**CME227 DATA STRUCTURES**

**Midterm, December, 5, 2014**

**Number/Name/Division:……............................................................. Duration: 75 minutes**

1-) (20 pts.) Assume a linked list structure containing integers. Draw a picture of the structure this code generates.

int main(){

struct node \*heads[4];

int i,j;

for ( i=0; i<4; i++) {

heads[i] = NULL;

for (j=1; j<=i; j++) {

struct node \*temp = new node();

temp>data = j;

temp>next = heads[i];

heads[i] = temp;

}

}

}

2-) (20 pts.) Draw the circular queue data structures in array implementations for “each step” in the following sequence: **enqueue(A), enqueue(B), enqueue(C), dequeue, enqueue(D), enqueue(E), dequeue, enqueue(F), enqueue(G).** Assume an initial size of 5 for the array implementation. Remember to show both Front and Rear for queue.

3-) (20 pts.) Write a function that adds values of the last and the first node of a circular doubly linked list and insert the sum into the list as the last node. You may assume there are at least two nodes in the list. You are not allowed to use any linked list function.

4-) (20 pts.) Write a function **AddMax**  that adds the largest node value to all nodes (including itself) in the linked list. Suppose the list stores the following elements:

[8, 4, 7, 2, **9**, 4, 5, 3]

If you made the call of AddMax(head), the list would then store the elements:

[17, 13, 16, 11, 18, 13, 14, 12]

5-) (20 pts.) Write a function that reverses a given stack using a temporary stack. You may use stack functions defined in the lecture.