

Project 2: BlackJack

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CIS - 5 - 40107

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Introduction:

Title: BlackJack

Description:

The object of the game is to be dealt cards to must add up to 21 points. The points/value for cards 2-10 are equivalent to their face number. Moreover, King, Queen and Jack cards are worth 10 points and an Ace can be either 1 point or 11 points, based on what the user thinks is best for his/her hand total. You will be dealt two cards initially and be asked if user would like to “hit” to get closer to 21. If user goes over 21, user “busts”/ loses.

In the beginning of the game, there is a display of the randomized numbers that will be dealt and then ask the user to mentally order them from ascending order. Then there will be a menu that will allow the user to play or exit the game. If the user decides to play and forgets the value of the cards, there will be a friendly reminder of the values of the cards.

Summary:

Code Line Total: 412

Loops: 9

Functions: 7

Checklist:

			<u>Project 2: BlackJack Table of Contents</u>		
<u>Chapter</u>	<u>Section</u>	<u>Topic</u>		<u>Line Occurance</u>	<u>Notes</u>
1 : Intro to programmin g	<u>5</u>	<u>Statements</u>			
2 : Intro to C++	<u>2</u>	<u>cout</u>		<u>38, 41,42,72,73,74,82,9 3,98,111, 112, 120</u>	
				<u>121, 136,137,143,144,15 0,156,164,165,</u>	
				<u>175,182,187, 206, 211, 215, 221</u>	
	<u>3</u>	<u>Libraries</u>		<u>9, 10, 11, 12, 13</u>	<u>iostream, iomanip, cstdlib, ctime ,cmath</u>
	<u>4</u>	<u>variables</u>			
	<u>4</u>	<u>literals</u>			
	<u>6</u>	<u>int data type</u>		<u>32, 68, 127</u>	<u>int num1,num2,num3,num4, choice</u>
	<u>7</u>	<u>char data type</u>		<u>33, 128</u>	<u>hit, letter</u>

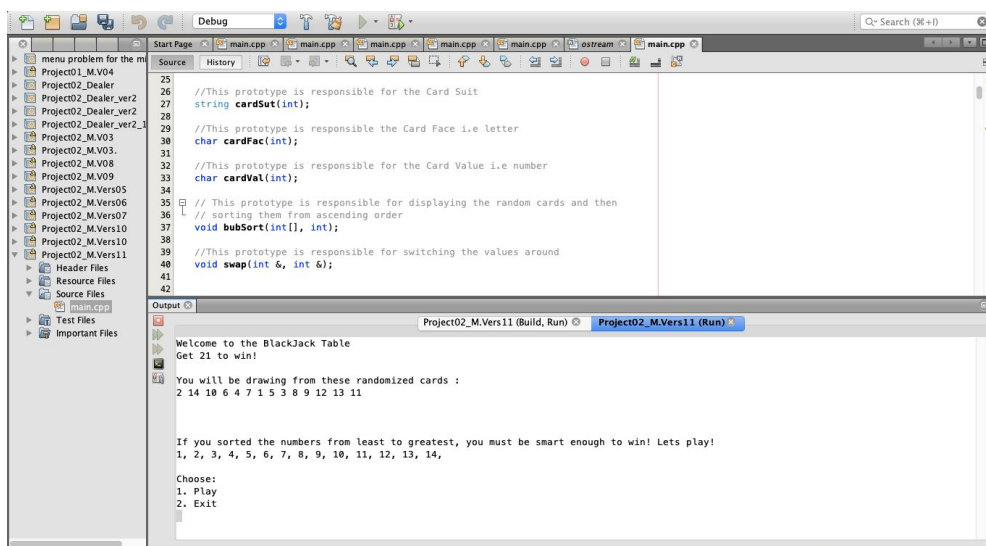
3: Expressions and interativity	<u>1</u>	<u>cin</u>		<u>75,151</u>	<u>hit, choice</u>
	<u>9</u>	<u>Random Numbers</u>		<u>28,46,87,160</u>	<u>srand</u>
4: Making Decisions	<u>1</u>	<u>Relational Operators</u>		<u>46,50,52,55,57,60,62,77,87,92,94,97,99</u>	<u>+, =</u>
				<u>88,102, 201 , 203 ,210 ,212 ,221 ,222</u>	
	<u>2</u>	<u>if Statement</u>		<u>49,54,59,70,91,96,101,109,153,162</u>	
				<u>168,180</u>	
	<u>4</u>	<u>if/else Statement</u>		<u>209,205,200,214</u>	
	<u>5</u>	<u>nested if statement</u>		<u>134</u>	
	<u>8</u>	<u>The operator</u>		<u>49,54,59,70,91,96,101,109,141,153,168</u>	<u>= =</u>
				<u>180,200,209,227</u>	
5: Loops and Files	<u>5</u>	<u>The <i>do-while</i> loop</u>		<u>130,227</u>	

--	--	--	--	--	--

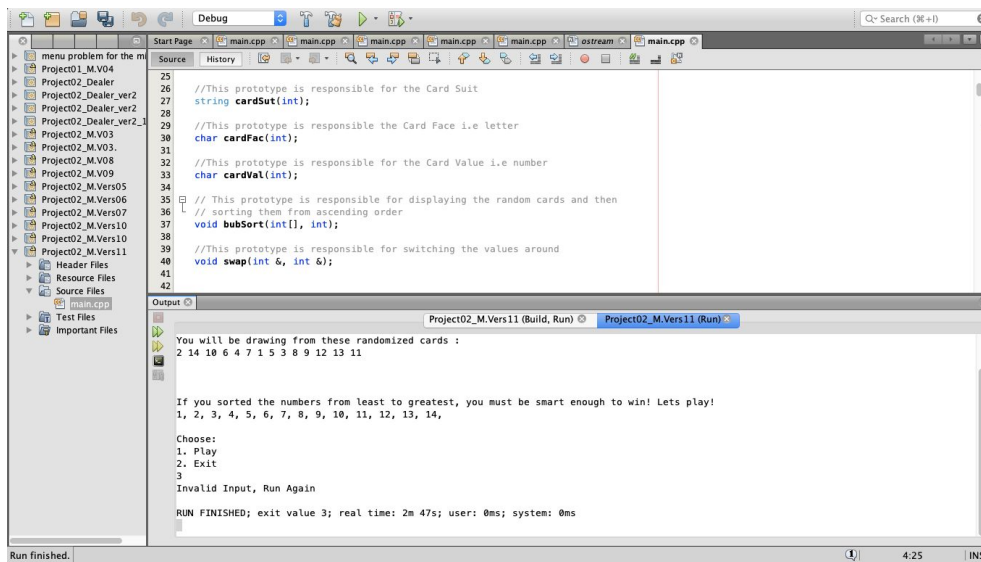
Chapter	Section	Topic		Line Occurrence	Notes
6 : Functions	2	Calling function: <i>void</i>		24,37,40,344,383,405	
	3	Function Prototype		24, 27,30,33,37,40	Void, void, void, char, char, string
	4	Sending Data into a function			
		Multiple arguments		37,40,45,84,383,405	
	7	<i>return</i>		115, 341, 360,369,380	return
	15	The <i>exit ()</i> function		121	exit(0)
7: Arrays and Vectors	1	Arrays hold multiple values		60, 62,360,369,395,397	
	2	Accessing Array Elements		74,91	
	4	Range-based <i>for</i> loop		74, 91, 390, 393	
	5	Processing Array Contents		366,369,395,397	
	6	Parallel Arrays			
	7	Arrays as Function Arguments		37,383	
8 : Searching and Sorting Arrays	1	Linear search			
	2	Binary Search			
	3	The Bubble Sort		37,84,383	
		Swapping array elements		40,397,405	
		The Selection Sort			

