COSCI 21a, Assignment W2

Directions: To receive full credit:
- Place your name at the top of each page.
- Start each problem on a new page.

1. Using the notation for an array implementation of a stack used in class, give pseudo code to reverse a stack \( S \) of \( n \) items in linear time and space. Note that you may use additional data structures, but it must be that \( S \) becomes reversed and not that some other stack is returned.

2. Using the notation for an array implementation of a queue used in class (including accessing the elements of the queue array directly), give pseudo-code to reverse a circular queue \( Q \) of \( n \) elements using \( O(n) \) time and only \( O(1) \) space in addition to the space used for \( Q \). Explain why your algorithm works correctly and analyze the asymptotic time and space used.

3. Using the basic list operations presented in class (CREATE, FIRST, LAST, SIZE, NEXT, PREV, INSERT, DELETE, DATA, etc.), give pseudo-code to determine a maximum value in the list \( L \) of \( n \) integers (i.e., return an integer equal to the maximum of any value stored in the list and leave the list unchanged). Analyze the asymptotic time and space used.

4. Using the basic list operations presented in class (CREATE, FIRST, LAST, SIZE, NEXT, PREV, INSERT, DELETE, DATA, etc.), give pseudo code to remove every other element of a list \( L \) of \( n \) integers and place these elements in a new list \( M \) (that is, \( M \) gets the 1st, 3rd, 5th, etc. elements of \( L \)). The elements that remain in \( L \) should stay in the same relative order and the elements of \( M \) should be in the same relative order as they were in \( L \). For example, if the input is \( L = 1 \ 2 \ 3 \ 4 \ 5 \), then after completion of the algorithm, \( M = 1 \ 3 \ 5 \) and \( L = 2 \ 4 \). Analyze the asymptotic time and space used.