CSIS 10B Assignment 4 SOLUTIONS

1) StudentSorter.java

```
import java.util.Scanner;
import java.util.Arrays;
import java.io.File;
import java.io.FileNotFoundException;
/**
 * Write a description of class StudentSorter here.
 *
 * @author Daniel Gopar
 */
public class StudentSorter
{
    public static void main(String [] args){

        File file = new File("Student100.txt");
        Student temp;
        Student [] database = new Student[200]; // extra space in case we go over 100
        int size =0;
        try{
            Scanner s = new Scanner(file);

            while (s.hasNext())
            {
                 // read in a Student record from the scanner and store in database array
                 temp = new Student();
                 temp.read(s);//read a student record from the file
                 database[size] = temp;
                 size++;
            }
        }
        catch (FileNotFoundException e) {
            e.printStackTrace();
        }

        for(int k=0; k<size; k++)
            System.out.println(database[k]);

        System.out.println("\n\n SORTING BY LAST NAME");
        Student.compareBy(Student.COMPARELASTNAME);
        Arrays.sort(database,0, size);

        for(int i=0; i<size; i++)
            System.out.println(database[i]);

        System.out.println("\n\n SORTING BY GPA");
        Student.compareBy(Student.COMPAREGPA);
         Arrays.sort(database,0, size);
        // display
        for(int j=0; j<size; j++)
            System.out.println(database[j]);

        System.out.println("\n\n SORTING BY ID");
        Student.compareBy(Student.COMPAREID);
        Arrays.sort(database,0, size);
        for(int k=0; k<size; k++)
            System.out.println(database[k]);
        /********  SEARCH FOR STUDENT BY ID ****************/
        System.out.println("enter a five-digit ID to look up");
        int ID =Integer.parseInt(keyboard.nextLine());
        Student key = new Student();
        key.setID(ID);

        int desiredIndex = Arrays.binarySearch(dataBase, key);
        System.out.println("Found your student at "+desiredIndex)
       System.out.println( dataBase[desiredIndex] );
    }
}
```

Student.java

```
import java.util.Scanner;
import java.util.*;
/**
 * Write a description of class Student here.
 * Class student represents a student record in a database.
 * @author (Villarreal)
 * @version 2/9/2011
 */
public class Student implements Comparable <Student>
{
   private String firstName, lastName;
   private double GPA;
   private int ID;

   public static int COMPARELASTNAME = 0;
   public static int COMPAREGPA=1;
   public static int COMPAREID= 2;

   public static int compareType = 0;

   public Student(){ // default constructor
      firstName = "";
      lastName = "";
      GPA=0;
      ID=0;
   }

   public Student(String firstName, String lastName, int ID, double GPA){
      this.firstName = firstName;
      this.lastName = lastName;
      this.ID = ID;
      this.GPA = GPA;
   }

   public Student(Scanner s){  // create a new Student with data from scanner
       ID = s.nextInt();
       firstName = s.next();
       lastName = s.next();
       GPA = s.nextDouble();
   }

   public boolean equals(Object other)
   {
       Student that = (Student)other;
       return ((this.ID == that.ID) && (this.GPA == that.GPA) &&
               (this.firstName.equals(that.firstName)) &&
               (this.lastName.equals(that.lastName)));
   }
   public String toString(){
       return firstName + " " + lastName + ", ID: " + ID + " - GPA: " +GPA;
   }

   public void setID(int ID){
       this.ID = ID;
   }

   /***** All GET and most SET methods deleted for clarity *******/

   public void read(Scanner s){
       ID = s.nextInt();
       firstName = s.next();
       lastName = s.next();
       GPA = s.nextDouble();
   }

   public static void compareBy(int compare)
   {
      compareType = compare;

   }

   public int compareTo(Student other)
   {
      if(compareType == COMPARELASTNAME)
      {
        int temp = this.lastName.compareTo(other.lastName);
        if (temp == 0)
        {
            return this.firstName.compareTo(other.firstName);
        }
        return temp;

      }
      else if(compareType == COMPAREGPA)
      {
          return (int)(100*GPA-100*other.GPA);
      }
      else
          return ID-other.ID;
    }
 }
```

2) Algorithm Analysis (BilliardsProblem.java)

```
import java.util.Scanner;
import java.util.Stack;
import java.lang.String;

/**
 * This program solves the Billiards problem from assignment 4.
 *
 * @author Juan Carlos Ponce
 * @version May 5, 2013
 */
public class BilliardsProblem
{

    public static void main(String [] args)
    {
        System.out.println("I think that billiards is between O(n^3) and O(2^n).");

        System.out.println("What string should I place with Dashes? ...");
        Scanner words = new Scanner(System.in);

        String word =  words.nextLine();

        printDashed(word);

        System.out.println("What value ball is pulled out");
        Scanner keyboard = new Scanner(System.in);

        int N = Integer.parseInt(keyboard.next());

        Stack<Integer> theStack;
        theStack = new Stack<Integer>();

        int count = 0;

        theStack.push(N);
        int num;

        while(!theStack.isEmpty())
        {
            num = theStack.pop();
            System.out.println("I removed: " + num);
            if(num != 1)
            {
                for(int i = 0; i < num; i++)    {
                     theStack.push(num/2);
                    System.out.println("I'll put in: " + num/2);
                    count++;
                }
            } else{
                count++;
            }
        }


       System.out.println("For N: " + N + " Count: " + count);
    }
```

3) Recursion (PrintDashed)

```
    public static void printDashed(String phrase){
            if (phrase.length() == 1)
                System.out.println(phrase);
            else{
                System.out.print(phrase.substring(0,1) + " - ");
                printDashed (phrase.substring(1,phrase.length()));
            }
    }

}
```