Screenshots: These screenshots are confirmation that my game ran using my personal NetBeans.

1.) Introduction to Project 2



2.) Invalid Menu Input



The screenshot shows a C++ IDE with a project named "Project02_M_Vers11". The source code is displayed in the main editor, and the output window shows the program's execution. The program prompts the user to choose between "1. Play" and "2. Exit". The user enters "3", which is considered invalid input. The program responds with "Invalid Input, Run Again" and then displays the final status: "RUN FINISHED; exit value 3; real time: 2m 47s; user: 0ms; system: 0ms".

```
25 //This prototype is responsible for the Card Suit
26 string cardSuit(int);
27
28 //This prototype is responsible the Card Face i.e letter
29 char cardFac(int);
30
31 //This prototype is responsible for the Card Value i.e number
32 char cardVal(int);
33
34 // This prototype is responsible for displaying the random cards and then
35 // sorting them from ascending order
36 void bubSort(int[], int);
37
38 //This prototype is responsible for switching the values around
39 void swap(int &, int &);
40
41
42
```

Output:

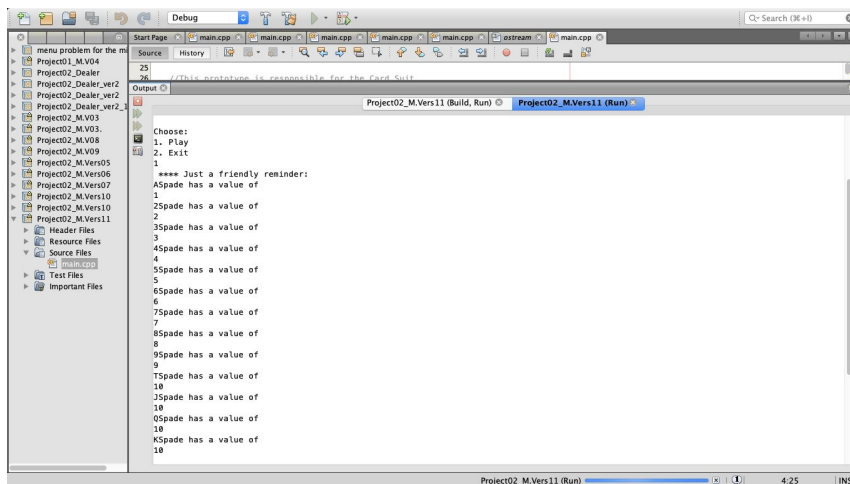
```
Project02_M_Vers11 (Build, Run) Project02_M_Vers11 (Run)
You will be drawing from these randomized cards :
2 14 10 6 4 7 1 5 3 8 9 12 13 11

If you sorted the numbers from least to greatest, you must be smart enough to win! Lets play!
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,

Choose:
1. Play
2. Exit
3
Invalid Input, Run Again

RUN FINISHED; exit value 3; real time: 2m 47s; user: 0ms; system: 0ms
```

3.) The Value of the cards reminder



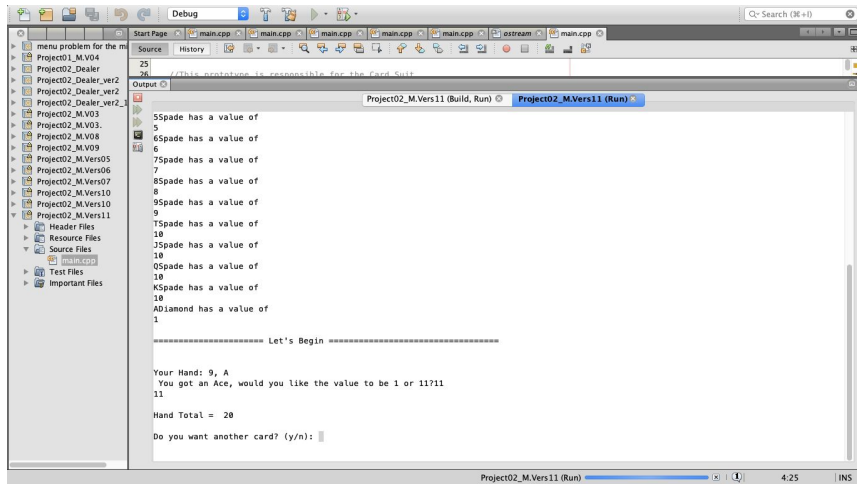
The screenshot shows the same C++ IDE as before, but the output window displays a list of cards and their values. The program prompts the user to choose between "1. Play" and "2. Exit". The user enters "1", which is considered valid input. The program then displays a list of cards and their values: "ASpade has a value of 1", "2Spade has a value of 2", "3Spade has a value of 3", "4Spade has a value of 4", "5Spade has a value of 5", "6Spade has a value of 6", "7Spade has a value of 7", "8Spade has a value of 8", "9Spade has a value of 9", "10Spade has a value of 10", "JSpade has a value of 10", "OSpade has a value of 10", and "KSpade has a value of 10".

```
25 //This prototype is responsible for the Card Suit
26 string cardSuit(int);
27
28 //This prototype is responsible the Card Face i.e letter
29 char cardFac(int);
30
31 //This prototype is responsible for the Card Value i.e number
32 char cardVal(int);
33
34 // This prototype is responsible for displaying the random cards and then
35 // sorting them from ascending order
36 void bubSort(int[], int);
37
38 //This prototype is responsible for switching the values around
39 void swap(int &, int &);
40
41
42
```

