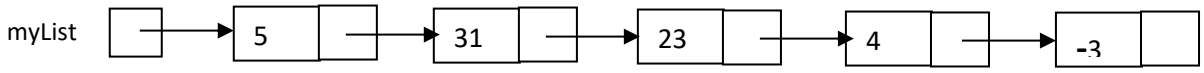
CSCI 162
Dr. Schwartz
Review Materials for Exam 2

Content: Chapter 4 (Linked Lists), Chapter 5 (Generics, up to, but NOT including interfaces)
Some terms to know: auto-boxing/auto-unboxing, wrapper classes, widening conversion, ADT, generic, generic type parameter, shallow vs. deep copy (and shallow vs. deep clones) ,

```
public class Node {
   private int data;
   private Node link;
   public Node(int initialData, Node initialLink){
         data = initialData;
         link = initialLink;
      }
   public int getData( ) {
      return data;
   }
   public Node getLink( ) {
      return link;
   }
   public void setData(int newData) {
      data = newData;
   }
   public void setLink(Node newLink) {
      link = newLink;
   }
}
```

1. Write code (that might be part of an application that uses the Node class) that will create a list containing the values (in this order) 5, 31, 23, 4, -3, with 5 being at the head of the list and -3 being at the end:



2. Assuming that the linked list in question #1 correctly exists (i.e. **`myList`** references the head of the list), write code (as part of an application that uses the Node class) to print the value of the third node in the list.

3. Write code that creates an Integer wrapper object called **`x`** and initialize it to 20.

Some of the following questions use the *Node<E>* class. Nodes have *E* typed data components.The node's components are accessed through *getLink*, *getData*, *setLink*, and *setData Node<E>* class methods.

4. Manipulating linked lists
a. Write a *print* method in Java that takes a reference to *Node<E>* as its only parameter and prints the data in each node on a separate line. It should not change the linked list.

b. Draw a picture showing what happens in an *addAfter* method that adds the *item* (provided as a parameter) to a new node added after the node given as the parameter *preceding*.

5. Implementing Classes with Linked Lists.
You may assume for this problem that the instance variables of a *Bag* class implemented with a linked list are *head* and *manyNodes*. *head* is a reference to *Node<E>* with nodes having data components of type *E*. *manyNodes* is an integer indicating the number of items in the bag.
a. Why might we use a linked list instead of an array?

b. Write a *LinkedBag* method *count* which has the method header of
public int count (E target)
that will return an integer containing the number of times target is in the bag. (8 pts)

c. Write a *LinkedBag* method that has the method header of

public LinkedBag<E> copyUnique ( )
that returns a new bag that contains the same items as in the current Bag but only one copy of each unique item. No, you haven't seen this before. Realize that if the Bag you are creating meets its invariant, you may safely call its methods including *add* and the *count* method in part

Do not alter the existing Bag. Do not worry about cloning the individual items, since this is a problem in generic collections.