ECE 217: Data Structure and Algorithm – Fall 2022: Midterm Exam

Instructor: Dr. Shayan (Sean) Taheri

Note – Cheating and Plagiarism: Cheating and plagiarism are not permitted in any form and cause certain penalties. The instructor reserves the right to fail culprits.

Deliverable: All your responses to the assignment questions should be included in a single compressed file to be uploaded in the Gannon University (GU) – Blackboard Learn environment.

Question 1-A. Determine the cases for evaluating the running time of algorithms, explain their similarities and differences, and mention their usages.

Question 1-B. Write the algorithms of "Sorting and Insertion" and "Binary Search" for an array.

Question 1-C. Provide five operating functions for the List abstract data type and an example for each of them.

Question 1-D. Show five operating functions for the Stack abstract data type with a figure and provide an example for each of them.

Question 2-A. Define "IDE" with explanations.

Question 2-B. Explain the three terms of "Object", "Structure", and "Class" and specify their relationships if exist.

Question 3-A. Write a program in C/C++ that perform the following computations with proper comments:

- Initialize an array of 15 floating-point numbers with random values between 21 and 110 inclusive.
- Display the values of all array elements.
- Prompt the user to enter a value to search for.
- Display the location of the element in the array if found or an error message otherwise.

Question 3-B. Write a program in C/C++ that implements the Bubble Sort algorithm with complete explanations.

Question 3-C. Provide eight operating functions for the Vector abstract class type and an example for each of them.

Question 4. Explain the insertion and the deletion operations for a Linked List graphically.