Output:

```
Project02_M_Vers11 (Build, Run) Project02_M_Vers11 (Run)
Choose:
1. Play
2. Exit
1
==== Just a friendly reminder:
ASpade has a value of
1
2Spade has a value of
2
3Spade has a value of
3
4Spade has a value of
4
5Spade has a value of
5
6Spade has a value of
6
7Spade has a value of
7
8Spade has a value of
8
9Spade has a value of
9
10Spade has a value of
10
JSpade has a value of
10
OSpade has a value of
10
KSpade has a value of
10
```

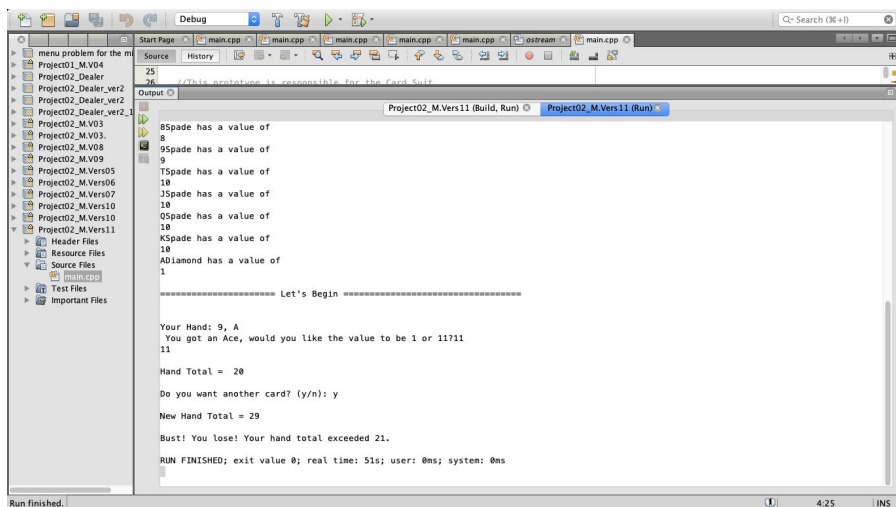
4.) Being dealt a card



```
25 //This prototype is responsible for the Card Suit
26
Output
Project02_M_Vers11 (Build, Run)
Project02_M_Vers11 (Run)
5Spade has a value of
5
6Spade has a value of
6
7Spade has a value of
7
8Spade has a value of
8
9Spade has a value of
9
10Spade has a value of
10
JSpade has a value of
10
QSpade has a value of
10
KSpade has a value of
10
ADiamond has a value of
1
===== Let's Begin =====

Your Hand: 9, A
You got an Ace, would you like the value to be 1 or 11?
11
Hand Total = 20
Do you want another card? (y/n):
```

5.) Losing

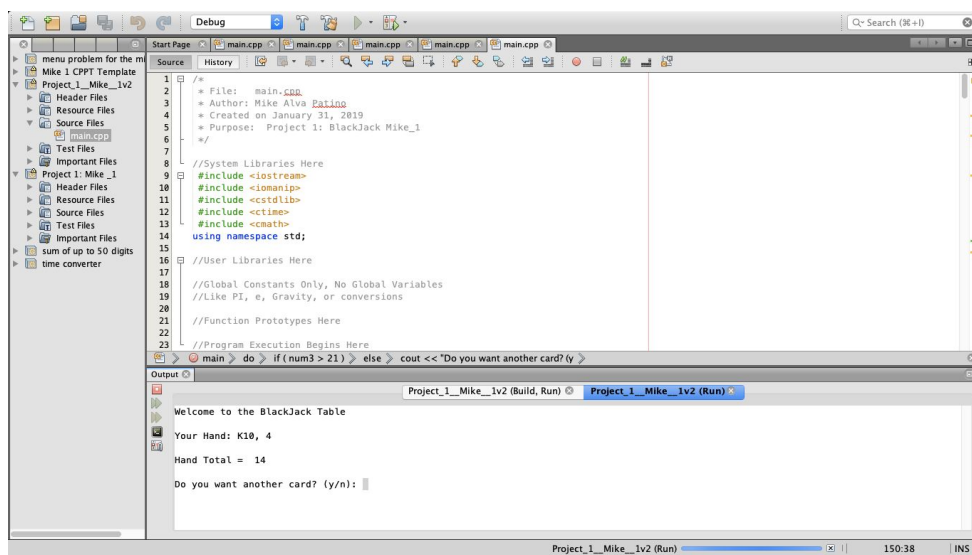


```
8Spade has a value of
8
9Spade has a value of
9
10Spade has a value of
10
JSpade has a value of
10
QSpade has a value of
10
KSpade has a value of
10
ADiamond has a value of
1
===== Let's Begin =====

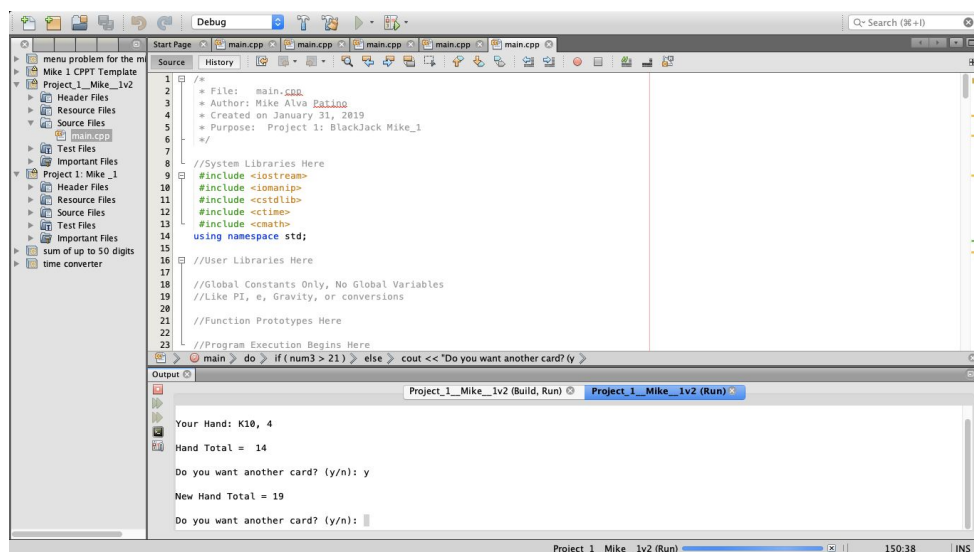
Your Hand: 9, A
You got an Ace, would you like the value to be 1 or 11?
11
Hand Total = 20
Do you want another card? (y/n): y
New Hand Total = 29
Bust! You lose! Your hand total exceeded 21.
RUN FINISHED; exit value 0; real time: 51s; user: 0ms; system: 0ms

Run finished.
```

