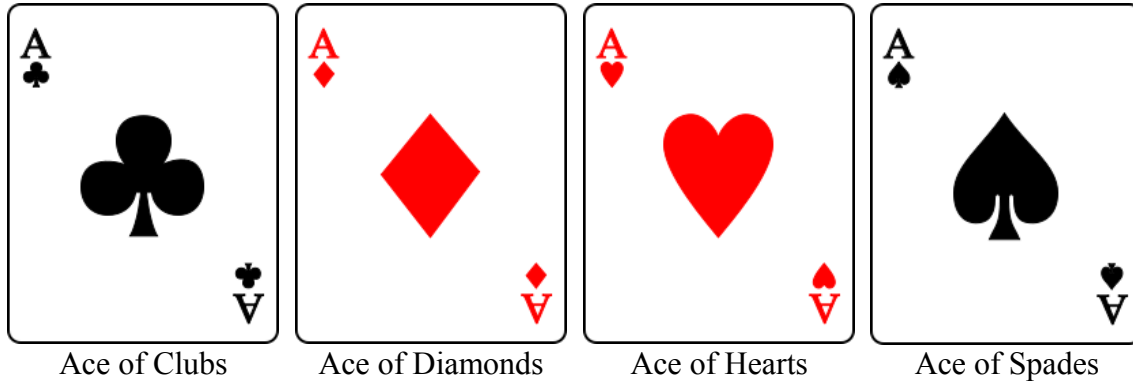


COMP 1451 – Assignment #1 (50 points)

Due: 11:59 p.m. the night before session 5

1451 Blackjack



Your first assignment is a simplified game similar to Blackjack to be played by a single player. The player will give his/her instructions through the keyboard. This game does not involve betting and the player is not playing against a dealer.

The game requires four classes:

Card models one card. The Card class has three fields: description, suit and value.

- There are 13 possible valid descriptions: “Ace”, “Two”, ..., “Ten”, “Jack”, “Queen”, “King” and a 14th, “Joker”.
- There are four suits: “Clubs”, “Diamonds”, “Hearts”, “Spades”.
- The class must have a default constructor that initializes description to “Joker”, suit to “Spades” and value to zero.
- The class must also have a non-default constructor that expects description and suit as String parameters.
- The non-default constructor will call set methods that validate their parameters.
- Method `setDescription(String description)` will accept as valid only the 13 descriptions above (case insensitive). If an invalid description is passed in, the method will set description to “Joker”.
- Method `setSuit(String suit)` will accept as valid only the four suits listed above (case insensitive). If an invalid suit is passed in, the method will set suit to “Spades”.
- Method `setValue(String description)` will set the int value field, with “Ace” having the value 11, “Jack”, “Queen” and “King” having the value 10 and all other cards having the value that corresponds to their description. As outlined above, a card with an invalid description will be a “Joker” with value 0.
- The class must have standard get methods for all fields.

Deck models a deck of 52 cards. The cards are stored in an ArrayList of Card. Deck has a method to:

- Add a single card to the arraylist.
- Add all 52 valid cards to the arraylist.
- Remove the first card from the arraylist and return it. This method must ensure the arraylist is not empty before attempting to remove a card. If the arraylist is empty the method returns null.
- Display on the screen all cards in the arraylist in this format: "Two of Spades".
- Shuffle the cards in the arraylist so that they are randomized.

InputReader provides a method to get String input from the keyboard.

Game contains the game logic. This class has a Deck field, an InputReader field, and an ArrayList of Card to hold the player's cards (the player's "hand").

- The game is run from the `play()` method, the only public method in the class.
- Suggested private "helper" methods called from `play()`:
`private void intro()` // intro message to player
`private void dealCard()` // deals a card to the player
`private int getHandValue()` // calculates hand value
`private void showHand()` // displays contents of hand
`private boolean hasBlackjack()` // is hand value 21?
`private boolean isBusted()` // is hand value above 21?
`private boolean isStanding()` // has player chosen to "stand"?
`private void report()` // final report of points
- The object of our simplified game is to get 21 points in a hand of cards. A hand that goes over 21 is a "bust". If the player busts, the player loses.
- The game begins with a new, shuffled deck. The game ends when the player chooses to stop.

Here are the specifications for a round of 1451 Blackjack:

- Deal two cards to the player.
- Show the player's cards by writing their information to the terminal, e.g.
player's hand:
Queen of Hearts
Nine of Spades
Hand value: 19
- Calculate and display the value of the hand. Face cards (king, queen, jack) are counted as 10. **An ace is counted as 11 unless that would cause a bust, in which case it is counted as 1.** Other number cards are counted at their numeric value.

