

## Week 7: Data Structures and Algorithms, Spring 2022

Linked Lists	Q1	Q2	Total
	3 + 3 + 3 + 3 + 3	5 + 5 + 5	30

Watch the following videos prior to doing this assignment:

1. Linked list: [https://youtu.be/9PxOFexl\\_7c](https://youtu.be/9PxOFexl_7c)
2. Creating Linked lists: [https://youtu.be/czD2e\\_GfqyY](https://youtu.be/czD2e_GfqyY)
3. Traversing the list: <https://youtu.be/1-jfMdfZrOw>
4. Adding a node – linked list: <https://youtu.be/wq9yJkP4vdc>
5. Deleting nodes – linked list: <https://youtu.be/v2eLfRF0XeU>

Q1) Write a **program** that implements the following:

1	Functions:	
	a) create ( ): adding the very first node.	3
	b) add ( ): the method should insert numbers in sorted order.	3
	c) delete ( ): the function should clearly show, with appropriate comments, deleting a node (if it is present) by enumerating all the elements of the list after deleting the concerned node, and “not found” if the requested node is not present in the list.	3
	d) length ( ): informs the user of the length of the linked list,	3
	e) traverse ( ), simply prints the elements of the list.	3
2	A main ( ) function that	
	a) calls upon an external file containing the numbers [1, 3, 7, 99, 101, 103,107] (you can create a text file yourself),	5
	b) creates and populates the linked list with all the elements presented to it in the text file of part (2a),	5
	c) thereafter, the function asks the user a series of actions that he/she would like to continue to perform iteratively up until he/she chooses to stop. Actions are:	5
	(i) add a node	
	(ii) delete a node	
	(iii) enumerate the elements of the list	
	(iv) length of the list	
	(v) end – stop the process and stores the current linked list in an external file called “output.txt”	

### Rubrics (Associated Marks)

S. No.	Content	Meets Criteria (1)	Marks	Does not meet expectations (0)	Marks
1	Indentation	Perfect	100%	Code not indented properly	0
2	Code works	Code compiles and executes properly for any variable sized matrices	100%	Code has errors	Based on the code
3	Comments	Code is properly commented	100%	Code is not properly commented.	0

Sample output: Inputs by the user are marked in red.

The program should run from the command line interface and may look something like this:

```
> program.exe
```

```
> Dear User, the program requires four inputs:
```

```
[1] program.exe
```

```
[2] Name of file containing list of numbers: for example, "input.txt" or "file.txt"
```

```
[-] E.g.: program.exe input.txt
```

```
> program.exe input.txt
```

```
Dear User, reading file "input.txt"
```

```
Linked List created.
```

```
Items included are: 1 – 3 – 7 – 99 – 101 – 103 – 107
```

```
What would you like to do next? Options are
```

```
(1) add a node,
```

```
(2) delete a node,
```

```
(3) enumerate the elements of the list,
```

```
(4) length of the list, and
```

```
(5) stop the process
```

```
User: 2
```

```
Enter the number: 99
```

```
Deleted 99, new List: 1 – 3 – 7 – 101 – 103 – 107
```

```
What would you like to do next? Options are
```

```
(1) add a node,
```

```
(2) delete a node,
```

```
(3) enumerate the elements of the list,
```

```
(4) length of the list, and
```

```
(5) stop the process
```

```
User: 4
```

```
OK. Length: 6
```

```
What would you like to do next? Options are
```

```
(1) add a node,
```

```
(2) delete a node,
```

```
(3) enumerate the elements of the list,
```

```
(4) length of the list, and
```

```
(5) stop the process
```

```
User: 5
```

```
OK. Thank you.
```

```
Your final list has been printed in file 'output.txt'
```