

**Project 2**  
**< Blackjack >**

**CIS 5 - Section 47165**  
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## Introduction

Welcome to the captivating world of virtual blackjack! Immerse yourself in the excitement of this computerized version of the classic card game, where you can experience a little bit of fun on your own screen.

Just like in real-life blackjack, the objective remains the same: aim to obtain a hand value of 21 or get as close to it as possible, without surpassing it. In this simplified version, this blackjack is developed using the C++ programming language with the knowledge and materials learned in class.

Are you ready to challenge the digital dealer and rate this blackjack experience out of 10? Let the games begin!

## Summary

Project size: 453 lines

Step into the virtual world of blackjack, where the objective is to reach 21 without going over. This simplified version, created using C++, allows you to play against a computerized dealer. Experience the game and rate it out of 10 to help improve future versions. Get ready for an immersive adventure in the virtual "casino"!

## How the game works

This is the guideline to play the game blackjack, I created. These rules will be provided in the game as well. The rules are:

1. The game starts with each player placing their bet on the table (max bet: \$1000).
2. The dealer deals two cards to each player, including themselves. The dealer's first card is dealt face up (shown), while the second card is dealt face down (not shown).
3. The value of each card is as follows:
  - a. All numbered cards are worth their face value
  - b. Face cards (such as Jacks, Queens, and Kings) are worth 10, and
  - c. Aces are worth 1 or 11 based on the system itself.
4. Players can choose to hit (receive another card) or stand (keep their current card) in order to get as close to 21 as possible without going over. Players can continue to hit until they decide to stand, or until they go over 21, or known as a bust.
5. Once the player has completed their turn, the dealer reveals their hole card and hits or stands according to a set of predetermined rules"

6. If the dealer busts, the player wins their bets. If the dealer does not bust, then the player and the dealer with the hand value closest to 21 without going over win. If the player's hand value is the same as the dealer's, it is a tie, and the player's bet is returned.

## **My Approach to the Game**

The game will start with an opening screen that consists of a welcome sign and a menu to choose from. With every menu chosen by the user and accomplishing each menu, the system will ask if the user with to proceed or repeat the game or exit the game instead. Ratings will only appear if the user finishes a game.

## **Contracts and Concepts Utilized**

This project cover all the materials learned in the Spring 2023 semester. The chapters include Introduction to C++, Expressions and Interactivity, Making Decisions, Loops and Files, Functions, Arrays, and Searching and Sorting Arrays. For detailed implementation in the code, please refer to the spreadsheet attached to this file. In the spreadsheet, there will be two pages which are for Project 2 and 1 itself.

## **Development Summary**

### **Version 1**

The first version of this project 2, converts the last version of Project 1 to a version that applies functions. Repeated codes were formed in one function and re-called to be used again. Some functions were for the menu, the first option of the table of contents, the second, third, and rating.

### **Version 2**

In the second version, I revised a couple of mistakes that were found in this code. I also add an additional function to exit the program in each part of the game. With the exit function, it will allow the program to ask the user if the user wants to stay in the game or not.

### **Version 3**

In the third version, I added the face cards and card suits for the game. As for Project 1, this blackjack has only been a game to obtain a number that is 21 or closer to 21. Now, for the second project, I added the face cards and card suits that we have in a card game.

## Version 4

In the fourth version, the modification that I did was simplifying the program's code and adding a returning boolean and defaulted arguments.

## Version 5

This version is where arrays and sorts are implemented in the program. The program will run but no specific changes were made for the output.

## Version 6

I fixed and try a few things in the code. No specific things were made and influenced the output.

