Homework #2
RELEASE DATE: 10/14/2015
DUE DATE: 11/02/2015, 12:00 (NOON)

As directed below, you need to upload your submission files to the github repository under the exact guidelines of the TAs.

Any form of cheating, lying or plagiarism will not be tolerated. Students can get zero scores and/or fail the class and/or be kicked out of school and/or receive other punishments for those kinds of misconducts. Discussions on course materials and homework solutions are encouraged. But you should write the final solutions alone and understand them fully. Books, notes, and Internet resources can be consulted, but not copied from.

Since everyone needs to write the final solutions alone, there is absolutely no need to lend your homework solutions and/or source codes to your classmates at any time. In order to maximize the level of fairness in this class, lending and borrowing homework solutions are both regarded as dishonest behaviors and will be punished according to the honesty policy.

Only English is allowed for writing any part of your homework. We do not accept any other languages.

1 Description

Your game in HW1 marks the beginning of the POOCasino. Now the POOCasino is ready to expand. You, as its core programmer, intend to implement the popular "Jacks or Better" game in the casino. "Jacks or Better" is a single-player video poker game. Please check `http://en.wikipedia.org/wiki/Video_poker#Jacks_or_Better` for some information about the game. The game is played with P-dollars—virtual money in the POO BBS System. Upon entering the game, the computer would first show the information of you, the sacred author. Then, the player will be asked to enter her/his name and will be given 1000 P-dollars. Each round of the game can be roughly described as follows:

(1) The computer virtually opens a new deck of 52 cards, and shuffles it.

(2) The player can choose to bet 1 to 5 P-dollars for the round. The P-dollars are immediately deducted by the computer.

(3) The computer distributes the player 5 cards from the shuffled deck.

(4) The player can choose to keep none, 1, 2, $\cdots$, to 5 cards out of those 5 on hand. Then, other cards are discarded and replaced with new cards from the shuffled deck.

(5) The computer then determines the best hand to describe the final 5 cards. The hands, sorted from the "best" to the "worst", are as follows:

- royal flush: A, K, Q, J, 10 with exactly the same suit
- straight flush: five cards of sequential values (a.k.a. ranks) and exactly the same suit
- four of a kind: four matching cards of one value and an unmatched card of another value
- full house: three matching cards of one value and two matching cards of another value
- flush: all five cards are of the same suit
- straight: five cards of sequential values
- three of a kind: three matching cards of one value and two unmatched cards of other values
- two pair: two matching cards of one value, two matching cards of another value and an unmatched card of yet another value
- Jacks or better: two matching cards of J, Q, K or A and three unmatched cards of other values
- others

For straight-related hands, 5, 4, 3, 2, A to A, K, Q, J, 10 are allowed.

(6) The computer then pays the user `payoff` P-dollars, determined by the P-dollars bet by the user and the payoff table below.

hand	1 P-dollar	2 P-dollars	3 P-dollars	4 P-dollars	5 P-dollars
royal flush	250	500	750	1000	4000
straight flush	50	100	150	200	250
four of a kind	25	50	75	100	125
full House	9	18	27	36	45
flush	6	12	18	24	30
straight	4	8	12	16	20
three of a kind	3	6	9	12	15
two pair	2	4	6	8	10
Jacks or better	1	2	3	4	5
others	0	0	0	0	0

The screen output of your program will be something like

```
POOCasino Jacks or better, written by b86506054 Hsuan-Tien Lin
Please enter your name: CharlieL
Welcome, CharlieL.
You have 1000 P-dollars now.
Please enter your P-dollar bet for round 1 (1-5 or 0 for quitting the game): 3
Your cards are (a) SA (b) HA (c) D5 (d) C3 (e) C2
Which cards do you want to keep? acde
Okay. I will discard (b) HA.
Your new cards are SA D4 D5 C3 C2.
You get a straight hand. The payoff is 12.
You have 1009 P-dollars now.
Please enter your P-dollar bet for round 2 (1-5 or 0 for quitting the game): 0
Good bye, CharlieL. You played for 1 round and have 1009 P-dollars now.
```

You can assume (for fun) that the player always have more than 100 P-dollars on hand. You are suggested to use the following classes to implement the game.

- a "Card" class that represents one of the 52 cards in a standard deck of playing cards
- a "Shuffler" class that implements the shuffling of N decks as described above (hint: read or use the `RandomIndex.java` on the course website)
- a "Computer" class that contains the actions of the computer
- a "Player" class that interacts with the decisions from the human player
- a "POOCasino" class that demonstrates the game

The structure above is only a suggestion. If you think you have a better design, you can contact the TAs for an approval of your own program structure and illustrate them in your report for bonus points.

We expect you to use suitable **class definitions**, **constructors**, **instance variables**, **instance methods** to finish the task. All those components are covered by the course materials on or before the 10/12 classes. We will teach topics of **encapsulation** and **static** in the next classes that you may (or may not) find useful. You are not required to use those coming topics, but you are encouraged to try.

2 Requirements

- Write the code that implement the classes described above. Note that readability of your source code would be worth 20 points out of 200 this time. That is, your grading TA would give you points based on the following qualitative measure:

  20 very readable

  16 readable

  12 mostly readable, but with some unreadable parts

  8 mostly unreadable, but with some readable parts

4 unreadable

0 very unreadable

Also, the TAs will qualitatively justify whether you have appropriately used the components (see the end of Section 1 above) for the task.

- Write a short report with at **most** three A4 pages **IN ENGLISH** that contains the following items:

  (1) your name and school ID

  (2) how a human player should play with your program

  (3) how you tested the correctness of your program

  (4) the output from three rounds of the game from your program

  (5) any part that you implemented that is worth getting "bonus" points

  You should submit your report in **PDF** format.

3 Submission File

Please submit your code with github as directed in the homework submission guide. Your directory structure should be

- `src/*`, your source code
- `Makefile`, where the TAs can use `make` on CSIE R217 linux machines to compile your code, and then `make run` to test your program
- a PDF file `report.pdf`, which is your report file written in English

Please do not include any other files (e.g. class files) in the repository. Otherwise you may lose some points.