

Kerry Ojakian's CSI 33 Class

Due Date: Thursday October 15

HW #3

General Instructions: For questions 1 to 4, hand them in on paper at the beginning of class. For programming questions, put them in a Colab folder called HW03. Please follow the instructions exactly! (naming functions, classes, etc exactly as requested, including upper/lower case case). Don't copy from others!

The Assignment

All page numbers in the textbook refer to the page numbers PRINTED on the PDF, not to the page number the PDF reader says.

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, where the first node is referenced by **head** and the last node is referenced by **last**.
 - (b) Using diagrams, show all steps for deleting the element 8 (make sure to indicate the order of the steps), assuming you have a reference to node 2.
 - (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), using your reference to the head.
 - (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, and 3) finding an element in the middle of the list.
4. Review.
 - (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++). Make on python notebook calling this prob5Python and a C++ notebook calling it prob5CPP and put both in folder HW03.
 - (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. Have head refer the the first node $n1$.
 - (b) Create a new node $n5$ with data 99 and insert it between $n2$ and $n3$. You may NOT refer directly to $n1, n2, n3, n4$ in your code; only use head and the links.
 - (c) Create a new node $n6$ with data 88 and insert it at the start of the list, so $n1$ becomes the second node. Like above, only refer to head.
 - (d) Delete the node $n2$ from the list. Like above, only refer to head.
6. From chapter 4 (**page 152**): Programming exercise 3 (add this our Python LList class without changing any of the existing methods beyond what is necessary). Call this prob6.cpp
7. At Google Colab go to my HW03 folder. Copy out the partially written C++ code in order to make a linked list class in C++. You should use the Python linked list class as a model (in Topic 4 at Colab)
(I may need to finish the code! ...)