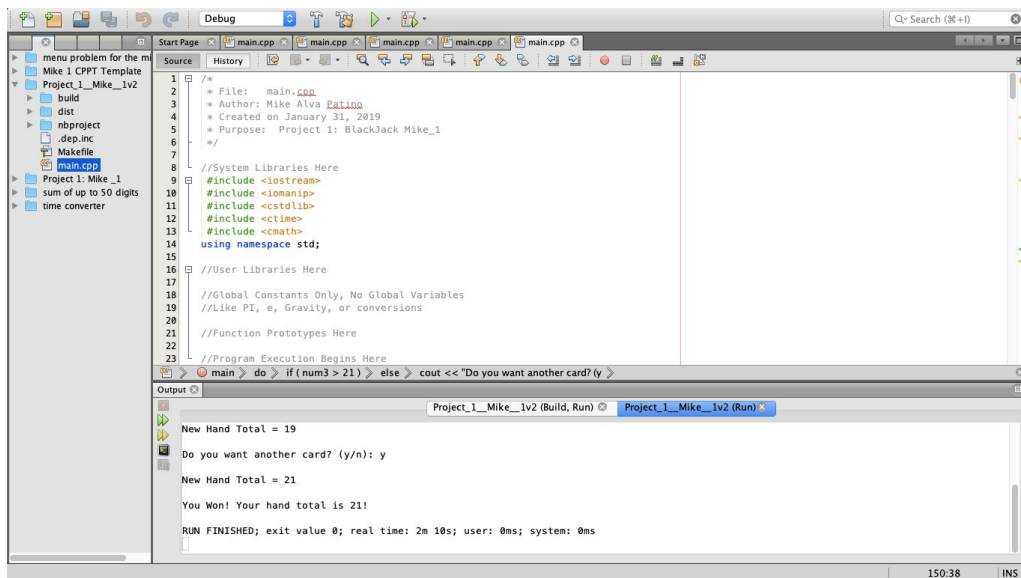

6.) Example of getting a King in first hand



7.) Example of asking for another card



8.) Example of winning the game



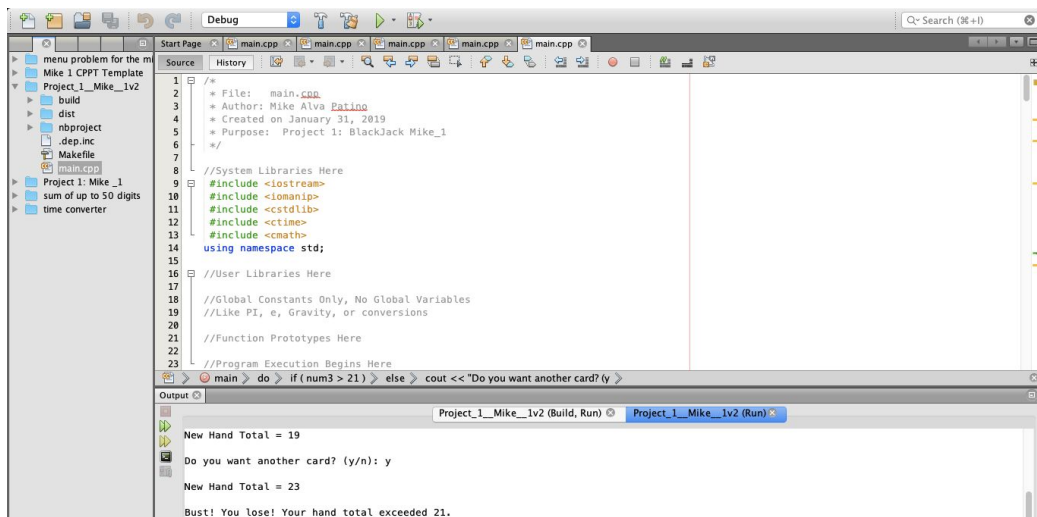
The screenshot shows a C++ IDE with a project named "Project_1_Mike_iv2". The source code is displayed in the main editor, and the output window shows the execution results. The code is a simple Blackjack game. The user's hand total is 19, and they choose to hit. The dealer's hand total is 21, and the user wins.

```
1  /*  
2   * File: main.cpp  
3   * Author: Mike Alva Pating  
4   * Created on January 31, 2019  
5   * Purpose: Project 1: BlackJack Mike_1  
6   */  
7  
8  //System Libraries Here  
9  #include <iostream>  
10 #include <iomanip>  
11 #include <cstdlib>  
12 #include <ctime>  
13 #include <cmath>  
14 using namespace std;  
15  
16 //User Libraries Here  
17  
18 //Global Constants Only, No Global Variables  
19 //Like PI, e, Gravity, or conversions  
20  
21 //Function Prototypes Here  
22  
23 //Program Execution Begins Here  
24 int main() {  
25     //main  
26     do {  
27         if (num3 > 21) {  
28             cout << "Do you want another card? (y/n) ";  
29             char ch; ch = 'n';  
30             while (ch != 'y' && ch != 'n') {  
31                 ch = ' ';  
32             }  
33             if (ch == 'y') {  
34                 //Hit  
35                 num3 = num3 + rand() % 10 + 1;  
36                 cout << "New Hand Total = " << num3 << endl;  
37                 if (num3 > 21) {  
38                     cout << "Bust! You lose! Your hand total exceeded 21." << endl;  
39                     return 1;  
40                 }  
41                 if (num3 < 21) {  
42                     cout << "You Won! Your hand total is " << num3 << endl;  
43                     return 0;  
44                 }  
45             }  
46             else {  
47                 //Stand  
48                 cout << "Do you want another card? (y/n) ";  
49                 char ch; ch = 'n';  
50                 while (ch != 'y' && ch != 'n') {  
51                     ch = ' ';  
52                 }  
53                 if (ch == 'y') {  
54                     //Hit  
55                     num3 = num3 + rand() % 10 + 1;  
56                     cout << "New Hand Total = " << num3 << endl;  
57                     if (num3 > 21) {  
58                         cout << "Bust! You lose! Your hand total exceeded 21." << endl;  
59                         return 1;  
60                     }  
61                     if (num3 < 21) {  
62                         cout << "You Won! Your hand total is " << num3 << endl;  
63                         return 0;  
64                     }  
65                 }  
66             }  
67         }  
68     } while (num3 < 21);  
69     cout << "RUN FINISHED; exit value 0; real time: 2m 10s; user: 0ms; system: 0ms" << endl;  
70     return 0;  
71 }
```

