Name: _____ Section: _____

Quiz #4

1. What is the name of the linear abstract data type that restricts the user to adding elements on one end while removing from the opposite end?

2. What is the name of the linear abstract data type that restricts the user to adding and removing from the same end?

3. Name an operation that is faster with an array than it is with a linked list.

4. Name an operation that is faster with a linked list than it is with an array.

5. Suppose you were to implement a queue using a linked list. Which end of the list would be best to use for adding elements? Circle one.

HEAD **TAIL**

6. Suppose you were to implement a stack using an array. Which side of the array would be best to use for pushing elements onto the stack? (The "front" of the array is the side with index 0.)

FRONT **BACK**

7. Suppose you are writing a class and you have chosen to override the equals method. What other method must you also override?

8. Using the variable **h** for "hashcode", **p** for "a large prime" and **t** for "table size", write the formula that we use to decide where to place a particular object in a hash table.

9. Suppose you are attempting to show that the function $17n + 40$ is $O(5n + 9)$ using the definition of big-O directly. What is the *smallest integer* that you could choose for the constant we call **m**?

[More questions on back page….]

10. What is the name of the Java class that represents a set, and allows you to iterate over the collection in the order that the elements were added?

11. What is the name of the Java class that represents a set, and allows you to iterate over the collection in sorted order?

12. Suppose you are writing a class called `SortedCollection`, which represents a collection of objects that will be stored in sorted order. You need to enforce the policy that the objects in the collection must implement the `Comparable` interface. Write the class declaration (the line that starts with "`public class`…") for this class using correct Java generic notation. (Use the type variable "T" to represent the type of the objects that will be stored in the collection.)

13. Suppose you are using a hash table to store instances of a class in which it is possible that occasionally objects that are not equal are assigned the same hash code. Will the hash table still work?

YES **NO**

14. Suppose you execute the method below:

```
/* Swaps two elements in the list */
public static void swap(List<Object> list, int index1, int index2) {
      Object temp = list.get(index1);      // get the element at index1
      list.set(index1, list.get(index2));  // replaces the element at index1
      list.set(index2, temp);              // replaces the element at index2
}
```

a. What will the expected running time be (in terms of big-O) if you run this on a LinkedList? State the best (smallest) big-O you can.

b. What will the expected running time be (in terms of big-O) if you run this on an ArrayList? State the best (smallest) big-O you can.