Exercise 1: **[10 pts]** [5 minutes]

Write a C++ function that inserts new nodes into a linked list in the increasing order. N.B.: this method should be able to insert nodes in the first position of the linked list, in between two nodes and in the last position of the linked list.

Exercise 2: **[10 pts]** [10 minutes]

Write the needed C++ code that declares **head** and **tail** pointer pointing to the head and tail of a linked list of integers. This code should also insert nodes into the linked list. After adding each node, head and tail should still be valid references to the head and tail nodes of the linked list.

Exercise 3: **[10 pts]** [5 minutes]

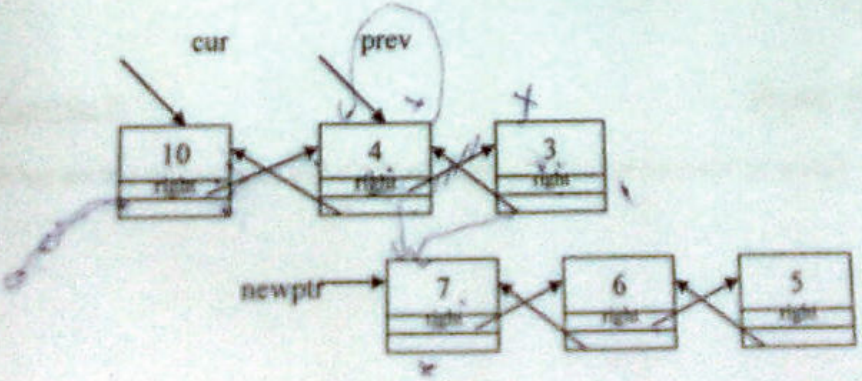
Write the needed C++ code to implement the function **countOccurrences** for the List class. **countOccurrences** function has one input parameter and returns the number of times this input parameter appears in the list.

Exercise 4: **[10 pts]** [5 minutes]

Write the needed C++ code to implement the function **removeNode** for the List class. **removeNode** has one input parameter '**item**' as an integer value. The function searches for the 'item' in the linked list and removes (deletes) its node from the list.

Exercise 5: **[10 pts]** [5 minutes]

Write the class definitions for the following linked list structure (do not write method implementations). Draw the final structure of the following D-linked lists after executing the below code:



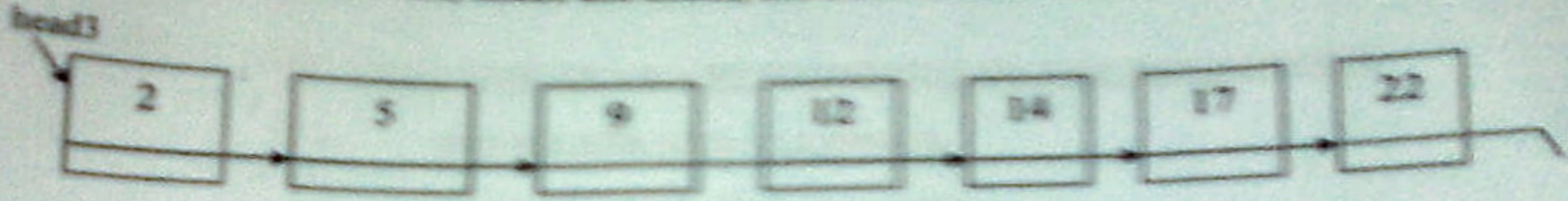

```
cur ->left->right->right = newptr->right->left;
cur->right->right->left = cur->left->right;
prev->right=cur->right->right->right;
newprt->left=prev;
```

Exercise 6:

[20 pts] [25 minutes]

Given the following linked lists:

Assume Class List is already implemented, write a program that uses the class List to merge the given ordered linked lists, head1 and head2, into a new ordered linked list head3.



Exercise 7:

[10 pts] [5 minutes]

Write the push and pop methods for a Stack that is implemented using a linked list.

Exercise 8:

[15 pts] [15 minutes]

Implement a Queue ADT using a **circular linked list**.

Exercise 9:

[5 pts] [5 minutes]

What are the advantages and disadvantages of a linked list over an array?