Output:

```
New Hand Total = 19  
Do you want another card? (y/n): y  
New Hand Total = 21  
You Won! Your hand total is 21!  
RUN FINISHED; exit value 0; real time: 2m 10s; user: 0ms; system: 0ms
```

9.) Example of Losing the Game



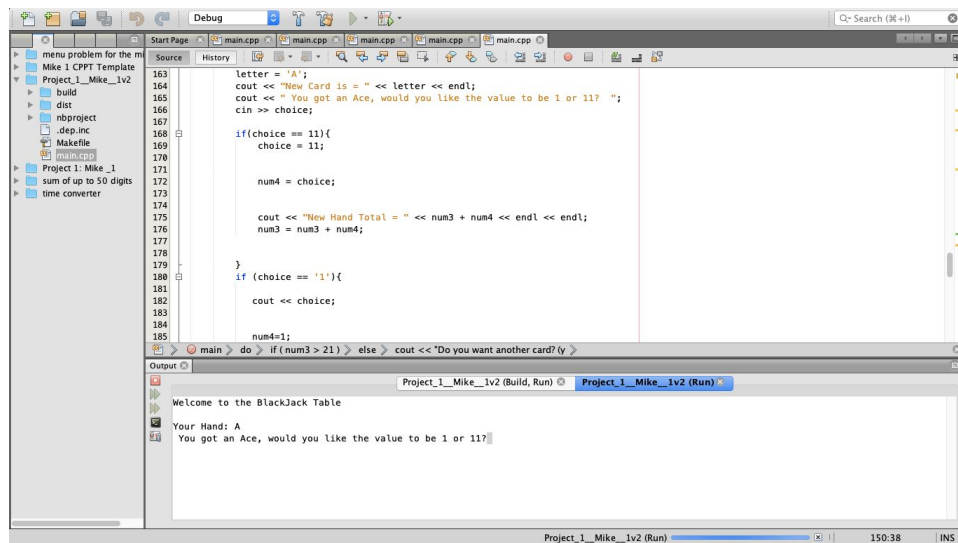
The screenshot shows the same C++ IDE as before, but the output window shows the execution results for a different run. The user's hand total is 19, and they choose to hit. The dealer's hand total is 23, and the user loses.

```
1  /*  
2   * File: main.cpp  
3   * Author: Mike Alva Pating  
4   * Created on January 31, 2019  
5   * Purpose: Project 1: BlackJack Mike_1  
6   */  
7  
8  //System Libraries Here  
9  #include <iostream>  
10 #include <iomanip>  
11 #include <cstdlib>  
12 #include <ctime>  
13 #include <cmath>  
14 using namespace std;  
15  
16 //User Libraries Here  
17  
18 //Global Constants Only, No Global Variables  
19 //Like PI, e, Gravity, or conversions  
20  
21 //Function Prototypes Here  
22  
23 //Program Execution Begins Here  
24 int main() {  
25     //main  
26     do {  
27         if (num3 > 21) {  
28             cout << "Do you want another card? (y/n) ";  
29             char ch; ch = 'n';  
30             while (ch != 'y' && ch != 'n') {  
31                 ch = ' ';  
32             }  
33             if (ch == 'y') {  
34                 //Hit  
35                 num3 = num3 + rand() % 10 + 1;  
36                 cout << "New Hand Total = " << num3 << endl;  
37                 if (num3 > 21) {  
38                     cout << "Bust! You lose! Your hand total exceeded 21." << endl;  
39                     return 1;  
40                 }  
41                 if (num3 < 21) {  
42                     cout << "You Won! Your hand total is " << num3 << endl;  
43                     return 0;  
44                 }  
45             }  
46             else {  
47                 //Stand  
48                 cout << "Do you want another card? (y/n) ";  
49                 char ch; ch = 'n';  
50                 while (ch != 'y' && ch != 'n') {  
51                     ch = ' ';  
52                 }  
53                 if (ch == 'y') {  
54                     //Hit  
55                     num3 = num3 + rand() % 10 + 1;  
56                     cout << "New Hand Total = " << num3 << endl;  
57                     if (num3 > 21) {  
58                         cout << "Bust! You lose! Your hand total exceeded 21." << endl;  
59                         return 1;  
60                     }  
61                     if (num3 < 21) {  
62                         cout << "You Won! Your hand total is " << num3 << endl;  
63                         return 0;  
64                     }  
65                 }  
66             }  
67         }  
68     } while (num3 < 21);  
69     cout << "RUN FINISHED; exit value 0; real time: 2m 10s; user: 0ms; system: 0ms" << endl;  
70     return 0;  
71 }
```

Output:

```
New Hand Total = 19  
Do you want another card? (y/n): y  
New Hand Total = 23  
Bust! You lose! Your hand total exceeded 21.
```

10.) Example of getting an Ace



```
163 letter = 'A';
164 cout << "New Card is " << letter << endl;
165 cout << "You got an Ace, would you like the value to be 1 or 11? ";
166 cin >> choice;
167
168 if(choice == 11){
169     choice = 11;
170
171     num4 = choice;
172
173
174     cout << "New Hand Total = " << num3 + num4 << endl << endl;
175     num3 = num3 + num4;
176
177
178 }
179
180 if (choice == '1'){
181     cout << choice;
182
183     num4=1;
184
185     main > do > if (num3 > 21) > else > cout << "Do you want another card? ly
```