## Version 7

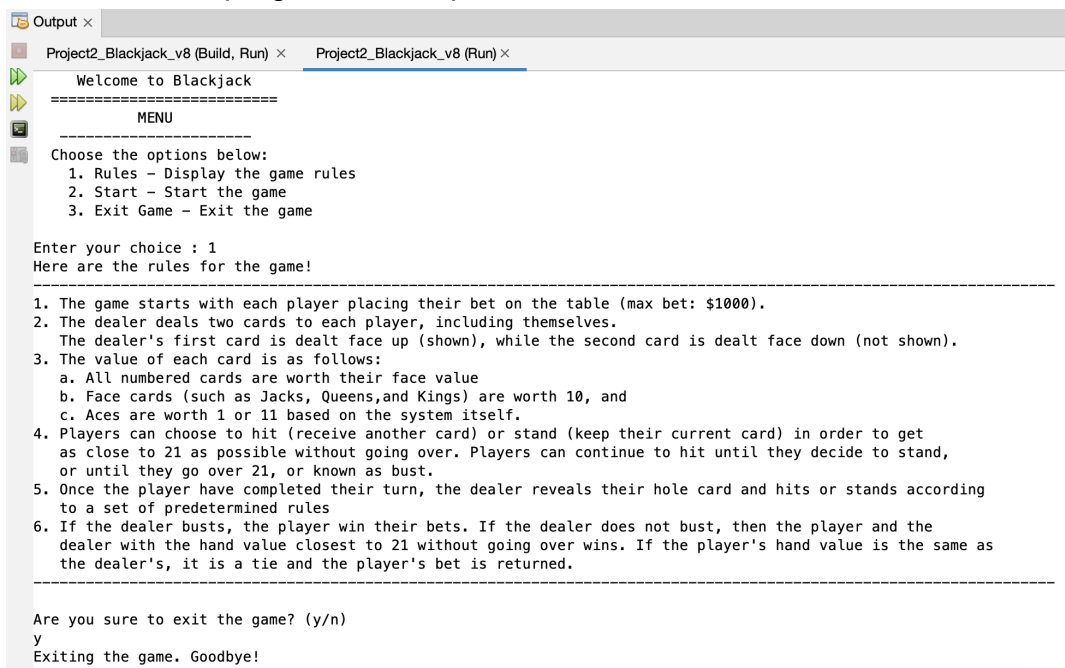
In this version I tried to implement overloading functions and fix some problems that occurred in the output.

## Version 8

This version is the last version of the second project. Users can run the code and play the game. Starting of with the menu, every time user inputs an invalid option, the code will run again and ask for another input. After finishing a round of the game, players are asked to rate the game.

## Sample Input and Outputs

This is how the program will output with the latest version:



```

Output x
Project2_Blackjack_v8 (Build, Run) x Project2_Blackjack_v8 (Run) x
Welcome to Blackjack
=====
MENU
=====
Choose the options below:
1. Rules - Display the game rules
2. Start - Start the game
3. Exit Game - Exit the game

Enter your choice : 1
Here are the rules for the game!
-----
1. The game starts with each player placing their bet on the table (max bet: $1000).
2. The dealer deals two cards to each player, including themselves.
   The dealer's first card is dealt face up (shown), while the second card is dealt face down (not shown).
3. The value of each card is as follows:
   a. All numbered cards are worth their face value
   b. Face cards (such as Jacks, Queens, and Kings) are worth 10, and
   c. Aces are worth 1 or 11 based on the system itself.
4. Players can choose to hit (receive another card) or stand (keep their current card) in order to get
   as close to 21 as possible without going over. Players can continue to hit until they decide to stand,
   or until they go over 21, or known as bust.
5. Once the player have completed their turn, the dealer reveals their hole card and hits or stands according
   to a set of predetermined rules
6. If the dealer busts, the player win their bets. If the dealer does not bust, then the player and the
   dealer with the hand value closest to 21 without going over wins. If the player's hand value is the same as
   the dealer's, it is a tie and the player's bet is returned.
-----

Are you sure to exit the game? (y/n)
y
Exiting the game. Goodbye!
  
```

```

Project2_Blackjack_v8 (Build, Run) × Project2_Blackjack_v8
Welcome to Blackjack
=====
MENU
-----
Choose the options below:
  1. Rules - Display the game rules
  2. Start - Start the game
  3. Exit Game - Exit the game

Enter your choice : 2
Let's Start!
Place your bet. (Bet should be less than $1000)
245
You put a bet for $ 245.00

Dealer's Card #1: 4 Club

Player's Card #1: Ace Club
Player's Card #2: 3 Club
Player's Total : 14

Player does not have a card with value 21
Please proceed the game.

Do you want to hit or stand? (H/S)
H

Player's new card: 4 Club
Player's Total : 18

Player does not have a card with value 21
Please proceed the game.

Do you want to hit or stand? (H/S)
H

Player's new card: 9 Club
Player's Total : 27

Player busts, dealer wins!
You lose your bet of $245.00

THANK YOU FOR VISITING BLACKJACK!
Please rate us starting from 1-10
Enter a number between 1 and 10: 9
You have rated this program as good.
Thank you for rating this program! Hope you enjoy your visit!

Are you sure to exit the game? (y/n)
y
Exiting the game. Goodbye!

RUN FINISHED; exit value 0; real time: 1m 16s; user: 0ms; system: 0ms

