

*All submitted code must take appropriate user inputs. No hard coded values will be accepted. If your code does not compile with make you will automatically incur a 50 point deduction.*

## CS240 Programming In C

### Homework 5

#### Linked Lists

100 pts

Due May 7th 11:59 pm

1. (25 pts.) Please write a program where you will insert a node at the beginning of a singly linked list.

```
Linked List : Insert a new node at the beginning of a Singly Linked List:
```

```
-----  
Input the number of nodes : 5
```

```
Input data for node 1 : 1
```

```
Input data for node 2 : 2
```

```
Input data for node 3 : 3
```

```
Input data for node 4 : 4
```

```
Input data for node 5 : 5
```

```
Data entered in the list are :
```

```
Data = 1
```

```
Data = 2
```

```
Data = 3
```

```
Data = 4
```

```
Data = 5
```

```
Input data to insert at the beginning of the list : 10
```

```
Data after inserted in the list are :
```

```
Data = 10
```

```
Data = 1
```

```
Data = 2
```

```
Data = 3
```

```
Data = 4
```

```
Data = 5
```

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2. (25. pts) Please write a program to add a node to the end of singly linked list.

```
Linked List : Insert a new node at the end of a Singly Linked List :
-----
Input the number of nodes : 4
Input data for node 1 : 1
Input data for node 2 : 2
Input data for node 3 : 3
Input data for node 4 : 4

Data entered in the list are :
Data = 1
Data = 2
Data = 3
Data = 4

Input data to insert at the end of the list : 10

Data after inserted in the list are :
Data = 1
Data = 2
Data = 3
Data = 4
Data = 10
```

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3. (25 pts.) Please write a program to insert a node into a linked list. Please note that if an invalid input is entered your code must produce an error.

```
Linked List : Insert a new node at the middle of the Linked List :
```

```
-----  
Input the number of nodes (3 or more) : 4
```

```
Input data for node 1 : 1
```

```
Input data for node 2 : 2
```

```
Input data for node 3 : 3
```

```
Input data for node 4 : 4
```

```
Data entered in the list are :
```

```
Data = 1
```

```
Data = 2
```

```
Data = 3
```

```
Data = 4
```

```
Input data to insert in the middle of the list : 5
```

```
Input the position to insert new node : 3
```

```
Insertion completed successfully.
```

```
The new list is :
```

```
Data = 1
```

```
Data = 2
```

```
Data = 5
```

```
Data = 3
```

```
Data = 4
```

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4. (25 pts) Please write a program to delete the first node of your linked list

```
Linked List : Delete first node of Singly Linked List :
```

```
-----  
Input the number of nodes : 5
```

```
Input data for node 1 : 1
```

```
Input data for node 2 : 2
```

```
Input data for node 3 : 3
```

```
Input data for node 4 : 4
```

```
Input data for node 5 : 5
```

```
Data entered in the list are :
```

```
Data = 1
```

```
Data = 2
```

```
Data = 3
```

```
Data = 4
```

```
Data = 5
```

```
Data of node 1 which is being deleted is : 1
```

```
Data, after deletion of first node :
```

```
Data = 2
```

```
Data = 3
```

```
Data = 4
```

```
Data = 5
```

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Extra Credit (50 pts.) Write a program to sort a linked list using merge sort.

```
Enter the number of elements in the list: 5
Element 1: 34
Element 2: 22
Element 3: 12
Element 4: 55
Element 5: 21

Original linked list:
34 22 12 55 21

Sorted linked list:
12 21 22 34 55
```

Please submit the following to the UNIX server:

- Q1-Q4.c
- Makefile
- readme