South Louisiana Community College
ASDV 2420, Advanced Programming Language I
Programming Examination 2 on 2018/3/8
Open book, notes and Internet.

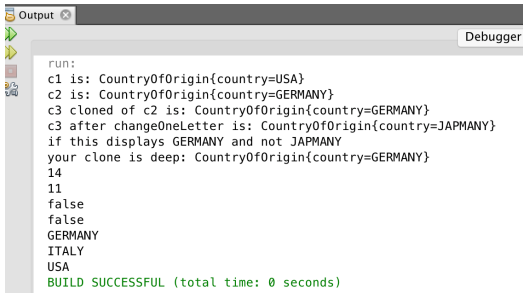
Create a project called Exam2LastName where LastName is your last name.
Upload the zip and html (***no line numbers)*** for each problem. Outside of your zip.

Problem 1 (5 points)

Create the class CountryOfOrigin which implements Cloneable and Comparable.
Use Netbeans Insert-Code for property, setter, getter, equals toString.
Observe that the code of method getCountry starting at line 10 is given and DOES NOT return char[] but String. The method at line 16, changeOneLetter is also given and changes one char at a specific index.

Test your class with the main given at the RHS to produce the exact output shown below:

OUTPUT




```
1   package exam2;
2   import java.util.Arrays;
3   class CountryOfOrigin implements Cloneable, Comparable<CountryOfOrigin>
4   {   private char[] country = "USA".toCharArray();
5
6       public CountryOfOrigin(char[] country)
7       {...3 lines }
10      public String getCountry(){return String.copyValueOf(this.country); }
11
12      public void setCountry(char[] country)
13      {...3 lines }
16      public boolean changeOneLetter(int index, char newLetter)
17      {
18          if (index >= this.country.length || index < 0)
19              return false;
20          this.country[index] = newLetter;
21          return true;
22      }
23
24      @Override
        public boolean equals(Object obj)
26      {...20 lines }
46
47      @Override
        public String toString()
49      {...3 lines }
52
53      @Override
        public int compareTo(CountryOfOrigin o)
55      {...3 lines }
58
59      @Override
        public Object clone()
61      {...3 lines }
64
65      public static void main(String[] args)
66              throws CloneNotSupportedException
67      {...25 lines }
92  }
93
```

main

```
    public Object clone()
61  {...3 lines }
64
65  public static void main(String[] args)
66          throws CloneNotSupportedException
67  {
68      CountryOfOrigin c1 = new CountryOfOrigin(new char[]{ 'U', 'S', 'A' });
69      CountryOfOrigin c2 = new CountryOfOrigin("GERMANY".toCharArray());
70      CountryOfOrigin c3 = (CountryOfOrigin) c2.clone();
71
72      System.out.println("c1 is: " + c1);
73      System.out.println("c2 is: " + c2);
74      System.out.println("c3 cloned of c2 is: " + c3);
75
76      c3.changeOneLetter(0, 'J');
77      c3.changeOneLetter(1, 'A');
78      c3.changeOneLetter(2, 'P');
79
80      System.out.println("c3 after changeOneLetter is: " + c3);
81      System.out.println("if this displays GERMANY and not JAPMANY\nyour clone is deep: " + c2);
82
83      System.out.println(c1.compareTo(c2));
84      System.out.println(c1.compareTo(c3));
85      System.out.println(c1.equals(c2));
86      System.out.println(c1.equals(c3));
87      System.out.println(c2.getCountry());
88      c2.setCountry("ITALY".toCharArray());
89      System.out.println(c2.getCountry());
90      System.out.println(c1.getCountry());
91  }
92  }
93
```

Problem 2 (3 points)

Implement the class Automobile shown below. Use the given compareTo which compares vins.

```
1   package exam2;
2   import java.util.Objects;
3
4   public class Automobile
5           implements  Comparable<Automobile>
6   {
7       private String vin;
8       private CountryOfOrigin origin;
9
11      public Automobile(String vin, CountryOfOrigin origin)
        {...4 lines }
15
16      public String getVin()
17      {...3 lines }
20
21      public void setVin(String vin)
22      {...3 lines }
25
27      public CountryOfOrigin getOrigin()
        {...3 lines }
30
32      public void setOrigin(CountryOfOrigin origin)
        {...3 lines }
35
36      @Override
38      public String toString()
        {...3 lines }
41
42      @Override
44      public boolean equals(Object obj)
        {...20 lines }
64
65      @Override
67      public int compareTo(Automobile o)
        {
68          return vin.compareTo(o.vin);
        }
70  }
71
```

Problem 3 (2 points)

Implement the method sortByVin of the class Dealership shown below. The sortByVin sorts all automobiles in ascending order on vin number. Test it with the exact main shown below to produce the exact output shown. Full **two points** if your sorting is done using Arrays.sort. **One point** only, if you use loops and do the sorting via loops.

```
1   package exam2;
2
3   import java.util.ArrayList;
4   import java.util.Arrays;
5
6   public class Dealership extends ArrayList<Automobile>
7   {
8       /**Sorts the inherited Arraylist of Automobiles
9        * into ascending order by vin number.
10       * @param d the Dealership of Automobiles
11       */
12      public static void sortByVin( Dealership d )
13      {...7 lines }
20
21      public static void main(String[] args)
22      {
23          Dealership d = new Dealership();
24
25          d.add( new Automobile( "8", new CountryOfOrigin("USA".toCharArray() )));
26          d.add( new Automobile( "1", new CountryOfOrigin("GERMANY".toCharArray() )));
27          System.out.println("THE ORIGINAL DEALERSHIP\n" + d);
28          Dealership.sortByVin( d );
29          System.out.println("\nTHE SORTED BY VIN DEALERSHIP\n" + d);
30      }
31  }
32
```

Output

Debugger Console | exam2 (run)

```
run:
THE ORIGINAL DEALERSHIP
[Automobile{vin=8, origin=CountryOfOrigin{country=USA}}, Automobile{vin=1, origin=CountryOfOrigin{country=GERMANY}}]

THE SORTED BY VIN DEALERSHIP
[Automobile{vin=1, origin=CountryOfOrigin{country=GERMANY}}, Automobile{vin=8, origin=CountryOfOrigin{country=USA}}]
BUILD SUCCESSFUL (total time: 0 seconds)
```