Project 1

< Blackjack >

24WINTER CIS-5
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Date: 2/3/2024

Introduction

Title: Blackjack

The game of blackjack or 21 is the most popular table game offered in casinos. The basic premise of the game is that you want to have a hand value that is closer to 21 than that of the dealer, without going over 21. In blackjack, the cards are valued as follows:

- An Ace can count as either 1 or 11, as explained below
- The cards from 2 through 9 are valued at their face value.
- The 10, Jack, Queen, and King are all valued at 10.

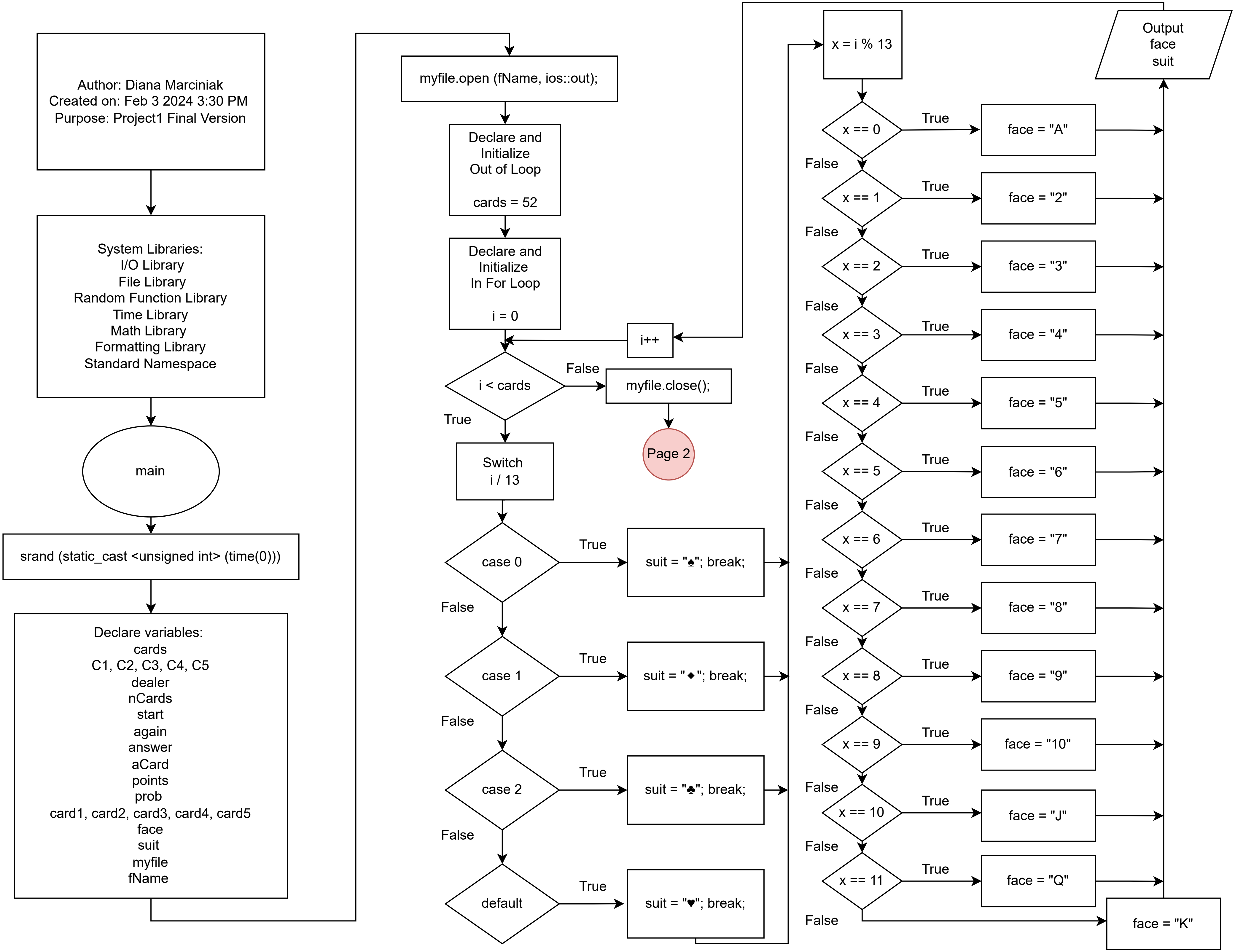
The suits of the cards do not have any meaning in the game. The value of a hand is simply the sum of the point counts of each card in the hand. If you draw a card that makes your hand total go over 21, you loose. A blackjack, or natural, is a total of 21 in your first two cards.

