Problem Set 4: Sorting and Graphs

CS3330 Data Structures and Algorithms
Term 1 2016: August 15 – October 15
Dr. Jack Davault

Overview. Provide the solutions for the problems in this assignment within a single Microsoft Word document. However, a Power Point file or scanned handwritten drawing for Problem 1(b) is fine. Remember to include your name and course number within all documents and files that you submit.

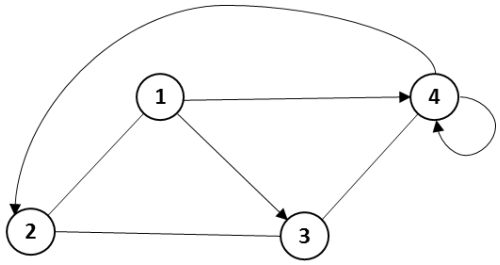
Problem 1. [4 points] Sorting: Read the assigned chapter and the notes for Week 7 located in the Learning Activities area, and then do the following problems:

(a) [2 points]. Both the Mergesort and the Quicksort algorithms will sort a list by portioning the list. Briefly explain how Mergesort differs from Quicksort when partitioning the list.

(b) [2 points] What is the big-O of the `shellsort()` function provided in Figure 7.6 on page 297? Briefly explain how you arrived at your answer. Remember big-O measures the worst case runtime scenario.

Problem 2. [6 points] Graphs: Read the assigned chapter and notes for Week 8 located in the Learning Activities area, and then do the following problems:

(a) [3 points] Draw the adjacency matrix for the following graph:



Hint: Remember that links without arrows are considered bi-directional.

(b) [3 points] Briefly explain the differences between dense and sparse graphs. When is if more feasible to use a linked representation for a graph over an adjacency matrix. Also, justify your answer using a mathematical definitions for sparse and dense graphs.

Other Notes: Submit your solutions using the Problem Set 4 link provided in the Assignment area. As usual, please ask if you have questions in either the *Ask the Instructor* forums area or via e-mail.