CECS 424 – Spring 2018

Lab 1

Direction:

- Please complete the lab and submit to Dropbox on Beachboard.

- After submitting your lab, please also demo your work.

1. The principle of the quicksort algorithm is this:

* Pick a “pivot” element (for simplicity pick the leftmost element).
* “Partition” the array into 3 parts:
  + First part: all elements in this part is less than the pivot.
  + Second part: the pivot itself (only one element!)
  + Third part: all elements in this part is greater than or equal to the pivot.
* Then, apply the quicksort algorithm to the first and the third part. (recursively)

2. Implement quicksort algorithm in C writing the following function:

void qsort(int \*a, int n)

3. Write a brief comment for every line of your code explaining what it does.

4. Write a simple main function to test your sort functions with the input sequence

4, 65, 2, -31, 0, 99, 2, 83, 782, 1 and print the result to the console.

NOTE:

A. Your program should print the list after each iteration to show the process of quicksort.

For instance:

1. Array to be sorted

3 1 4 1 5 9 2 6 5 3

2. Pick a pivot

**3** 1 4 1 5 9 2 6 5 3

3. Partition the array

2 1 1 **3** 5 9 4 6 5 3

4. Pick a pivot for the left subarray

**2** 1 1 **3** 5 9 4 6 5 3

5. Partition the left subarray

1 1 **2** **3** 5 9 4 6 5 3

6. Pick a pivot again

**1** 1 **2** **3** 5 9 4 6 5 3

Keep on repeating

B. Quicksort is an in-place sorting i.e. you do not need an extra array to store the result.  
C. The most important part of quicksort is the partitioning step. Please be sure NOT to use any extra array for this step.