Computer Science 303 – Algorithms
Programming Assignment #1: Sorting algorithms
Due: 2/28/2013, Friday by midnight

In this programming assignment, you are to explore the various sorting algorithms we have learned in this semester. They include mergesort, bubblesort, quicksort, heapsort, count sort and radix sort. For count sort and radix sort, they only works for integers of a specific range. Thus their use isn't as widely as the comparison based sorting algorithms we discussed. These sorting algorithms are based on different ideas and obviously have different efficiencies. For example, merge sort will always outperform bubble sort for a relatively large dataset.

Objective

- Experience how to transfer from algorithm to codes
- Understand the efficiency class of algorithms
- Compare sorting algorithms

Task

You should implement mergesort, bubblesort, quicksort, and heapsort sorting algorithms and all algorithms should be able to sort data obtained from a file. I have uploaded a sample file data.txt and the code I use to generate these numbers on angel which has the following format.

n_1
n_1 data points

n_2
n_2 data points
…

where n_1 and n_2 are positive integers indicating how many data are in the next line. Each data is a decimal number and there is a space separating each data point.

Your code should sort all the data and put the sorted results in another file. For each data set, you should include the time it took for each algorithm to complete and the sorted result. These information should be put into a file.

Notes

- The time in the output is how long it took to sort the data can be measured in seconds. You borrow from the following code to calculate the time

```
#include <stdio.h>
#include <time.h>
int main (){
        time_t start,end;
        double dif;
        time (&start);
        // do your stuff
        time (&end);
        dif = difftime (end,start);

        // now dif contains the difference of the time from start to end.

        return 0;
}
```

- Your code must work for any input file in the correct format.

- Please put your honor pledge as comments in the code you turn in.

Grading
The total score of this programming assignment is 100 points. Bubble sort will be worth 10 points. The remaining three sorting algorithms will be 20 points each. 10 points will be given for the correct output.

Work to submit
1. Your code including all the header files or data files.
2. Your sorted result

Have fun!