```

```

Project2_Blackjack_v8 (Build, Run) × Project2_Blackjack_v8 (Run) ×
Welcome to Blackjack
=====
MENU
-----
Choose the options below:
1. Rules - Display the game rules
2. Start - Start the game
3. Exit Game - Exit the game

Enter your choice : 3
Are you sure to exit the game? (y/n)
n
Welcome to Blackjack
=====
MENU
-----
Choose the options below:
1. Rules - Display the game rules
2. Start - Start the game
3. Exit Game - Exit the game

Enter your choice : 3
Are you sure to exit the game? (y/n)
y
Exiting the game. Goodbye!

RUN FINISHED; exit value 0; real time: 7s; user: 0ms; system: 0ms

```

## Flowchart

There is a flowchart attached for the first project, which is an unfinished portion of Project 2.

## Reference

1. Dr. Lehr's Lectures and Lab
2. Gaddis, T. (2017). Starting out with C++ from control structures to objects (9th ed.). Pearson.

## Pseudocode

Include all system libraries: iostream, iomanip, cstdlib, ctime, fstream, string, cmath, vector

Function prototypes: first, menu(), display, def(int), toc1(), toc2(), toc3(), Rate(), vldRate(), exitGm(), printCS(int), printFV(int), slSt(int [], int), linSc(int [], int, int)

Begin main function with parameters int argc, char\*\* argv

Set random number seed using srand function with time(0) as argument

Begin main function

DO

    first()

    WHILE not exitGm()

End function

Begin Function first

    Declare Integer choice, inp

    Static Integer gmCnt = 0

    output "Welcome to Blackjack"

    output "=====

Do

    Call Function Menu, passing choice

    Switch choice

        Case 1: Call Function toc1

        Case 2: Call Function toc2

        Case 3: Call Function toc3

        Default: Call Function def, passing inp

    End Switch

While inp < 3

    Increment gmCnt

    output "Number of games played: " + gmCnt

End Function

Begin Function Menu, passing option

    Declare Boolean vldInp = False

    option = 0

    WHILE not vldInp

        Call Function display

        output ""

        output "Enter your choice" + option + ": "

        input option

        If option < 1 or option > 3



```

        Output Input invalid.
    ELSE vldInp is true
End Function

Begin Function Display
    Declaring
        const int OPTIONS equals to 3
        const string menuOpt[OPTIONS][2]
            {"1. Rules", "Display the game rules"},
            {"2. Start", "Start the game"},
            {"3. Exit Game", "Exit the game"}
    output "MENU"
    output "-----"
    output "Choose the options below:"
    Generate a for loop to print out the menu that is sorted in
    2D arrays
End Function

Begin Function Def
    output typing a value will exit the program.
End Function

Begin Function TOC1
    output the rules of the game
End Function

Begin Function TOC2
    Declaring variable
        int : card, faceVal, sum, sum2
        char : hsAns
        float : pBet
    Output start game
    Output betting time
    Input pBet
    IF pBet is greater than 1000
        Output invalid value
    ELSE pBet is within range

```

```

    IF pbet is less than 0
        Set pBet to the absolute value of pBet
    Output value of the user's bet in format

Set sum to 0
Generate a for loop which shuffles the deck for the dealer
Output dealer's first card

Declare
    int : pCrd[2], numPC = 2
Generate a for loop which shuffles the deck for the player
Generate a bubble sort for the player's cards
Call the slSt function
Output the player's first and second card
Set sum2 to 0
Generate a for loop to calculate player's total card
Output the value of the player's total card

WHILE sum and sum2 is less than 21, sum is less than sum 2,
sum2 is less than sum, and sum and sum2 is not equal to 21
    Generate a linear search if player's total card is
    not 21
        Declare scVal to 21
        Create a bool statement of found which calls
        linSc function
        IF bool is found
            output "Player has a card value"
        ELSE
            output "Player does not have a card with
            value 21"
            output "Please proceed the game"

Output message to ask if the player wants to hit or
stay
Input hsAns

IF hsAns is 'H' or 'h'

