CS 152h: Data Structures Homework #1

ADTs: LISTS, STACKS, AND QUEUES

3.26 Describe in a few sentences how to implement three stacks in one array.

3.29 Write an algorithm for reversing a singly linked list, using only constant extra space. This means that you cannot use recursion but you may assume that your algorithm is a list member function. Can such an algorithm be written if the routine is a constant member function?

3.34 A linked list contains a cycle if, starting from some node n, following a sufficient number of `next` links brings us back to node n where n does not have to be the first node in the list. Assume that you are given a linked list that contains N nodes. However, the value of N is unknown.

Design an $O(N)$ algorithm to determine if the list contains a cycle, that is, the running time of your algorithm is linear in N. You may use only $O(1)$ extra space, that is, the amont of memory does not grow with N.