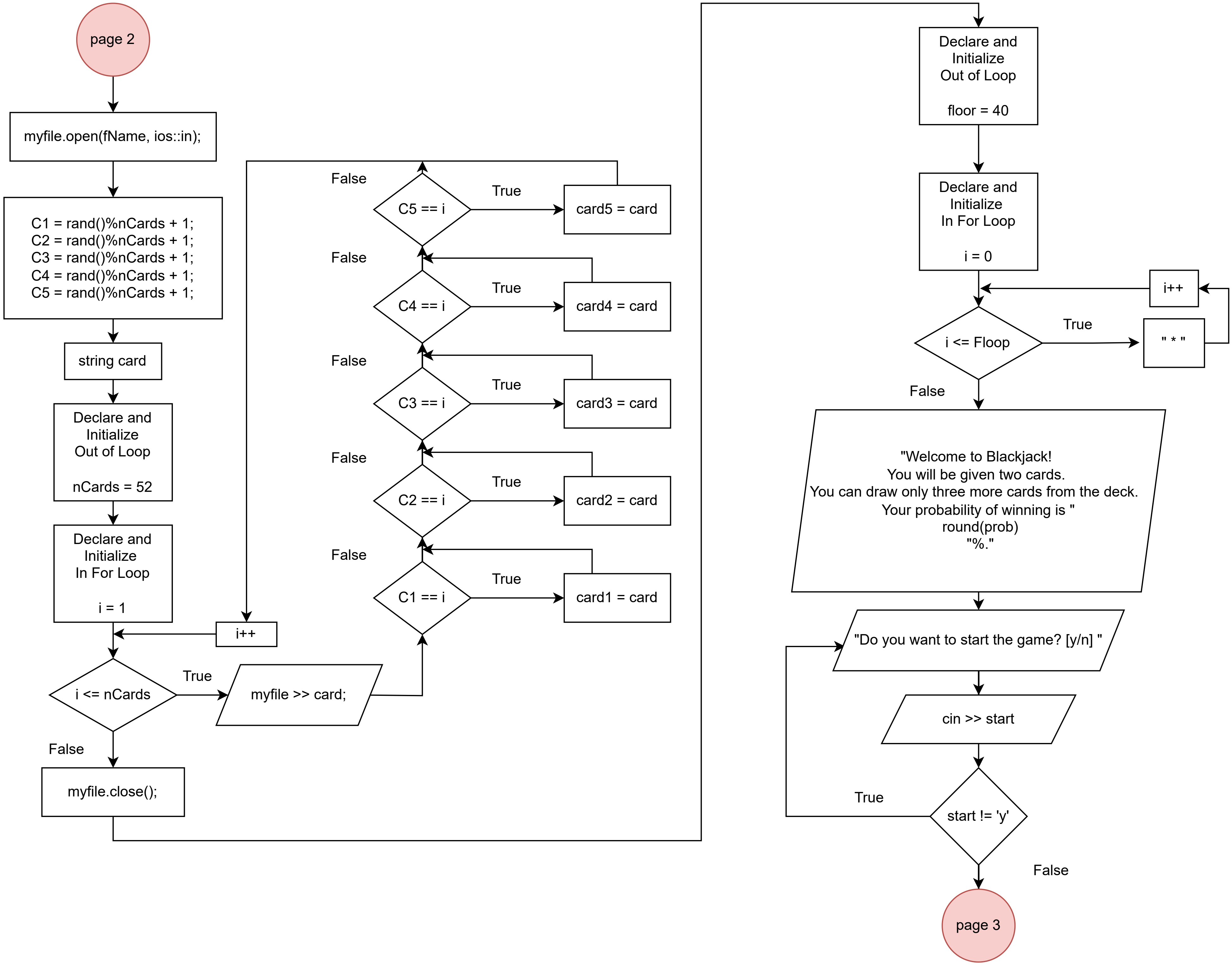
Summary

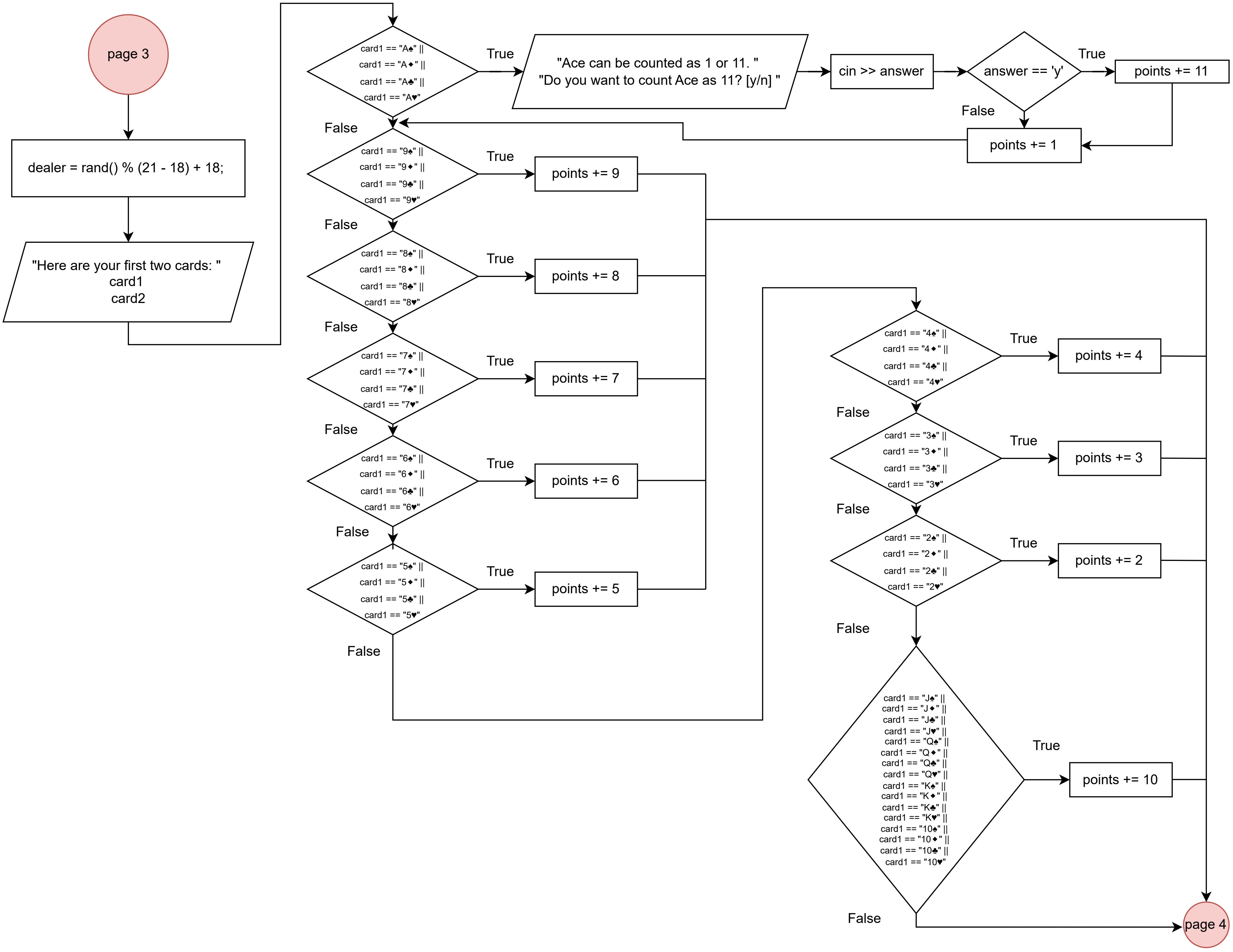
Project size: 500+ lines

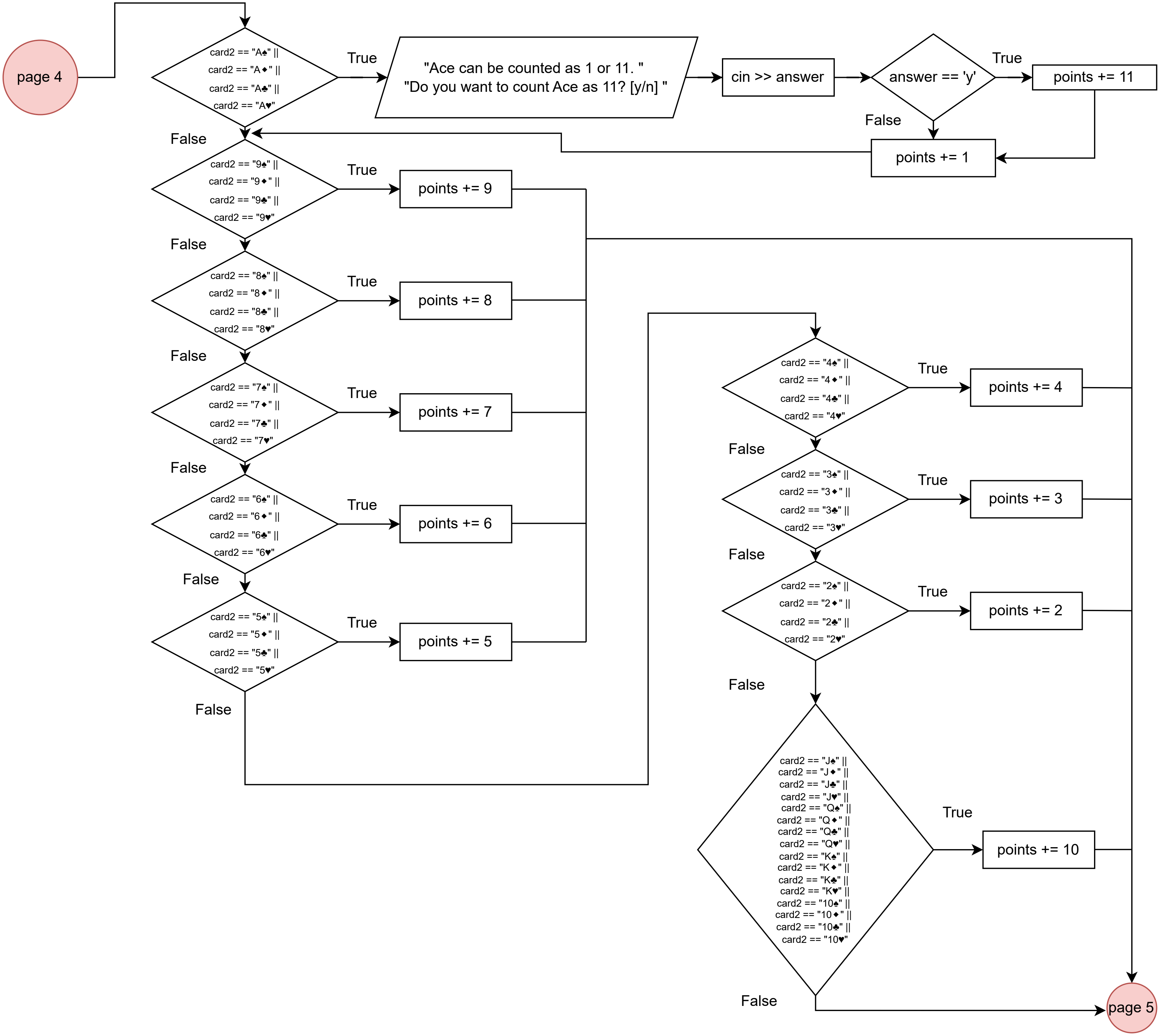
The number of variables: 20+

