**Project 1**

Title:

**21**

Course:

**CSC-5-46023**

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**Pseudocode**

Execution Starts Here!

Declare and Initialize Variables

Inputs and Constants

Input from file

Ace Value

Character length

Ace Type, Inputted from file

Character string to compare input string to

Character string to compare input string to

Character string to compare input string to

Outputs

Player's Card 1 value

Player's Card 2 value

Player's Additional card value

Player's Additional card value

Player's Total value of all cards

Dealer's Card 1 value

Dealer's Card 2 value

Dealer's additional card value

Dealer's additional card value

Dealer's total value of all cards

Number of wins

Number of losses

Winning percentage

Output to file

Set the Random Seed

Output Pre-Game Directions

Input Values

Open the Input file

Test File For Open Failures

Input Ace Type

Determine Game Type

If file reads High

Set Ace Value to High

Else if file reads Low

Set Ace Value to Low

Else if file reads Either

Set Ace Value to Either

Else Default to Either

Set loop=true

Do: Game Loop

Output Start of New Game Information

If Ace Values are High

Output Ace Value as High

Else if Ace Values are Low

Output Ace Value as Low

Else Default to Either

Determine Values for Card 1 and 2 for Player

Output Player's Cards

Output Player's Card 1

If Card 1 is Ace

Output Card 1 as Ace

If Ace Value is High or Either

Set Ace Value as 11

Else

Set Ace Value as 1

Else if Card 1 is Jack

Output Card 1 as Jack

Set Jack Value as 10

Else if Card 1 is Queen

Output Card 1 as Queen

Set Queen Value as 10

Else if Card 1 is King

Output Card 1 as King

Set King Value as 10

Else

Output Card 1 as Number

Output Player's Card 2

If Card 2 is Ace

Output Card 2 as Ace

If Ace Value is High or Either

Set Ace Value as 11

Else

Set Ace Value as 1

Else if Card 2 is Jack

Output Card 2 as Jack

Set Jack Value as 10

Else if Card 2 is Queen

Output Card 2 as Queen

Set Queen Value as 10

Else if Card 2 is King

Output Card 2 as King

Set King Value as 10

Else

Output Card 2 as Number

Determine Values for Card 1 and 2 for Dealer

Output Dealer's Cards

Output Dealer's Card 1

If Card 1 is Ace

Output Card 1 as Ace

Else if Card 1 is Jack

Output Card 1 as Jack

Else if Card 1 is Queen

Output Card 1 as Queen

Else if Card 1 is King

Output Card 1 as King

Else

Output Card 1 as Number

Output Dealer's Card 2 as Unknown

Calculate total value of Player's cards

Initialize Player Decision as Stay

If Total Value of Player's Card is Less than 22

Ask Player for Hit or Stay Decision

Player Hit Loop

While Total Value of Player's Card is Less than 22 and Player Chooses Hit

Determine Value for Card3 for Player

Output Player's Card 3

If Card 3 is Ace

Output Card 3 as Ace

If Ace Value is High or Either

Set Ace Value as 11

Else

Set Ace Value as 1

Else if Card 3 is Jack

Output Card 3 as Jack

Set Jack Value as 10

Else if Card 3 is Queen

Output Card 3 as Queen

Set Queen Value as 10

Else if Card 3 is King

Output Card 3 as King

Set King Value as 10

Else

Output Card 3 as Number

Calculate total value of Player's cards

If Ace Value is Either Determine Best Ace Value

If Card 1 is High Ace and Total Value of Player's Cards is Over 22

Set Ace Value as 1

Calculate new Total Value of Player's Cards

If Card 2 is High Ace and Total Value of Player's Cards is Over 22

Set Ace Value as 1

Calculate new Total Value of Player's Cards

If Card 3 is High Ace and Total Value of Player's Cards is Over 22

Set Ace Value as 1

Calculate new Total Value of Player's Cards

If Card 4 is High Ace and Total Value of Player's Cards is Over 22

