Kerry Ojakian's CSI 32 Class

HW #2

General Instructions:

- Homework must be put in a your dropbox folder; if there are multiple parts, create a single folder for the assignment. Make sure you give clear names to your files and folders.
- Remember that you must work on your own without help from anyone (that includes classmates and tutors).

The Assignment

1. Take the complete Dice Poker program from class and add code to it so that it does error checking. Once you add error checking, no matter what the user types in, the program should never crash and always operate in a reasonable manner that follows all the rules of the game. Also, add code to it to make it print out and interact with the user in a slicker fashion.
2. Create a class called `Line` which is meant to represent a line on the plane. You should use the `Point` class that we developed. The `Point` class should be used in the `Line` class. The class `Line` has the following methods.
   (a) The initializer takes two tuples (each of length 2) as inputs which represent the 2 points that define the line (for example, we might create a `Line` by writing `L = Line((3,4),(5,8))`).
   (b) Write a method `slope` which takes no inputs and returns the slope of the line. For example, on the line above, `L.slope()` should return 2. Return the string 'undefined' if the slope is undefined.
   (c) Write a method `onLine` which takes one tuple (of length 2) as input, which is meant to represent a point. It returns a boolean: `True` if the given point is on the line, and `False` if it is not.
   (d) Override the '<=' so that in comparing 2 lines, it returns a boolean: `True` if the second line has a slope that is at least as large as the first, and `False` otherwise.
   (e) Override the '+' so that you can add a `Line` object and a `Point` object (i.e. the `Line` first and the `Point` second). The result should be a `Line` object which is shifted according to the point, i.e. if the point has coordinates (x, y), then every point on the line is shifted x steps in the horizontal direction and y steps in the vertical direction.

(f) (**Extra Credit**) Write a method `getEquation` which takes no inputs, but returns the equation of the line as a string. If it can, it should return a string of the form "y = mx + b", though it should also return an appropriate string if the line is horizontal or vertical.

3. The Switch or Stay Game is the following game: There are 3 cards, where one says "Winner" and the other two say "Loser". The dealer places them randomly facedown, so the player cannot see what is written on them, but the dealer knows where the Winner is. The player chooses a card, leaving it facedown. The the dealer turns over one of the other two cards, making sure she turns over a Loser (since she knows where it is, she can do this). Then the player keeps his original card or switches to the other card that was not yet turned over. The player wins if he ends up with the Winner.

   Our goal is to write a program in which the user is prompted for a strategy as a string of S's and W' (Example: 'SWSSWWW'). The program will then simulate the switch/stay game one time for each letter, where an S means the player will stay with his original choice, and a W means he will switch. At the end of simulating all the games, the program should nicely report on the outcome, i.e. at least indicating the number of games played and the percentage of wins. In the above example (with input 'SWSSWWW'), the program will simulate one game in which the player stays, then a game in which he switches, and so on. Then the program will print out the results of the simulations. Note: In order to keep the printout from being too large, just print out the final result of the simulation; do not print out the result of each step.

   (a) Before doing anything, what is your guess: Should the player stay, switch, or does it not matter?

   (b) Write a design specification for your program. This should contain no code, and not even any pseudo code. It should just precisely describe what the program will do. Use a program like microsoft word or some text editor to do this.

   (c) Your goal is to create an object oriented program. In fact you must have a Give a complete design for the program using a UML class diagram. *You should include at least one class that deals with the 3 cards and another class that keeps track of the statistics of the game results.*

   (d) NOW ... You submit the above 3 items BEFORE going on to the program. When you get my OK, then, and only then, go on to the next step!! (so think hard before submitting the above 3 items)

   (e) Now write the program, following your design.