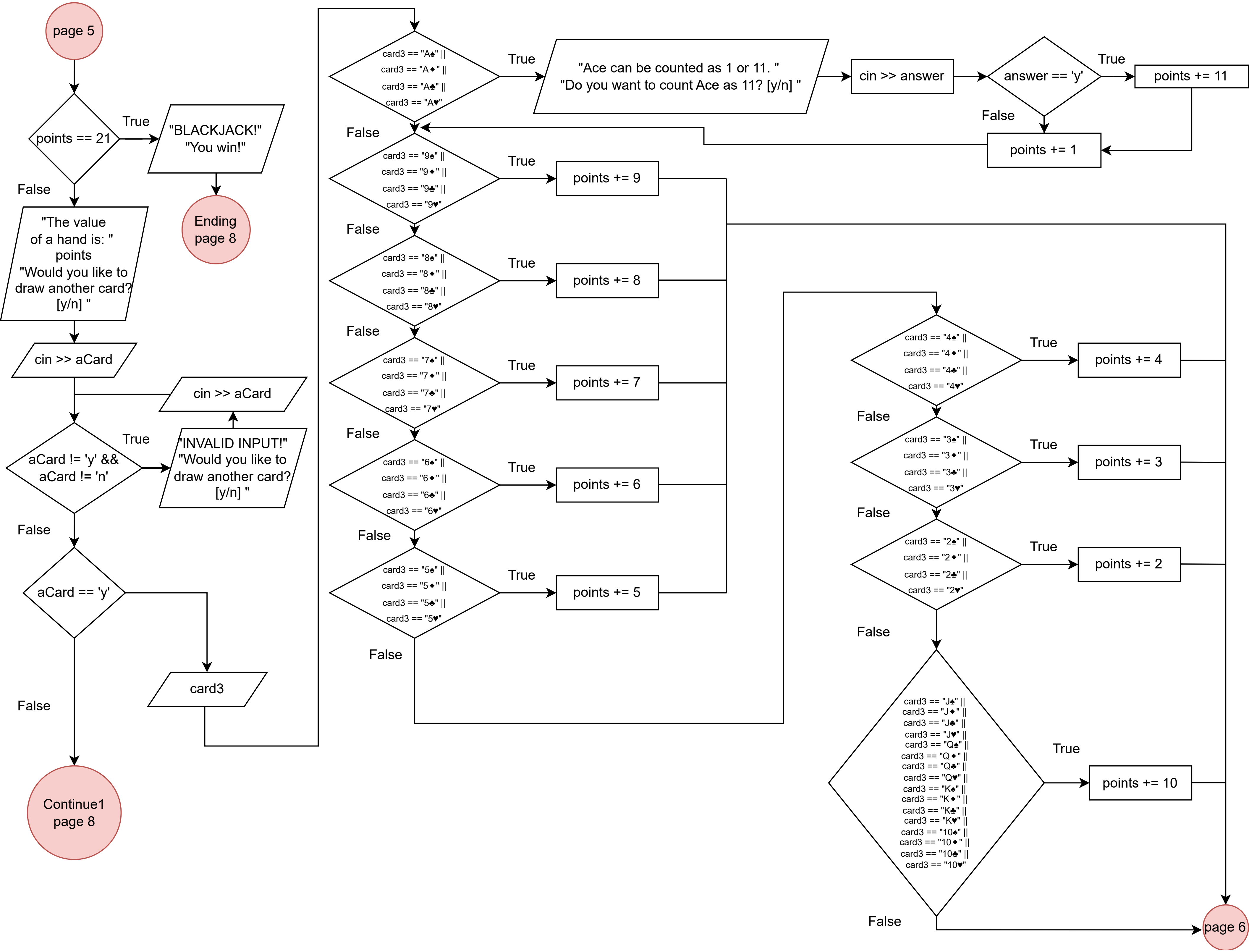
I created a one-player game - blackjack. The player is given two randomly chosen cards from the file DeckOfCards. The program asks the user if he/she wants to draw another card (the user can draw a maximum of 3 more cards). The program calculates the user's points and generates a random number of points for the dealer. The user wins if he/she scores higher than the dealer. It took me a few days to finish the program. It was relatively easy to do due to its repetition in code. However, there is a lot of room for improvement.