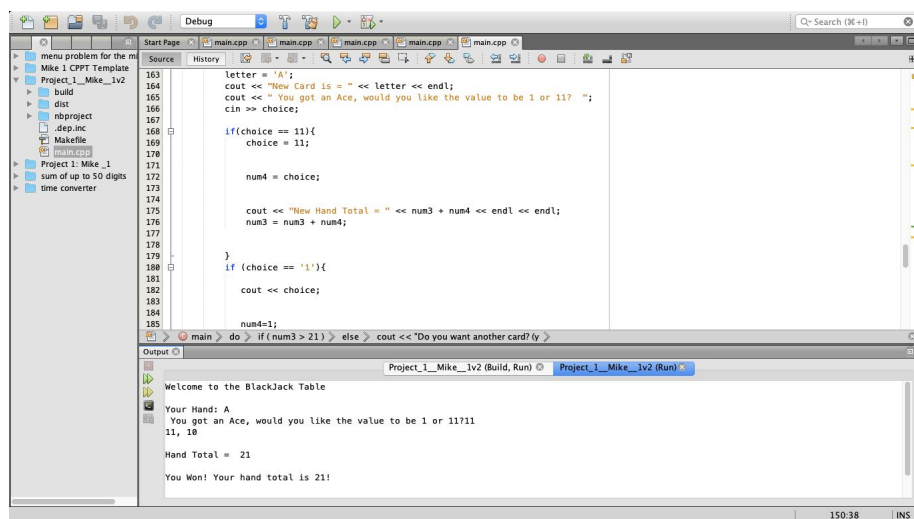
Project_1_Mike_1v2 (Build, Run) Project_1_Mike_1v2 (Run)

Welcome to the BlackJack Table

Your Hand: A

You got an Ace, would you like the value to be 1 or 11?

11.) Example of Using an Ace to win



```
163 letter = 'A';
164 cout << "New Card is " << letter << endl;
165 cout << "You got an Ace, would you like the value to be 1 or 11? ";
166 cin >> choice;
167
168 if(choice == 11){
169     choice = 11;
170
171     num4 = choice;
172
173
174     cout << "New Hand Total = " << num3 + num4 << endl << endl;
175     num3 = num3 + num4;
176
177
178 }
179
180 if (choice == '1'){
181     cout << choice;
182
183     num4=1;
184
185     main > do > if (num3 > 21) > else > cout << "Do you want another card? ly
```

Project_1_Mike_1v2 (Build, Run) Project_1_Mike_1v2 (Run)

Welcome to the BlackJack Table

Your Hand: A

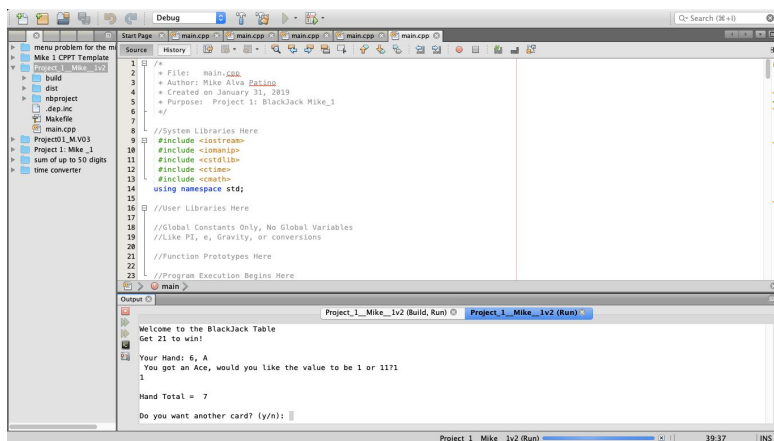
You got an Ace, would you like the value to be 1 or 11?

11, 10

Hand Total = 21

You Won! Your hand total is 21!

12.) Example of an Ace being 1

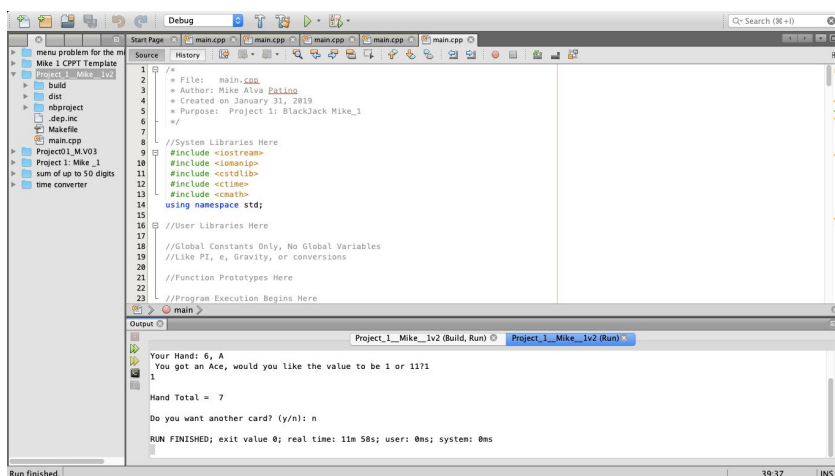


The screenshot shows a C++ IDE with a project named "Project_1_Mike_1v2". The source code is displayed in the main editor, and the output window shows the program's execution. The code is a simple Blackjack game simulation. The output shows the player's hand as "6, A" and the total as "7". The player is asked if they want another card, and they respond with "1", indicating the Ace is valued as 1.

```
1 //  
2 * File: main.cpp  
3 * Author: Mike Alva Pallo  
4 * Created on January 31, 2019  
5 * Purpose: Project 1: Blackjack Mike_1  
6 */  
7  
8 //System Libraries Here  
9 #include <iostream>  
10 #include <iomanip>  
11 #include <cstdlib>  
12 #include <ctime>  
13 #include <cmath>  
14 using namespace std;  
15  
16 //User Libraries Here  
17  
18 //Global Constants Only, No Global Variables  
19 //Like PI, e, Gravity, or conversions  
20  
21 //Function Prototypes Here  
22  
23 //Program Execution Begins Here  
24  
25 int main()  
26 {  
27     Welcome to the Blackjack Table  
28     Get 21 to win!  
29  
30     Your Hand: 6, A  
31     You got an Ace, would you like the value to be 1 or 11? 1  
32  
33     Hand Total = 7  
34  
35     Do you want another card? (y/n):  
36 }
```

Output: Project_1_Mike_1v2 (Build, Run) | Project_1_Mike_1v2 (Run)
Welcome to the Blackjack Table
Get 21 to win!
Your Hand: 6, A
You got an Ace, would you like the value to be 1 or 11? 1
Hand Total = 7
Do you want another card? (y/n):

