**CMSC 3233**

**Data Structures**

**Assignment 4 – Problems**

**20 Points**

Do the follow problems from Chapter 4. Put the answers in a Word Doc. Put the Word doc, Java code and spreadsheet into a folder and zip it up and upload to this assignment in BlackBoard.

Page 182 – (2 pt each) R-4.9,R-4.10,R-4.11,R-4.12,R-4.13

For each write an equation that shows the **worst case** number of operations for n.

For each show order of the algorithm using big-Oh notation.

Page 185 – (3 pts each)C-4.36,C4.55

Page 187 – (4 pts) P 4.61 –

* Write the code in Java for each algorithm
* Output n and number of milliseconds for the time it took to execute the algorithm for n
* Use a range of n that will give you good data to graph the running time of the algorithm (my guess for each)
  + #1 : 100000 step n by 100
  + #2 : 100000 step n by 100
  + #3 : 100000 step n by 100
  + #4 : 100000 step n by 100
  + #5 : 1000 step by 10
* Sent the output to a text file (CSV) so you can import it into a spreadsheet
* How to measure time in Java. (Note: you could create a StopWatch class that would do this for you with methods: start(), stop(), runtime())

long startTime = System.nanoTime();

myCall();

long stopTime = System.nanoTime();

System.out.println(stopTime - startTime);

* Create a spreadsheet with tabs for each algorithm. On each tab display
  + the data (column 1 is n, column 2 is the time nano seconds)
  + a graph of the two columns with n as x-axis and time as y-axis (scatter chart may work best)