Lab13: Card Game, Concentration Using Array of Cards

https://www.youtube.com/watch?v=492bM_dhdR4

Day 1:

Part 1: Creating the Card class.

a. Create a Card class that stores int face, suit,
   where:
      1 = spade, 2 = heart, 3 = clover, 4 = diamond.
      1 = A, 2-10 = 2-10, 11 = J, 12 = Q, 13 = K.

b. Cards can also either be face up or face down, so make another instance variable called isFaceUp.

c. Create 2 Card constructors.

d. In the Card class, create a function called cardToString(). toString() functions are to make your data type look "correct" not "texty." So we wouldn't make cardToString() return "Spade Three" or "This card is a spade three." because that is not a useful representation of our data. Instead, return "S3" for Spade 3. We prefer "S3" over "Spade 3" so that we can print a whole board of cards. For consistent spacing, represent 10's (the only 2 character face value) with X's. For example, heart 10 should be "HX" instead of "H10". If the Card is face down, return "??" instead. Account for null.

Part 2: Creating the Concentration class.

a. Create a Concentration class that does not store any instance variables. Because we will not be creating any Concentration objects, we do not need any constructors either.

b. Create a static void printBoard() function that takes in a 2-d array of Cards and prints them face up or face down. You may not assume the 2d array will always be 7x8, but you may assume it will be rectangular (ie, same number of columns in each row). If they are face down, you should print "??" instead. Remember that to use Card functions, you have to write `Card.cardToString()`. Include row and column headers. Ex,

```
        1       2       3       4       5       6       7       8
1       SA      S2      S3      S4      S5      S6      S7      S8
2       S9      SX      SJ      SQ      SK      HA      H2      H3
3       H4      H5      H6      H7      H8      H9      HX      HJ
4       HQ      HK      CA      C2      C3      C4      C5      C6
5       C7      C8      C9      CX      CJ      CQ      CK      DA
6       D2      D3      D4      D5      D6      D7      D8      D9
7       DX      DJ      DQ      DK
```

c. For testing purposes, create a printBoardFaceUp() function.

Part 3: Testing your code in the Main class.

a. Create an ordered deck of cards (starting at spade A, ending at diamond K) and print it out. Remember that to use Card functions, you have to write Card.cardToString().

b. Create an 7x8 2d array of Cards, filled in order (spade A is upper left, then fill out to the right and down). Print the board using Concentration.printBoardFaceUp() and Concentration.printBoard().

Day 2:

Part 4: Create the Concentration game

a. In the Concentration class, create a function that returns a randomized deck.

```
public static Card[] createRandomDeck();
```

b. In the Concentration class, create a function that returns a 7x8 board, filled with random cards, all face down.

```
public static Card[][] createRandomBoard();
```

c. In the Concentration class, create a play() function that does the following:

1. Create a random board.
2. Keep track of 2 players taking alternating turns and their score.
3. If a player matches 2 cards, they get to go again.

Part 5: Optional challenge

a. Allow for any positive number of players.

b. Allow for any of the players to be either human or CPU. Create a function for the CPU that returns their move as {row,column}.