Set Ace Value as 1

Calculate new Total Value of Player's Cards

Output Total Value of Player's Cards

If Total Value of Player's Cards is less than 22

Ask Player for Hit or Stay Decision

If Player Hits

Determine Value for Card 4 for Player

Output Player's Card 4

If Card 4 is Ace

Output Card 4 as Ace

If Ace Value is High or Either

Set Ace Value as 11

Else

Set Ace Value as 1

Else if Card 4 is Jack

Output Card 4 as Jack

Set Jack Value as 10

Else if Card 4 is Queen

Output Card 4 as Queen

Set Queen Value as 10

Else if Card 4 is King

Output Card 4 as King

Set King Value as 10

Else

Output Card 4 as Number

Calculate total value of cards

If Ace Value is Either Determine Best Ace Value

If Card 1 is High Ace and Total Value of Player's Cards is Over 22

Set Ace Value as 1

Calculate New Total Value for Player's Cards

If Card 2 is High Ace and Total Value of Player's Cards is Over 22

Set Ace Value as 1

Calculate New Total Value for Player's Cards

If Card 3 is High Ace and Total Value of Player's Cards is Over 22

Set Ace Value as 1

Calculate New Total Value for Player's Cards

If Card 4 is High Ace and Total Value of Player's Cards is Over 22

Set Ace Value as 1

Calculate New Total Value for Player's Cards

Output Total Value of Player's Cards

If Total Value of Player's Cards are less than 22

Ask Player for Hit or Stay Decision

Else

Exit Hit Loop

Calculate Total Value of Dealer's Cards

If Both Cards are Valued as 10

Total Value of Dealer's Cards is 20

Else if One Card is Ace and The Other is Valued as 10 and Ace Value is High or Either

Total Value of Dealer's Cards is 21

Else if Card 1 is Valued at 10

Total Value of Dealer's Cards is 10 plus Card Number

Else if Card 2 is Valued at 10

Total Value of Dealer's Cards is 10 plus Card Number

Else

Total Value of Dealer's Cards is Card 1 Number plus Card 2 Number

Dealer's Turn

If Total Value of Dealer's Cards is greater than or equal to Total Value of Player's Cards

Output Dealer's Cards

Output Dealer's Card 1

If Card 1 is Ace

Output Card 1 as Ace

Else if Card 1 is Jack

Output Card 1 as Jack

Else if Card 1 is Queen

Output Card 1 as Queen

Else if Card 1 is King

Output Card 1 as King

Else

Output Card as Number

Output Dealer's Card 2

If Card 2 is Ace

Output Card 2 as Ace

Else if Card 2 is Jack

Output Card 2 as Jack

Else if Card 2 is Queen

Output Card 2 as Queen

Else if Card 2 is King

Output Card 2 as King

Else

Output Card 2 as Number

Output Total Value of Dealer's Cards

Output Dealer as Winner

Add Loss

If Total Value of Dealer's Cards is Less than Total Value of Player's Cards and Both are Less than 22

Output Dealer's Cards

Output Dealer's Card 1

If Card 1 is Ace

Output Card 1 as Ace

If Ace Value is High or Either

Set Ace Value as 11

Else

Set Ace Value as 1

Else if Card 1 is Jack

Output Card 1 as Jack

Set Jack Value as 10

Else if Card 1 is Queen

Output Card 1 as Queen

Set Queen Value as 10

Else if Card 1 is King

Output Card 1 as King

Set King Value as 10

Else

Output Card 1 as Number

Output Dealer's Card 2

If Card 2 is Ace

Output Card 2 as Ace

If Ace Value is High or Either

Set Ace Value as 11

Else

Set Ace Value as 1

Else if Card 2 is Jack

Output Card 2 as Jack

Set Jack Value as 10

Else if Card 2 is Queen

Output Card 2 as Queen

Set Queen Value as 10

Else if Card 2 is King

Output Card 2 as King

Set King Value as 10

Else

Output Card 2 as Number

Calculate Total Value of Dealer's Cards

Output Total Value of Dealer's Cards

Dealer Hit Loop

While Total Value of Dealer's Cards is less than Total Value of Player's Cards or 16, and Less than 22