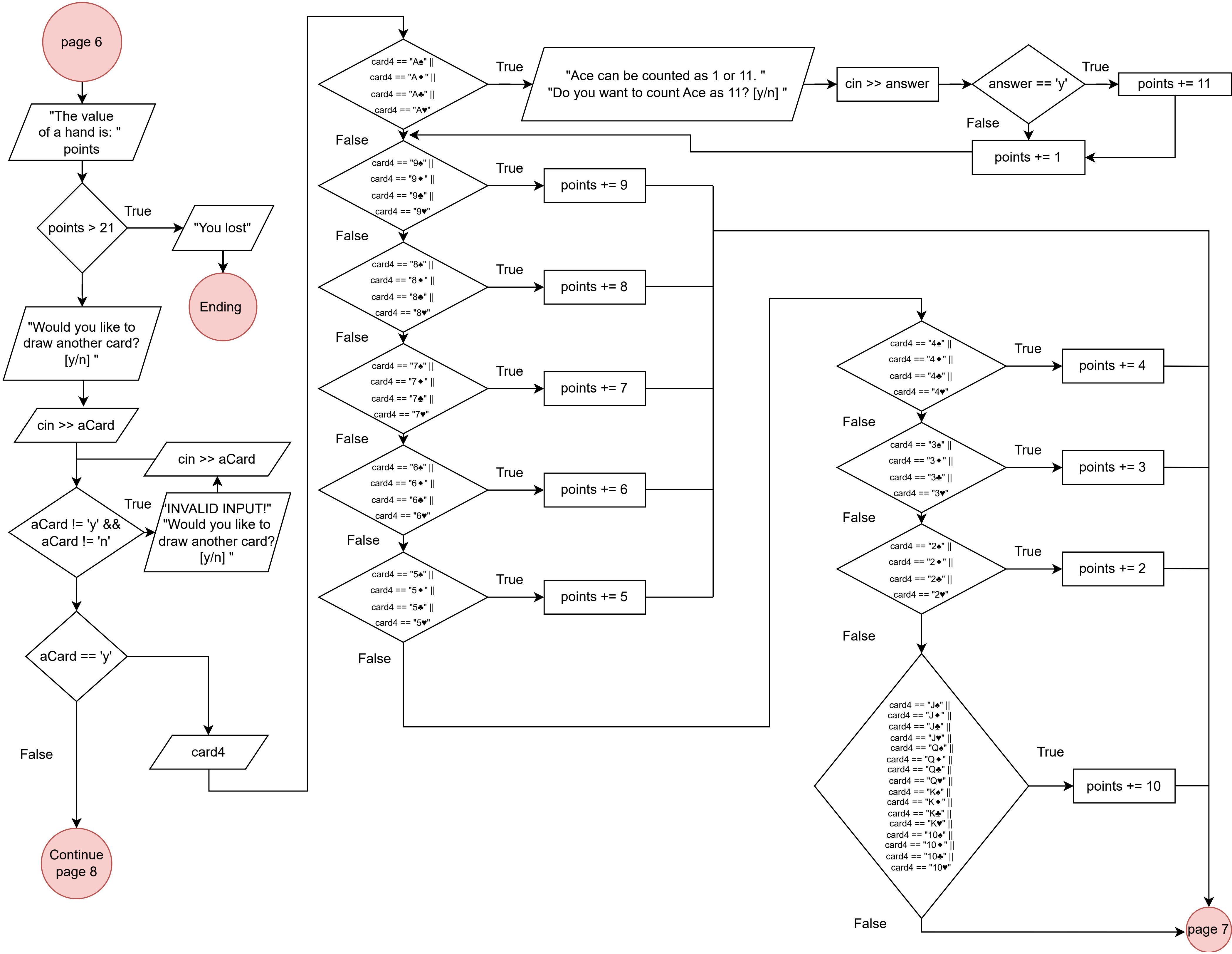

Author: Diana Marciniak
Created on: Feb 3 2024 3:30 PM
Purpose: Project1 Final Version
System Libraries:
I/O Library
File Library
Random Function Library
Time Library
Math Library
Formatting Library
Standard Namespace
main
srand (static_cast <unsigned int> (time(0)))
Declare variables:
cards
C1, C2, C3, C4, C5
dealer
nCards
start
again
answer
aCard
points
prob
card1, card2, card3, card4, card5
face
suit
myfile
fName
myfile.open (fName, ios::out);
Declare and Initialize Out of Loop
cards = 52
Declare and Initialize In For Loop
i = 0
i++
i < cards
False
myfile.close();
Page 2
True
Switch
i / 13
case 0
True
suit = "♠"; break;
False
case 1
True
suit = "♦"; break;
False
case 2
True
suit = "♣"; break;
False
default
True
suit = "♥"; break;
x = i % 13
x == 0
True
face = "A"
False
x == 1
True
face = "2"
False
x == 2
True
face = "3"
False
x == 3
True
face = "4"
False
x == 4
True
face = "5"
False
x == 5
True
face = "6"
False
x == 6
True
face = "7"
False
x == 7
True
face = "8"
False
x == 8
True
face = "9"
False
x == 9
True
face = "10"
False
x == 10
True
face = "J"
False
x == 11
True
face = "Q"
False
face = "K"
Output
face
suit