```

Generate a for loop to add cards for player  
Output new card  
Output player's new total

IF sum2 is greater than 21  
    Output message player busts and dealer wins!  
    Output the total loss of player's bet  
    Call rate function  
    Call exitGm function

IF sum2 is equal to 21  
    Output message player wins!!  
    Output the player's bet  
    Call rate function  
    Call exitGm function

ELSE IF hsAns is 'S' or 's'  
    Generate a for loop for dealers second card  
    Output dealer's second card  
    Output dealer's total

IF sum is less than 17  
    Initialize random card  
    Output dealer's new card  
    Call the printFV function  
    Call the printCS function  
    output dealer's total

IF sum is greater than 21  
    output dealer busts, player wins!  
    output congrats, player won their bet  
    Call the rate function  
    Call the exit function

IF sum is less than or equal to 21 and sum2 is  
less than or equal to 21  
    IF sum is greater than sum2  
        output dealer wins!

```

        output player's lost their bet
        Call the rate function
        Call the exit function

```

```

    ELSE IF sum is greater than 21
        output dealer busts, player wins!
        output congrats, player won their bet
        Call the rate function
        Call the exit function

```

```

    ELSE
        output it's a tie!
        output player got their bet back
        Call the rate function
        Call the exit function

```

```
End Function
```

```
Begin Function linSc
```

```

    Generate a for loop to search a particular number (21)
        IF arr[i] is key
            return true;
        return false

```

```
End Function
```

```
Begin Function printCS
```

```

    switch sign
        CASE 1
            output "diamond"
            Break
        CASE 1
            output "club"
            Break
        CASE 1
            output "heart"
            Break
        CASE 1
            output "spade"

```

Break

End Function

Begin Function printFV

IF value is 1 or 11

output "Ace "

ELSE IF value is greater or equal than 2 or less than 10

output value

ELSE IF value is equal to 10

output "Jack "

ELSE IF value is equal to 11

output "Queen "

ELSE IF value is equal to 12

output "King "

End Function

Begin Function slSt

Generate a single dimensioned as function arguments

Generate a wap to found the minimum val

End Function

Begin Function toc 3

Call exitGm function

End Function

Begin Function Rate

output "THANK YOU FOR VISITING BLACKJACK!"

output "Please rate us starting from 1-10"

Set inpRate to vldRate function

output "You have rated this program as " ratings[inpRate -  
1]

output "Thank you for rating this program! Hope you enjoy  
your visit!"

Return true

End Function

Begin Function Rate

```

    Input inpRate
    Declare variable
        string: rate
    look through the file which line is the input located
    Return rate(ratings)
End Function

```

```

Begin Function vldRate
    Declare variable
        int : inpRate;
        bool : validRating = false
    WHILE it is not validRating
        output "Enter a number between 1 and " ratings.size
        input inpRate
        IF inpRate is greater than or equal to 1 and less than
            or ratings.size
            validRating is true
        ELSE
            output "Invalid rating. Please try again!"
        Return inpRate
    End Function

```

```

Begin Function exitGm
    Declare variable
        char: ext
    output "are you sure to exit the game? (y/n)"
    Input ext
    IF ext is 'Y' or 'y'
        output "Exiting the game. Goodbye!"
        Call exit function
    ELSE
        Call first function
    Return true
End Function

```

## Code

```

/*
 * File:    main.cpp
 * Author: Aurelia Sindhunirmala
 *
 * Created on June 3, 2023, 11:00 PM
 * Purpose: Version 8 of Project 2
 *
 */

// System Libraries
#include <iostream>      //Input/Output library
#include <iomanip>        //Format library
#include <ctime>          //Set Random library
#include <cstdlib>        //Random Functions
#include <fstream>        //File Stream Library
#include <string>         //String
#include <cmath>          //Math Library
#include <vector>         //Vector Library
using namespace std;

//User Libraries

//Global Constants Math/Physics/Chemistry/Conversions ONLY!!!!

//Function Prototypes
void first();                //First page of the game
void Menu(int&);             //Menu for the first page
void display();              //Display menu
void def(int);               //Default switch case for menu
void toc1();                 //Menu option 1
bool toc2();                 //Menu option 2
void toc3();                 //Menu option 3
bool Rate();                 //Rate the game
int vldRate(const vector<string>&); //Validating Rate Input
bool exitGm();               //Exit game
void printCS(int);           //Print Card Suites
void printFV(int);           //Print Card Face Val
void slSt(int [], int);      //Selection sort

