorithms:

   (a) Insertion sort
   (b) Selection sort

2. Write some test cases to test your program.

3. Generate some random inputs for your program and apply both insertion sort and merge sort algorithms to sort the generated sequence of data. Record the execution times of both algorithms for inputs of different size. Plot an input-size vs execution-time graph.

4. Explain your observations.

3 Deliverables

Submit the following within two weeks:

1. Source code for Task 1, 2, and 3.

2. A short report for Task 3, and 4.

4 Readings

1. For sorting algorithms: Chapter 5 and 12 of Necaise, R. D. (2010). Data Structures and Algorithms Using Python.

2. For algorithm analysis and performance measurement: Chapter 1 of Horowitz et al. (2013). Fundamentals of Computer Algorithms.

3. For unit testing: `https://docs.python.org/3/library/unittest.html`, `https://realpython.com/python-testing/`