

```
1  /*
2   Question 2 and 3
3   Creator: Wahid Bawa
4   Purpose: To create a doubly Linked List
5           Adds multiple delete methods
6           Adds enqueue and dequeue
7  */
8  public class LList {
9      private LNode head, tail;
10
11     public LList() {
12         head = null;
13         tail = null;
14     }
15     public void add(int val) { // Adds node to tail of List
16         LNode tmp = new LNode(val, tail, null);
17         if (tail != null) { // sets the "last" node's next to new node
18             tail.setNext(tmp);
19         }
20         if (head == null) { // sets head to new node if list is empty.
21             head = tmp;
22         }
23         tail = tmp;
24     }
25
26     public String toString() { // displays the parts of the Linked List
27         String ans = "";
28         LNode tmp = head;
29         while (tmp != null) {
30             ans += tmp.getVal() + (tmp.getNext() == null ? "" : "-");
31             tmp = tmp.getNext();
32         }
33         return ans;
34     }
35
36     public void enqueue(int val) { // calls add
37         add(val);
38     }
39
40     public int dequeue() { // removes the head and then returns it
41         LNode tmp = head;
42         head = tmp.getNext();
43         head.setPrev(null);
44         return tmp.getVal();
45     }
46     private void delete(LNode node) { // used for deleting within the class
47         if (node == head) { // this is the case for removing head
48             head = node.getNext();
49         }
50         if (node == tail) { // this is the case for removing tails
51             tail = node.getPrev();
52         }
53         if (node.getNext() != null) { // this updates the next node
54             node.getNext().setPrev(node.getPrev());
55         }
56         if (node.getPrev() != null) { // this updates the previous node
57             node.getPrev().setNext(node.getNext());
58         }
59     }
60     public void delete(int val) { // loops through all nodes until "val" is found. Then calls the private delete method to get rid of it
61         LNode tmp = head;
62         while (tmp != null) {
63             if (tmp.getVal() == val) {
64                 delete(tmp);
65                 break;
66             }
67             tmp = tmp.getNext();
68         }
69     }
70     public void deleteAt(int index) { // loops through nodes until "index" is reached. then calls the private delete method
71         int i = 0;
72         LNode tmp = head;
73         while (tmp != null) {
74             if (i == index) {
75                 delete(tmp);
76                 break;
77             }
78             tmp = tmp.getNext();
79             i++;
80         }
81     }
82 }
```