```

```

bool linSc(int [], int , int);      //Linear search

//Execution Begins HERE!!!!
int main(int argc, char** argv) {
    //Set random number seed
    srand(static_cast <unsigned int>(time(0)));

    //Declare variables

    //Initialize Inputs

    //Map Inputs to Outputs - Process
    do{
        first();
    }
    while (!exitGm());
    //Display output

    //Exit stage right
    return 0;
}

void first(){ //First page of the game
    //Declare variables
    int choice, inp;
    static int gmCnt = 0;

    //Display output
    cout<<setw(25)<<"Welcome to Blackjack"<<endl;
    cout<<setw(28)<<"===== "<<endl;

    do{
        Menu(choice);
        switch(choice){
            case 1:    toc1();break;
            case 2:    toc2();break;
            case 3:    toc3();break;
            default:    def(inp);
        }
    }
}

```



```

while (inp < 3);

// Increment gameCount
gmCnt++;
cout << "Number of games played: " << gmCnt << endl;
}

void Menu(int& option){    //Menu for the first page
    bool vldInp = false;
    option = 0;
    while (!vldInp){
        display();
        cout << endl << "Enter your choice ";
        if (option == '1' || option == '2' || option == '3') {
            cout << option;
        }
        cout << ": ";
        cin >> option;
        if (option < 1 || option > 3){
            cout << "Input invalid." << endl << endl;
        }
        else{ vldInp = true;}
    }
}

void display(){
    const int OPTIONS = 3;
    const string menuOpt[OPTIONS][2] = {
        {"1. Rules", "Display the game rules"},
        {"2. Start", "Start the game"},
        {"3. Exit Game", "Exit the game"}
    };

    cout << setw(16) << "MENU" << endl;
    cout << setw(25) << "-----" << endl;
    cout << setw(27) << "Choose the options below:" << endl;
    for (int i = 0; i < OPTIONS; i++) {
        cout << setw(12);
        if (i == OPTIONS - 1){
            cout << setw(16);

```

```

    }
    cout << menuOpt[i][0] << " - " << menuOpt[i][1] << endl;
}
}

void def(int inp = 0){ //Default switch case for menu
    cout<<endl<<"Typing "<<inp<<" exits the program."<<endl;
}

void toc1(){ //Menu option 1: Rules of the Game
    cout << "Here are the rules for the game!" << endl;
    cout << "-----" << endl;
    cout << "1. The game starts with each player placing their bet on
the table (max bet: $1000)." << endl;
    cout << "2. The dealer deals two cards to each player, including
themselves." << endl;
    cout << "    The dealer's first card is dealt face up (shown),
while the second card is dealt face down (not shown)." << endl;
    cout << "3. The value of each card is as follows: " << endl;
    cout << "    a. All numbered cards are worth their face value" <<
endl;
    cout << "    b. Face cards (such as Jacks, Queens,and Kings) are
worth 10, and" << endl;
    cout << "    c. Aces are worth 1 or 11 based on the system itself."
<< endl;
    cout << "4. Players can choose to hit (receive another card) or
stand (keep their current card) in order to get " << endl;
    cout << "    as close to 21 as possible without going over. Players
can continue to hit until they decide to stand, " << endl;
    cout << "    or until they go over 21, or known as bust."<<endl;
    cout << "5. Once the player have completed their turn, the dealer
reveals their hole card and hits or stands according" << endl;
    cout << "    to a set of predetermined rules" << endl;
    cout << "6. If the dealer busts, the player win their bets. If the
dealer does not bust, then the player and the" << endl;
    cout << "    dealer with the hand value closest to 21 without going
over wins. If the player's hand value is the same as " << endl;