Determine Value of Dealer's Card 3

Output Dealer's Card 3

If Card 3 is Ace

Output Card 3 as Ace

If Ace Value is High or Either

Set Ace Value as 11

Else

Set Ace Value as 1

Else if Card 3 is Jack

Output Card 3 as Jack

Set Jack Value as 10

Else if Card 3 is Queen

Output Card 3 as Queen

Set Queen Value as 10

Else if Card 3 is King

Output Card 3 as King

Set King Value as 10

Else

Output Card 3 as Number

Calculate Total Value of Dealer's Cards

If Ace Value is Either Determine Best Ace Value for Dealer

If Card 1 is High Ace and Total Value of Dealer's Cards is over 21

Set Ace Value as 1

Calculate New Total Value of Dealer's Cards

If Card 2 is High Ace and Total Value of Dealer's Cards is over 21

Set Ace Value as 1

Calculate New Total Value of Dealer's Cards

If Card 3 is High Ace and Total Value of Dealer's Cards is over 21

Set Ace Value as 1

Calculate New Total Value of Dealer's Cards

If Card 4 is High Ace and Total Value of Dealer's Cards is over 21

Set Ace Value as 1

Calculate New Total Value of Dealer's Cards

Output Total Value of Dealer's Cards

If Total Value of Dealer's Cards is less than Total Value of Player's Cards or 16, and Less than 22

Determine Value of Dealer's Card 4

Output Dealer's Card 4

If Card 4 is Ace

Output Card 4 as Ace

If Ace Value is High or Either

Set Ace Value as 11

Else

Set Ace Value as 1

Else if Card 4 is Jack

Output Card 4 as Jack

Set Jack Value as 10

Else if Card 4 is Queen

Output Card 4 as Queen

Set Queen Value as 10

Else if Card 4 is King

Output Card 4 as King

Set King Value as 10

Else

Output Card 4 as Number

Calculate total value of Dealer's cards

If Ace Value is Either Determine Best Ace Value for Dealer

If Card 1 is High Ace and Total Value of Dealer's Cards is over 21

Set Ace Value as 1

Calculate New Total Value of Dealer's Cards

If Card 2 is High Ace and Total Value of Dealer's Cards is over 21

Set Ace Value as 1

Calculate New Total Value of Dealer's Cards

If Card 3 is High Ace and Total Value of Dealer's Cards is over 21

Set Ace Value as 1

Calculate New Total Value of Dealer's Cards

If Card 4 is High Ace and Total Value of Dealer's Cards is over 21

Set Ace Value as 1

Calculate New Total Value of Dealer's Cards

Output Total Value of Dealer's Cards

Determine winner

If Total Value of Dealer's Cards is Over 21

Output That Dealer Busts and Player Wins

Add Win

If Total Value of Dealer's Cards is Over Total Value of Player's Cards

Output That Dealer Wins

Add Loss

Else

Output That Player Wins

Add win

Else

Output That Player Busts

Add Loss

End of Game Loop

Ask to Play Again

If Player Chooses Yes Continue Game Loop

Default End Game Loop

While: Player Wants to Play

Calculate Win Percentage

Output the results to file

Output Total Wins

Output Total Losses

Output Win Percentage

Inform Player Results were Outputted to File

Exit Stage Right!

Close Files

**Concept Checklist**

|  |  |  |
| --- | --- | --- |
| Used in Code | Concept | Example in Code |
| X | cout | Line 55 |
| X | cin | Line 234 |
| X | endl | Line 55 |
| X | #include | Line 8 |
| X | short | Line 45 |
| X | int | Line 29 |
| X | float | Line 47 |
| X | char | Line 28 |
| X | character strings | Line 31 |
| X | bool | Line 95 |
| X | Math Expressions | Line 225 |
| X | Type Casting | Line 798 |
| X | Naming Constants | Line 29 |
| X | Combined Assignment | Line 290 |
|  | Format Input | NONE |
| X | Format Output | Line 801 |
| X | File Input | Line 66 |
| X | File Output | Line 802 |
| X | Relational Operators | Line 230 |
| X | if | Line 230 |
| X | if/else | Line 68 |
| X | if/else if | Line 77 |
| X | switch | Line 783 |
| X | Menus | Line 783 |
| X | Logical Operators | Line 238 |
| X | Validating User Input | Line 68 |
| X | String Compare | Line 77 |
| X | Increment and Decrement Operators | Line 495 |
| X | while | Line 238 |
| X | do-while | Line 97 |
|  | for | NONE |

**Future Improvements**

* Betting system
* Multiple players
* Additional blackjack rules and options
* Incorporate arrays and functions to shorten overall code length

**References**

Dr. Mark Lehr

Savitch, Walter. *Problem Solving With C++*. 8th Edition. 2012 Pearson Education, Inc.