316 Data Structures

Assignment #1

(Due: Friday, Sept. 14, 2012)

Objective: To practice the implementation skills with array, linked list, stack, and queue.

1. (20 points) Write a non-recursive function to reverse a singly linked list in O(N) time.

2. (20 points) Implement a function that recognizes palindromes.

A *palindrome* is a string that reads the same forward and backward.

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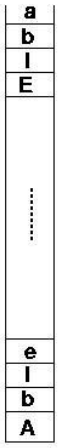
Hint:

- Read the line of text into both a stack and a queue.
- Compare the contents of the stack and the queue character-by-character to see if they would produce the same string of characters.



Stack

Queue

3. (20 points) Implement a client function that returns the number of items in a queue. The queue is unchanged. **You may <u>not</u> assume any knowledge of how the queue is implemented.** What would be the time requirements using big-O?

int Length**(QueueType& queue)**

Function: Determines the number of items in the queue.

Precondition: queue has been initialized.

Postconditions: queue is unchanged

4. (20 points) Implement a **member** function that returns the number of items in an array-based queue. What would be the time requirements in this case using big-O?

5. (20 points) Implement a **member** function that returns the number of items in a linked-list-based queue. What would be the time requirements in this case using big-O?

Submission: follow the instructions at http://cs.uakron.edu/~echeng/Submission_How.html. Use course number 3460:316.