```

```

        cout << "    the dealer's, it is a tie and the player's bet is
returned."<<endl;

                                                    cout <<
"-----"
-----" << endl;

    cout << endl;
    exitGm();
}

bool toc2(){    //Menu option 2
    //Declaring variables
    int card, faceVal, sum, sum2;
    char hsAns;
    float pBet;

    cout << "Let's Start!" << endl;
    cout << "Place your bet. (Bet should be less than $1000)"<<endl;
    cin >> pBet;
    if (pBet > 1000){
        cout << "Value exceed the maximum rule." << endl << endl;
    }
    else{
        if (pBet < 0){
            pBet = abs(pBet);
        }
        cout << fixed << showpoint << setprecision(2);
        cout << "You put a bet for $ " << pBet << endl << endl;

        //Set random of seed
        srand(static_cast <unsigned int>(time(0)));

        //Shuffle deck for dealer
        sum = 0;
        for (int i = 0; i < 1; i++) {
            card = rand() % 52 + 1;    //[1,52]
            faceVal = (card % 11) + 1;    //[1,11]
            sum += faceVal;
            cout << "Dealer's Card #1" << ": ";
            printFV(faceVal);

```

```

        printCS(rand() % 4 + 1); // Randomly generate and print
card sign
        cout << endl << endl;
    }

    //Shuffle deck for player
    int pCrd[2];
    int numPC = 2;
    for (int i = 0; i < numPC; i++) {
        card = rand() % 52 + 1;    //[1,52]
        faceVal = (card % 11) + 1;    //[1,11]
        pCrd[i] = faceVal;
        cout << "Player's Card #" << i + 1 << ": ";
        printFV(faceVal);
        printCS(rand() % 4 + 1); // Randomly generate and print card
sign
        cout << endl;
    }

    // Bubble sort the player's cards
    for (int i = 0; i < numPC - 1; i++) {
        for (int j = 0; j < numPC - i - 1; j++) {
            if (pCrd[j] > pCrd[j + 1]) {
                int temp = pCrd[j];
                pCrd[j] = pCrd[j + 1];
                pCrd[j + 1] = temp;
            }
        }
    }

    // Selection sort the player's cards
    slSt(pCrd, numPC);

    // Calculate the sum of player's cards
    sum2 = 0;
    for (int i = 0; i < numPC; i++) {
        sum2 += pCrd[i];
    }

    // Display sum to player

```

```

cout << "Player's Total  : " << sum2 << endl << endl;

// Additional cards for player
while (sum <= 21 || sum2 <= 21 || sum < sum2 || sum2 < sum
      || sum != 21 || sum2 != 21) {

    // Linear search for a specific card value
    int scVal = 21;
    bool found = linSc(pCrd, numPC, scVal);
    if (found) {
        cout << endl << "Player has a card with value " << scVal
<< endl;
    } else {
        cout << "Player does not have a card with value " << scVal
<< endl;
        cout << "Please proceed the game." << endl << endl;
    }

    cout << "Do you want to hit or stand? (H/S)" << endl;
    cin >> hsAns;
    cout << endl;

    // If player choose to hit
    if (hsAns == 'H' || hsAns == 'h') {
        card = rand() % 52 + 1;      //[1,52]
        faceVal = (card % 11) + 1;   //[1,11]
        sum2 += faceVal;
        cout << "Player's new card: ";
        printFV(faceVal);
        printCS(rand() % 4 + 1); // Randomly generate and print
card sign

        cout << endl;
        cout << "Player's Total  : " << sum2 << endl << endl;

        // If player's card sum exceeds 21, player busts and loses
the game
        if (sum2 > 21) {
            cout << "Player busts, dealer wins!" << endl;
            cout << "You lose your bet of " << "$" << pBet <<
endl;

```

```

        cout << endl;

        Rate();
        exitGm();
    }

    // If player's card sum is exactly 21, player wins the
game
    else if (sum2 == 21) {
        cout << "Player wins!" << endl;
        cout << "Congrats! You win your bet of " << "$" <<
pBet << endl;
        cout << endl;

        Rate();
        exitGm();
    }
}
// If player choose to stand, dealer starts their turn
else if (hsAns == 'S' || hsAns == 's') {
    // Dealer's 2nd card
    card = rand() % 52 + 1;      //[1,52]
    faceVal = (card % 11) + 1;   //[1,11]
    sum += faceVal;
    cout << "Dealer's Card #2: ";
    printFV(faceVal);
    printCS(rand() % 4 + 1); // Randomly generate and print
card sign

    cout << endl;
    cout << "Dealer's Total  : " << sum << endl << endl;

    // Dealer's additional cards
    if (sum < 17) {
        card = rand() % 52 + 1;      //[1,52]
        faceVal = (card % 11) + 1;   //[1,11]
        sum += faceVal;
        cout << "Dealer's new card: ";
        printFV(faceVal);
        printCS(rand() % 4 + 1); // Randomly generate and
print card sign

