IIP First Partial - ETSInf
Date: November 21st, 2011. Time: 2 hours.

1. 6 points An application that uses a set of Spanish playing cards (*baraja*) is being implemented. Therefore, the necessary classes must be defined. One of them is the `Card` class, which represents a card of the set of Spanish playing cards. To identify a `Card` the required data are:
   - its figure: *oros* (gold coins), *copas* (cups), *espadas* (swords), and *bastos* (sticks), and
   - its value: a number between 1 and 12, both included.

   For that class, **you must implement**:
   a) (0.5 points) Define 4 constant integer public class attributes, that represent each figure: `OROS` is 0, `COPAS` is 1, `ESPADAS` is 2, and `BASTOS` is 3.
   b) (0.5 points) Define instance attributes for `figure` and `value`.
   c) (1 point) Implement two constructors: one for creating a random card and other that creates the card according to two parameters that represent figure and value (you can suppose that they have correct values).
   d) (0.5 points) Write the two consultor methods and the two modifier methods for the instance attributes.
   e) (1 point) Implement a method `isLower` that returns if the current card is lower than a given card (parameter). The order is initially given by figure (*oros* is the lowest, followed by *copas*, *espadas* and finally *bastos*), and for the same figure is given by the value (1, 2, ..., 12).
   f) (0.5 points) Write a method `nextFig` that returns a card with the same value of the current card but whose figure is the next of the current card figure, following the order of the previous item and considering that next figure to *bastos* is *oros*.
   g) (1 point) Write an `equals` method (that overrides the `equals` method of the `Object` class) to check that two cards are equal.
   h) (1 point) Write a `toString` method (that overrides the `toString` method of the `Object` class) that returns a `String` with format: "`value` of `figure`"; e.g., "4 of oros" or "1 of bastos".

2. 4 points Considering the class of the previous question, **you must** implement a Java class `CardGame` with the following methods:
   a) (2 points) A class method that, given two `Card` objects and an integer which represents the winner figure, determines which is the most powerful card. The method must return 0 if the two cards are the same. In other case, it must return -1 when the first card is the most powerful and 1 when the second card is the most powerful.

      To determine the most powerful card you must use the following rules:
      - If the two cards are of the same figure, the most powerful card is the ace (number 1), and in the rest of cases the higher number is the most powerful (e.g., "1 of oros" wins to "7 of oros", "5 of copas" wins to "2 of copas", "11 of bastos" wins to "7 of bastos").
      - If the two cards are of different figures:
        - If any card pertains to the winner figure, it is more powerful than the other.
        - In other case, the first card is always more powerful than the other.

b) (2 points) A `main` method in which you must:

1. Create a `Card` object with a given `figure` and `value` (you must ask the user for their values), and show its data on the screen.
2. Create a random `Card` object and show its data on the screen.
3. Randomly generate an integer in the range $[0, \ldots, 3]$ that represents the winner figure, and show it on the screen.
4. Show on the screen which `Card` wins (by using the previously implemented method); the first `Card` parameter must be the `Card` object generated by the user input.

Solution:

Card.java

```
public class Card {
  public static final int OROS=0;
  public static final int COPAS=1;
  public static final int ESPADAS=2;
  public static final int BASTOS=3;

  private int figure;
  private int value;

  public Card() {
    figure=(int) Math.floor(Math.random()*4);
    value=(int) Math.floor(Math.random()*12)+1;
  }

  public Card(int f, int v) {
    figure=f; value=v;
  }

  public int getFigure() { return figure; }
  public int getValue() { return value; }

  public void setFigure(int f) { figure=f; }
  public void setValue(int v) { value=v; }

  public boolean isLower(Card c) {
    return ((this.figure*12+this.value)<(c.figure*12+c.value));
  }

  public Card nextFig() {
    return new Card((this.figure+1)%4,this.value);
  }

  public boolean equals(Object o) {
    return ( (o instanceof Card) &&
             (this.figure==((Card) o).figure) &&
             (this.value==((Card) o).value) );
  }

  public String toString() {
    String res=value+" of ";
    switch(figure) {
      case OROS: res+="oros"; break;
      case COPAS: res+="copas"; break;
      case ESPADAS: res+="espadas"; break;
      case BASTOS: res+="bastos"; break;
    }
    return res;
  }
}
```

Card.java

CardGame.java

```
import java.util.*;

public class CardGame {
  public static int mostPowerful(Card c1, Card c2, int wf) {

    if (c1.equals(c2)) return 0;

    if (c1.getFigure()==c2.getFigure()) {
      if (c1.getValue()==1) return -1;
      else if (c2.getValue()==1) return 1;
      else if (c1.getValue()>c2.getValue()) return -1;
      else return 1;
    }
    else {
      if (c1.getFigure()==wf) return -1;
      else if (c2.getFigure()==wf) return 1;
      else return -1;
    }
  }

  public static void main(String args []) {
    Scanner kbd=new Scanner(System.in);
    System.out.print("Input the figure for your card (0=OROS, 1=COPAS, 2=ESPADAS, 3=BASTOS): ");
    int f=kbd.nextInt();
    System.out.print("Input the value for your card (1,...,12): ");
    int v=kbd.nextInt();
    Card c1=new Card(f,v);
    System.out.println("Your card is: "+c1);

    Card c2=new Card();
    System.out.println("My random card is: "+c2);

    int wf=(int) Math.floor(Math.random()*4);
    System.out.print("The winner figure is ");
    switch(wf) {
      case Card.OROS: System.out.println("oros"); break;
      case Card.COPAS: System.out.println("copas"); break;
      case Card.ESPADAS: System.out.println("espadas"); break;
      case Card.BASTOS: System.out.println("bastos"); break;
    }

    int winner=mostPowerful(c1,c2,wf);
    if (winner==0) System.out.println("They are the same card, what a coincidence!");
    else if (winner==-1) System.out.println("Your card ("+c1+") wins over mine ("+c2+")");
    else System.out.println("My card ("+c2+") wins over yours ("+c1+")");

  }
}
```

CardGame.java