**CS 3450 – Data Structures and Algorithms**

**Final Assignment (250 points)**

Course instructor: Patrik Boloz

Deadline: 5/12/2023 by 11PM (uploaded to Brightspace)

This final assignment is to be completed as a report and any programming code is to be included in your final upload along with the report. The following numbered assignments are required to be completed in their entirety. Please read the instructions carefully and follow them to get the full number of points. Any code uploaded that does not successfully run will be considered incomplete and will result in only partial point assignment, which will depend solely at my discretion. **All your work will be considered as your own work, therefore any use of AI tools (like ChatGPT) or any straight up copying from the internet will be considered as cheating, resulting in 0 points for the whole assignment!**

1) Choose one of the following data structures in Python: linked list, queue, set, map (dictionary).

In one page, explain what your chosen data structure is, how it is used, what the running time (Big O) of searching and adding elements is, why is that the case, and show an example of the structure (created by you) in Python. Take a screenshot and include it with your explanation in the report. (80 points)

2) Choose one of the following sorting/selection algorithms: selection sort, insertion sort, radix sort, counting sort, bubble sort, heap sort, quick sort, merge sort, and bucket sort.

In one page, explain what your chosen sorting algorithm is, how it works, what the running time (Big O) is, why is that the case, and show an example of the implementation in Python. Take a screenshot and include it with your explanation in the report. (80 points)

3) Choose one of the graph traversal algorithms: depth-first search, breadth-first search, Dijkstra algorithm.

In one page, explain what your chosen traversal algorithm is, how it is used, what the running time (Big O) is, why is that the case, and show an example of the implementation in Python. Take a screenshot and include it with your explanation in the report. (90 points)

Complete all of these assignments with the necessary information and details. Each assignment will have some python code attached to it; therefore, you will upload 4 files to Brightspace for the final assignment to be considered as complete (.py file per each assignment and the Word/PDF report). If there are any questions regarding any of the numbered assignments, please contact me.