```

```

        cout << endl;
        cout << "Dealer's Total    : " << sum << endl << endl;

        // If dealer's card sum exceeds 21, dealer busts and
player wins
        if (sum > 21) {
            cout << "Dealer busts, player wins!" << endl;
            cout << "Congrats! You win your bet of " << "$" <<
pBet << endl;

            cout << endl;

            Rate();
            exitGm();
        }
    }

    // If neither player nor dealer busts, compare their card
sums
    if (sum <= 21 && sum2 <= 21) {
        if (sum > sum2) {
            cout << "Dealer wins!" << endl;
            cout << "You lose your bet of " << "$" << pBet <<
endl;

            cout << endl;

            Rate();
            exitGm();
        }
        else if (sum < sum2) {
            cout << "Player wins!" << endl;
            cout << "Congrats! You win your bet of " << "$" <<
pBet << endl;

            cout << endl;

            Rate();
            exitGm();
        }
        else {
            cout << "It's a tie!" << endl;
            cout << "You get your bet back!" << endl;

```

```

        cout << endl;

        Rate();
        exitGm();
    }
}

}

}

}

}

bool linSc(int arr[], int size, int key) {
    for (int i = 0; i < size; i++) {
        if (arr[i] == key) {
            return true;
        }
    }
    return false;
}

void printCS(int sign) {
    switch (sign) {
        case 1: cout << "Diamond"; break;
        case 2: cout << "Club"; break;
        case 3: cout << "Heart"; break;
        case 4: cout << "Spade"; break;
        default: break;
    }
}

void printFV(int value) {
    if (value == 1 || value == 11) {
        cout << "Ace ";
    }
    else if (value >= 2 && value < 10) {
        cout << value << " ";
    }
    else if (value == 10) {
        cout << "Jack ";
    }
}

```



```

        else if (value == 11) {
            cout << "Queen ";
        }
        else if (value == 12) {
            cout << "King ";
        }
    }

void slSt(int arr[], int size) {
    for (int i = 0; i < size - 1; i++) {
        int indx = i;
        for (int j = i + 1; j < size; j++) {
            if (arr[j] < arr[indx]) {
                indx = j;
            }
        }
        // Swap the found minimum val
        int temp = arr[indx];
        arr[indx] = arr[i];
        arr[i] = temp;
    }
}

void toc3(){    //Menu option 3
    exitGm();
}

bool Rate(const vector<string>& ratings){    //Rate the game
    cout << "THANK YOU FOR VISITING BLACKJACK!" <<endl;
    cout << "Please rate us starting from 1-10" << endl;

    int inpRate = vldRate(ratings);

    //Printing out the category for the rating
    cout << "You have rated this program as " << ratings[inpRate - 1]
    << "." << endl;
    cout << "Thank you for rating this program! Hope you enjoy your
    visit!" << endl << endl;

    return true;
}

```

```

}

bool Rate(){
    //Calling the file and declaring variables inside the file
    fstream in;
    string rate;

    //Reading the file
    in.open("rate.dat", ios::in);
    vector<string> ratings;
    while (getline(in, rate)){
        ratings.push_back(rate);
    }
    in.close();

    return Rate(ratings);
}

int vldRate(const vector<string>& ratings) {
    int inpRate;
    bool validRating = false;

    //Asking user for input
    while (!validRating) {
        cout << "Enter a number between 1 and " << ratings.size() <<
": ";
        cin >> inpRate;

        //Validating user input
        if (inpRate >= 1 && inpRate <= ratings.size()) {
            validRating = true;
        } else {
            cout << "Invalid rating. Please try again!" << endl;
        }
    }
    return inpRate;
}

bool exitGm(){
    char ext;

```

```
cout << "Are you sure to exit the game? (y/n)" << endl;
cin >> ext;
if (ext == 'Y' || ext == 'y'){
    cout << "Exiting the game. Goodbye!" << endl;
    exit(0);
}
else {
    first();
}
return true;
}
```