Kerry Ojakian's CSI 33 Class
Due Date: Thursday October 17

HW #2

General Instructions: For questions 1 to 4, hand them in on paper at the beginning of class. For programming questions 5 and 6, put them in Dropbox in a new folder called HW02 in your folder Homework. For the programming parts you should use the code from class in my Dropbox. Please follow the instructions exactly! (naming functions, classes, etc exactly as requested, including upper/lower case case). Don't copy from others!

The Assignment

1. From Chapter 4, **page 151**: Short-answer questions 6 and 7 (with some explanation). If we have discussed some in class, still include that here with a cleaner explanation. Note that the Python list uses an array.

2. From Chapter 4 (**page 151**): Short-answer question 8 (justify your answers). Note - this is the linked structure we did as a class assignment.

3. Consider the **doubly linked list**:

$$3, 7, 2, 8, 1$$

   (a) Draw a diagram of this, drawing the links as arrows.

   (b) Using diagrams, show all steps for deleting the element 8 (make sure to indicate the order of the steps).

   (c) Using diagrams, show all the steps for inserting the element 9 in between the 3 and 7 (make sure to indicate the order of the steps).

   (d) In general for doubly linked lists, do a theta analysis for 1) finding the third element from the start, and 2) for finding the third from the end.

4. (a) Evaluate this postfix expression, showing your steps: $5\ 6\ 3\ +\ 2\ *\ -$

   (b) Evaluate this prefix expression, showing your steps: $*\ +\ 5\ 6\ -\ 7\ 4$

5. From scratch, just using the ListNode class (not the Linked List class), do the following (in Python and also in C++). Call the python juypter notebook prob5.ipynb and the C++ prob5.cpp and put both in folder HW02.

   (a) Create a linked list with node names $n1, n2, n3, n4$, which appear in that order in a linked list, containing the data: $101, 102, 103, 104$, respectively.

   (b) Create a new node $n5$ with data 99 and insert it between $n2$ and $n3$.

   (c) Create a new node $n6$ with data 88 and insert it at the start of the list, so $n1$ becomes the second node.

   (d) Delete the node $n2$ from the list.

6. From chapter 4 (**page 152**): Programming exercise 3 (add this our C++ class without changing any of the existing methods beyond what is necessary). Call this prob6.cpp and put it in folder HW02.