CSCI 232 Data Structures & Algorithms
Programming Problems using a Stack and Queue

Write an array-based implementation of Stack and Queue. Then write a driver to test each program.

1. Create an array-based circular queue using an array, as described here: https://www.programiz.com/dsa/circular-queue. Implement the queue, and then write a driver program to test it. Each time an item is enqueued or dequeued, your program should print the data item and the array index where the operation occurred.

2. Suppose you are given an array containing n numbers in order. Describe in pseudocode an efficient algorithm for reversing the order of the numbers in the array using a single loop that indexes through the cells of the array to insert each element into a stack, and then another loop that removes the elements from the stack and puts them back into in reverse order. What is the running time of this algorithm?

3. Solve the previous exercise using a queue instead of stack. That is, suppose you are given an array containing n numbers in order, as in the previous exercise. Describe in pseudocode an efficient algorithm for reversing the order of the numbers in the array using a single for-loop that indexes through the cells of the array to insert each element into a queue, and then another loop that removes the elements from the queue and puts them back into in reverse order. What is the running time of this algorithm?

   For each of the scenarios above, create an array of type *int* and size *n*. Populate the array using a random number generator. Then implement the algorithms described.

4. Implement a program that determines whether a word or phrase is a palindrome. The program must use a stack.

Please name your files so it's obvious what they are, and add comments to the top with your name and the problem description. Then, submit your source code (.cpp, .h files) to the Dropbox for grading.