Project 4

Your task is to write a program that plays a simple card game with one to four players, one of which is a human while the remaining are computer players. The game uses a deck of 52 cards. Each card has a value (either a number 2 through 10 or a label jack, queen, king, or ace) and a suit (hearts, diamonds, clubs or spades). The objective of the game is to get four cards with the same value. For example, the 8 of hearts, diamonds, clubs and spades.

At the beginning of the game, the cards are shuffled and each player is given four cards. The remaining cards are placed into a "draw pile." There is another pile called the "discard pile" that starts out empty.

If no player has been dealt a winning hand, the players take turns until one of them wins. At each turn the player can either draw a new card from the draw pile or pick up the top card from the discard pile. The player then discards a card, so that the number of cards in their hand remains at four.

Randomly choose a player to go first. Because the discard pile starts out empty, the first player must initially pick up a card from the draw pile. After that, the first player must select a card to put into the discard pile. This can either be the card they drew or one that was already in their hand. If the first player now has four cards with the same value, they win. Otherwise, it is the next player's turn.

The second player can either draw a card from the draw pile or pick up the card that the first player put onto the discard pile. Then the second player must place one of their cards onto the discard pile. If the second player now has four cards with the same value, they win. Otherwise, it is the next player's turn.

This process repeats until one player wins. At that point, the game should display the message "You win!" if the human player won or "I win!" if a computer player won. The program should then terminate.

If the draw pile becomes empty before someone has won, take all of the cards from the discard pile, shuffle them, and put them into the draw pile. On the next turn, the player must draw from the draw pile since the discard pile will be empty.

An example execution of this game for one human player and one computer player is shown in the program output below. A rubric explaining how you will be graded follows the example.

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Your cards are:
     Queen of Hearts
     Seven of Hearts
     Eight of Hearts
     Seven of Diamonds
The discard pile is currently empty -- you must draw a card
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You drew the Five of Spades
Now your cards are:
      1. Queen of Hearts
      2. Seven of Hearts
      3. Eight of Hearts
      4. Seven of Diamonds
      5. Five of Spades
Which one do you want to discard? 1
I will draw a new card.
I will discard the Two of Spades
Your cards are:
      Five of Spades
      Seven of Hearts
      Eight of Hearts
      Seven of Diamonds
The top card in the discard pile is the Two of Spades
Do you want to pick up the Two of Spades (1) or draw a card (2)? 2
You drew the Queen of Diamonds
Now your cards are:
      1. Five of Spades
      2. Seven of Hearts
      3. Eight of Hearts
      4. Seven of Diamonds
      5. Queen of Diamonds
Which one do you want to discard? 1
I will pick up the Five of Spades
I will discard the Six of Diamonds
Your cards are:
      Queen of Diamonds
      Seven of Hearts
      Eight of Hearts
      Seven of Diamonds
The top card in the discard pile is the Six of Diamonds
Do you want to pick up the Six of Diamonds (1) or draw a card (2)? 2
You drew the Five of Diamonds
Now your cards are:
      1. Queen of Diamonds
      2. Seven of Hearts
      3. Eight of Hearts
      4. Seven of Diamonds
      5. Five of Diamonds
Which one do you want to discard? 1
I will draw a new card.
I will discard the King of Spades
Your cards are:
      Five of Diamonds
      Seven of Hearts
      Eight of Hearts
      Seven of Diamonds
The top card in the discard pile is the King of Spades
Do you want to pick up the King of Spades (1) or draw a card (2)? 2
You drew the Nine of Diamonds
Now your cards are:
      1. Five of Diamonds
      2. Seven of Hearts
      3. Eight of Hearts
      4. Seven of Diamonds
      5. Nine of Diamonds
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Which one do you want to discard? 5
I will draw a new card.
I will discard the Queen of Spades
Your cards are:
        Five of Diamonds
        Seven of Hearts
        Eight of Hearts
        Seven of Diamonds
The top card in the discard pile is the Queen of Spades
Do you want to pick up the Queen of Spades (1) or draw a card (2)? 2
You drew the Six of Spades
Now your cards are:
        1. Five of Diamonds
        2. Seven of Hearts
        3. Eight of Hearts
        4. Seven of Diamonds
        5. Six of Spades
Which one do you want to discard? 5
I will draw a new card.
I will discard the Four of Clubs
Your cards are:
        Five of Diamonds
        Seven of Hearts
        Eight of Hearts
        Seven of Diamonds
The top card in the discard pile is the Four of Clubs
Do you want to pick up the Four of Clubs (1) or draw a card (2)? 2
You drew the Seven of Spades
Now your cards are:
        1. Five of Diamonds
        2. Seven of Hearts
        3. Eight of Hearts
        4. Seven of Diamonds
        5. Seven of Spades
Which one do you want to discard? 3
I will draw a new card.
I will discard the Ten of Diamonds
Your cards are:
        Five of Diamonds
        Seven of Hearts
        Seven of Spades
        Seven of Diamonds
The top card in the discard pile is the Ten of Diamonds
Do you want to pick up the Ten of Diamonds (1) or draw a card (2)? 2
You drew the King of Diamonds
Now your cards are:
        1. Five of Diamonds
        2. Seven of Hearts
        3. Seven of Spades
        4. Seven of Diamonds
        5. King of Diamonds
Which one do you want to discard? 5
I will draw a new card.
I will discard the Three of Diamonds
Your cards are:
        Five of Diamonds
        Seven of Hearts
        Seven of Spades
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        Seven of Diamonds
The top card in the discard pile is the Three of Diamonds
Do you want to pick up the Three of Diamonds (1) or draw a card (2)? 2
You drew the Three of Clubs
Now your cards are:
        1. Five of Diamonds
        2. Seven of Hearts
        3. Seven of Spades
        4. Seven of Diamonds
        5. Three of Clubs
Which one do you want to discard? 5
I will draw a new card.
I will discard the Seven of Clubs
Your cards are:
        Five of Diamonds
        Seven of Hearts
        Seven of Spades
        Seven of Diamonds
The top card in the discard pile is the Seven of Clubs
Do you want to pick up the Seven of Clubs (1) or draw a card (2)? 1
Now your cards are:
        1. Five of Diamonds
        2. Seven of Hearts
        3. Seven of Spades
        4. Seven of Diamonds
        5. Seven of Clubs
Which one do you want to discard? 1
You win!
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Your program will be graded according to this rubric:

[45 points] The basic gameplay is implemented as described.

[15 points] The computer players display some "intelligence" in choosing its actions (i.e. they don't rely solely on random number generation).

[15 points] Data structures are chosen and utilized appropriately.

[15 points] Good object-oriented development principles are followed. The program is logically organized into classes with appropriate fields and methods. The Model-View-Controller design pattern is followed.

[10 points] The code is clearly written, including following standard coding conventions and containing meaningful comments.

Extra credit opportunity: You can implement a GUI version of this application for one point of extra credit on your overall grade in the course.