13.) Not wanting another card



The screenshot shows the same C++ IDE as before, but the output window shows the player's response "n" to the question "Do you want another card?". The program then displays "RUN FINISHED" and the exit value, real time, user time, and system time.

```
1 //  
2 * File: main.cpp  
3 * Author: Mike Alva Pallo  
4 * Created on January 31, 2019  
5 * Purpose: Project 1: Blackjack Mike_1  
6 */  
7  
8 //System Libraries Here  
9 #include <iostream>  
10 #include <iomanip>  
11 #include <cstdlib>  
12 #include <ctime>  
13 #include <cmath>  
14 using namespace std;  
15  
16 //User Libraries Here  
17  
18 //Global Constants Only, No Global Variables  
19 //Like PI, e, Gravity, or conversions  
20  
21 //Function Prototypes Here  
22  
23 //Program Execution Begins Here  
24  
25 int main()  
26 {  
27     Welcome to the Blackjack Table  
28     Get 21 to win!  
29  
30     Your Hand: 6, A  
31     You got an Ace, would you like the value to be 1 or 11? 1  
32  
33     Hand Total = 7  
34  
35     Do you want another card? (y/n): n  
36 }
```

Output: Project_1_Mike_1v2 (Build, Run) | Project_1_Mike_1v2 (Run)
Your Hand: 6, A
You got an Ace, would you like the value to be 1 or 11? 1
Hand Total = 7
Do you want another card? (y/n): n
RUN FINISHED; exit value 0; real time: 11m 58s; user: 0ms; system: 0ms

Flowchart:

In the folder as a PDF and XML file

Code:

```
/*
 * File:  main.cpp
 * Author: Mike Alva Patino
 * Created on January 31, 2019
 * Purpose: Project 02: BlackJack
 */

//System Libraries Here
#include <iostream>
#include <iomanip>
#include <cstdlib>
#include <ctime>
#include <cmath>
using namespace std;

//User Libraries Here

//Global Constants Only, No Global Variables
//Like PI, e, Gravity, or conversions

//Function Prototypes Here

//This Prototype is responsible for displaying the card face and value
```

```
void print(int);
```

```
//This prototype is responsible for the Card Suit  
string cardSut(int);
```

```
//This prototype is responsible the Card Face i.e letter  
char cardFac(int);
```

```
//This prototype is responsible for the Card Value i.e number  
char cardVal(int);
```

```
// This prototype is responsible for displaying the random cards and then  
// sorting them from ascending order  
void bubSort(int[], int);
```

```
//This prototype is responsible for switching the values around  
void swap(int &, int &);
```

```
//Program Execution Begins Here
```

```
int main(int argc, char** argv) {
```

```
    //Set the random number seed
```

```
    srand(static_cast<unsigned int>(time(0)));
```

```
    //Declare all Variables Here
```

```
    int num1, num2, num3;
```

```
    char letter;
```

```
    int NCARDS =14;
```

```
    int number;
```

```
    //For my Bubble Sort Function
```

```
    const int SIZE = 14;
```

```
int val[SIZE] = { 2, 14, 10, 6, 4, 7, 1, 5, 3, 8, 9, 12, 13, 11};
```

```
//Initialize or input
```

```
cout << "Welcome to the BlackJack Table " << endl;
```

```
cout << "Get 21 to win!" << endl << endl;
```

```
cout << "You will be drawing from these randomized cards : " << endl;
```

```
for (auto element : val)
```

```
    cout << element << " ";
```

```
cout << endl << endl << endl;
```

```
//===== Bubble Sort =====//
```

```
bubSort(val, SIZE);
```

```
cout << endl;
```

```
cout << "If you sorted the numbers from least to greatest, "
```

```
    "you must be smart enough to win! Lets play!" << endl;
```

```
for (auto element : val){
```

```
    cout << element << ", " ;
```

```
}
```

```
cout << endl;
```

```
//Display the outputs
```

```
//Sorted List
```

```
cout << endl;
```

```
cout << "Choose:" << endl;
```

```
cout << "1. Play" << endl;
```

```
cout << "2. Exit" << endl;
```

```
cin >> number;
```

```
while (number != 1 && number != 2){  
    cout << "Invalid Input, Run Again" << endl;
```

```
    return number;
```

```
}
```

```
if (number == 2){
```

```
    exit (0);
```

```
}
```

```
if (number == 1){
```

```
cout << " **** Just a friendly reminder: " <<endl ;
```

```
//These are meant to be instructions or reminders of the values
```

```
print(NCARDS);
```

```
cout << endl;
```



```
cout << "===== Let's Begin  
===== " << endl;
```

```
}  
cout << endl;
```

```
cout << endl;  
cout << "Your Hand: ";
```

```
//This will give user random numbers from [1-14]
```

```
num1 = (rand() %13+1);
```

```
//Card 1: Assigning King, Queen, Jack Values
```

```
if (num1 == 11){  
    letter = 'K';  
    cout << letter;  
    num1 =10;  
}
```

```
if (num1 == 12 ){  
    letter = 'Q';  
    cout << letter;  
    num1 =10;  
}
```

```
if (num1 == 13){  
    letter = 'J';
```

```
    cout << letter;
    num1 =10;
}
```

//If Card 1 is an Ace

```
int choice;
```

```
if (num1 == 1 ){
    letter = 'A';
    cout <<letter;
    cout << endl;
    cout << fixed << setw(3) <<" You got an Ace, would you like the value to be 1 or 11?";
    cin >> choice;
```

```
    num1=choice;
```

```
}
```

```
    cout << num1 << ", ";
```

//Getting Card 2 From the Dealer

```
num2 = (rand() %13+1);
```

//Card 2: Assigning King, Queen, Jack Value

```
if (num2 == 11){
    letter = 'K';
    cout <<letter;
    num2 =10;
}
```

```
if (num2 == 12){  
    letter = 'Q';  
    cout << letter;  
    num2 = 10;  
}  
if (num2 == 13){  
    letter = 'J';  
    cout << letter;  
    num2 = 10;  
}
```

//Assigning Card 2 if it is an Ace

```
if (num2 == 1){  
    letter = 'A';  
    cout << letter;  
    cout << endl;  
    cout << fixed << setw(3) << " You got an Ace, would you like the value to be 1 or 11?";  
  
    cin >> choice;  
    num2 = choice;  
}
```

```
cout << num2 << endl << endl;  
cout << "Hand Total = " << num1 + num2 << endl << endl;  
num3 = num1 + num2;
```

//Declare New Variables for Card #3

```
int num4;  
char hit;
```

```
do {
```

//This will decide whether or not the loop ends

```

if ( num3 > 21 ){

    cout << "Bust! You lose! Your hand total exceeded 21.";
    cout << endl;
    break;
}

else if (num3 == 21){

    cout << "You Won! Your hand total is 21!";
    cout << endl;
    break;
}

else {

    cout << "Do you want another card? (y/n): ";
    cin >> hit;

    if (hit == 'y' || hit == 'Y' ){

        cout << endl;

        //This will give values from [1-14]

        num4 = (rand() % 13+1);

        if (num4 == 1){
            letter = 'A';

            cout << " You got an Ace, would you like the value to be 1 or 11? ";
            cin >> choice;

