**You are required to use Java or Python to do project assignments in this**

**semester.**

**The language used may be in any platform and under any OS.**

**The CS department has Java and Python language installed. The**

**recommended reference book may include a free download of the software.**

**You will submit the (scanned) source program and the (scanned) program**

**print out or the copy of the scree to Canvas by due Date and due time. Late**

**Project gets 10% penalty. Too late project after late due time gets no credit.**

**Anything not mentioned in these assignments, you are free to do whatever you desire. No need to ask questions.**

**Turn in thru e-mail will receive no credit.**

# PROJECT 1 (45 points)

**INSERTION SORT and ALGORITHM ANALYSIS**

Using Insertion Sort algorithm Implement a Program in Java or Python language you desire to sort an array of Real Numbers of size N.

1. Input at least 10 or more sets of randomized unsorted data with at least N elements in each set. For example, N= 12, 18, 24, 30, 36, 42, 48, 54, 60, 72.
2. Display the Unsorted data input and sorted data output for each array of N elements. Plot a graph to compare the worst case (average case) algorithm and the actual count putting counters in strategic points of your programs by assuming the cost ci = 1 for all statements.
3. Display a table of N, Actual count, and the worst case T(N).
4. Plot a graph to compare the Worst Case Complexity of the algorithm and actual count putting counters in strategic points of your programs. Input data must be good for Worst Case Insertion Sort or average case insertion sort.

Notes: The axis of the graph should be the theoretic total cost T(N) or the actual count vs. the N value. You may need to move function curve by multiplying a constant for easy comparison. **Proper message in the program output is required to indicate the execution and different outputs.**

**Anything not mentioned in these assignments, you are free to do whatever you desire. No need to ask questions.**

**Turn in thru e-mail will receive no credit.**

# Project 2 (30 points)

**MERGE SORT and ALGORITHM ANALYSIS**

Using Merge sort algorithm Implement a Program in the language you select to sort an array of Real numbers of size N.

Do (1), (2), (3) and (4) same as in project 1 using general case for Merge Sort.

Notes: The axis of the graph should be the theoretic total cost T(N) or the actual count vs. the N value. You may need to move function curve by multiplying a constant for easy comparison. **Proper message in the program output is required to indicate the execution and different outputs.**