- If the player's cards total 21, that constitutes Blackjack and is an immediate win (see below).
- If the player has not scored Blackjack, the player decides whether to "hit" or "stand". Prompt the player to type their choice, and read in their choice from the keyboard. A hit consists of another card dealt from the deck. The player's turn continues until the player gets Blackjack, decides to stand or busts (goes over 21).
- Determine the player's points. A bust is zero points. A stand with a hand of less than 17 is zero points. A stand with a hand of less than 21 is one point. Blackjack (a hand of exactly 21) is five points.
- Ask the player if they want to play another round. Continue until the player chooses to stop.
- If the deck runs out of cards during play, replace it with a new shuffled deck.
- Report the total points earned and the total number of rounds played.

Suggested plan of attack:

- Start with the Card class. **Test thoroughly.** Move on to the Deck class. **Test thoroughly.** Add the InputReader. If you have not previously worked with an input reader, ask your classmates, TA or instructor for suggestions.
- Work out the logic for the Game class' play() method. It is important to break the complex logic into several small methods that perform a single task each. See the signatures of suggested private methods on the previous page.
- **Start early** so that you have time to ask questions.
- Post questions in D2L.
- When you get stuck, walk away and think about the problem while doing something else.
- **Test thoroughly.**

What to turn in:

- Your completed project.
- Proof of testing. In the BlueJ terminal window, turn on Unlimited buffering, and play your game. Copy the output from the terminal window into a text (or Word) file. If you find any errors (bugs) that you do not have time to fix, report them at the end. If you think everything is working correctly, report this at the end. See the sample output at the end of this document.

Marks will be given for:

- Comments – appropriate and complete. Be sure to use appropriate Javadoc tags.
- Style – see the style guide Appendix J in your textbook.
- Correctness and completeness – code meets the requirements listed above.
- Testing – documentation of testing is thorough, and any remaining bugs are reported.

Create a .zip file containing your entire BlueJ project and the Word (or text) document. Name the .zip file with your name and the assignment number, e.g. "WongSusanAssign1.zip". Upload the file to the assignment dropbox before the cutoff time.

Sample output from playing 1451 Blackjack.

```
Welcome to 1451 Blackjack!
You will start with two cards.
You will be prompted to 'hit' or 'stand'
'hit' means you want another card, 'stand' not.
You are trying to get Blackjack with exactly 21 points.
```

```
Blackjack!
Your cards:
Ace of Spades
Jack of Spades
Hand value: 21
```

```
Another round? Type yes or no > yes
Your cards:
Two of Diamonds
Four of Hearts
Hand value: 6
```

```
Your choice: hit or stand? > hit
Your cards:
Two of Diamonds
Four of Hearts
Three of Diamonds
Hand value: 9
```

```
Your choice: hit or stand? > hit
Your cards:
Two of Diamonds
Four of Hearts
Three of Diamonds
Three of Spades
Hand value: 12
```

```
Your choice: hit or stand? > hit
Your cards:
Two of Diamonds
Four of Hearts
Three of Diamonds
Three of Spades
```

Four of Diamonds
Hand value: 16

Your choice: hit or stand? > hit
Your cards:
Two of Diamonds
Four of Hearts
Three of Diamonds
Three of Spades
Four of Diamonds
Ace of Spades
Hand value: 17

Your choice: hit or stand? > hit
Your cards:
Two of Diamonds
Four of Hearts
Three of Diamonds
Three of Spades
Four of Diamonds
Ace of Spades
Three of Clubs
Hand value: 20

Your choice: hit or stand? > stand
Player stands
Your cards:
Two of Diamonds
Four of Hearts
Three of Diamonds
Three of Spades
Four of Diamonds
Ace of Spades
Three of Clubs
Hand value: 20

Another round? Type yes or no > yes
Your cards:
Two of Clubs
Five of Diamonds
Hand value: 7

Your choice: hit or stand? > hit
Your cards:
Two of Clubs
Five of Diamonds
Eight of Diamonds

Hand value: 15

Your choice: hit or stand? > hit

Your cards:

Two of Clubs

Five of Diamonds

Eight of Diamonds

Five of Hearts

Hand value: 20

Your choice: hit or stand? > stand

Player stands

Your cards:

Two of Clubs

Five of Diamonds

Eight of Diamonds

Five of Hearts

Hand value: 20

Another round? Type yes or no > yes

Your cards:

Six of Diamonds

Six of Clubs

Hand value: 12

Your choice: hit or stand? > hit

You have busted!

Your cards:

Six of Diamonds

Six of Clubs

Ten of Spades

Hand value: 22

Another round? Type yes or no > no

Player points: 7

Total rounds: 4