```

```
if(choice == 11){
    choice = 11;

    num4 = choice;

    cout << "New Hand Total = " << num3 + num4 << endl << endl;
    num3 = num3 + num4;

}
if (choice == '1'){

    cout << choice;

    num4=1;

    cout << "New Hand Total = " << num3 + num4 << endl << endl;
    num3 = num3 + num4;

}
```

//Card 3: Assigning King, Queen, Jack Values

```
if (num4 == 12 ){
    letter = 'Q';
    cout << letter;
    num4 =10;
}
else{
    cout << endl;
}
```

```

        if (num4 == 13){
            letter = 'J';
            cout << letter;
            num4 =10;
        }
        else{
            cout << endl;
        }
    }

    cout << "New Hand Total = " << num3 + num4 << endl << endl;
    num3 = num3 + num4;

    }
}
while (hit == 'y' || hit == 'Y');

//Exit

return 0;
}

void print(int n){

    for(int i=0 ;i < n; i++ ){

        cout << cardFac(i) << cardSut(i)

        << " has a value of " <<static_cast<int> (cardVal(i)) <<endl;
    }
}

```

```

string cardSut(int i){

    string cardsut[] = {"Spade","Diamond" , "Clubs" , "Hearts"};

    return cardsut[i/13];

}

```

```

char cardFac(int i){

    char cardFac[] = {'A','2','3','4','5','6','7',
                      '8','9','T','J','Q','K'};

    return cardFac[i % 13];
}

```

```

char cardVal(int i){

    cout << endl;

    int imod13 = i%13+1;

    //This returns values 10 or lower

    return imod13 < 11 ? imod13:10;
}

```

```

void bubSort(int a[], int size){

    //This is the maximum element for sorting
    int maxElem;

    int indx;

    for (maxElem = size -1; maxElem > 0; maxElem-- ){
        for (indx =0 ; indx < maxElem; indx ++){
            if ( a[indx] > a[indx +1]){

```

```

        swap(a[indx], a[indx+1]);
    }
}
}
}

```

```

void swap(int &x, int &y){

```

```

    int temp = x;
    x = y;
    y = temp;
}

```

Pseudocode:

```

// Opening with file, name, date, and project name.
//Then utilize upstream, iomanip, cstdlib, ctime, cmath and using namespace std.
//Function prototypes are void print, string card suit, card face, card value bubble sort, and swap.
They all have integer arguments.
// Now enter main function and immediately be given the srand static cast function with
argument time 0.

```

```

//initializing variables num1, num2, num3 which are the user's "cards", char letter to represent
the Jack, king, queen, and ace.
int NCARDS =14 to display the card values though a function and int number to use for the
menu in the beginning of the program.

```

```

//constant int SIZE= 14 and the in val[SIZE]= to an array of mixed numbers from 1 to 14 which
will be used in bubble sort.

```


//In the beginning, display “Welcome to the BlackJack Table Get 21 to win! You will be drawing from these randomized cards :” then for loop

//for (auto element : val)
display the mixed values in the array

//call to bubble sort function

//Display “If you sorted the numbers from least to greatest, you must be smart enough to win! Lets play!” after the bubble sort

//for (auto element : val)
display the elements in ascending order

//allow the user to chose to play or exit by entering 1 or 2.

//while (number does not equal 1 and number does not equal 2)
display invalid input and run again with return number.

//if number is equal to 2
exit() function will exit the entire program

// if number is equal to 1 , display the called function print (NARDS) which will give a friendly reminder of the values of the cards

//num1 generates the random number generator from 1 though 14

//if num1 is equal to 11 then the value will be 10 and a K will display next to it
//if num1 is equal to 12 then the value will be 10 with a Q will be displayed next to it
//if num1 is equal to 13 then the value will be 10 and the letter J will display next to the value.

//int choice

//if num1 is equal to the 1 then the letter A will be displayed then the message alerting user of the ace and allow the user to input their choice
num1 will equal choice

//Display num1,

//num2 will be generated by the random number generator.

//if num2 is equal to 11 then the value will be 10 and a K will display next to it

//if num2 is equal to 12 then the value will be 10 with a Q will be displayed next to it

//if num2 is equal to 13 then the value will be 10 and the letter J will display next to the value.

//if num2 is equal to 1 the letter A will be displayed and a message alerting the ace will also be displayed

then enter the choice of either 1 or 11 to make that card the value

num2 will equal the choice value

//the hand total will be num 1 + num2

//num3 = num 1 + num2

//int num4, char hit;

//do { if num3 is greater than 21 then a message will indicate that the user busted and loses because they user exceeded 21 points

 //break;

//otherwise if (else if) num3 is equal to 21 then a display will state that the user won because the hand total is 21

//else does user want another card? (y/n)

//input hit

//if hit is equal to lowercase y or capital Y

 then the user will be given another card from the deck, num4 using a random number generator

//if num4 is equal to 1 then the letter A will be displayed and the user can choose the value of the ace

//if choice is equal to 11 then num4 equals 11

//if choice is equal to 1 then num4 will equal 1

//the New hand total is displayed along with num3+num4 which will accumulate the hand

//num3 = num3 +num4

//if num4 is equal to 11 then the value will be 10 and a K will display next to it

```
//if num4 is equal to 12 then the value will be 10 with a Q will be displayed next to it
//if num4 is equal to 13 then the value will be 10 and the letter J will display next to the value.
// while hit is equal to lower case y or capital Y
```

```
//return 0, which is the end of the main function
```

```
//in the function void print(int n )
//for the int i equals 0, and i is less than n, then display the cardFac(i) function and the cardSut
(i) function as well. Then static cast the cardVal(i) function.
```

```
//next function is the string card suit (int i). This fills an array with character face values and
returns the card face i%13
```

```
//the next function is the card value (int i ) which returns values 10 or lower
```

```
//The next function void bubble sort (int a[], int size) is the function that will sort my filled
randomized array.
```

```
//int maxElem, indx will find the max element in the array and sort the numbers from ascending
order.
```

```
//for the max element is equal to size-1 , and max element is greater than 0,max element - -
```

```
//only if the array [indx] is greater than array [indx +1]
```

```
//then utilize the swap function (array[indx], array[indx+1])
```

```
//The last function is the void swap (int &x, int &y) which will swap an int temp equals x, as x
equals y and y equals temp.
```