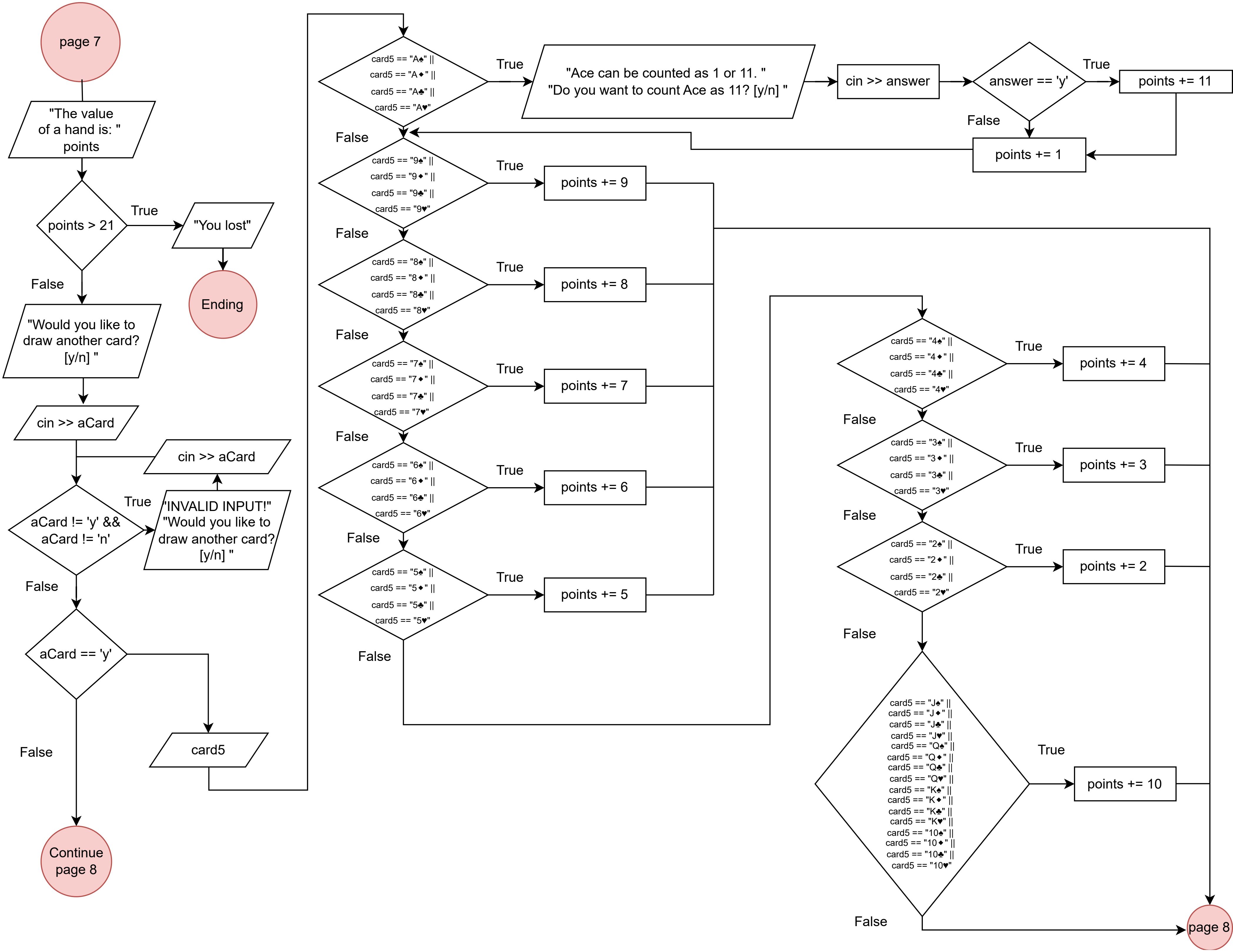

page 2
myfile.open(fName, ios::in);
C1 = rand()%nCards + 1;
C2 = rand()%nCards + 1;
C3 = rand()%nCards + 1;
C4 = rand()%nCards + 1;
C5 = rand()%nCards + 1;
string card
Declare and Initialize Out of Loop
nCards = 52
Declare and Initialize In For Loop
i = 1
i++
i <= nCards
True
myfile >> card;
False
myfile.close();
False
C5 == i
True
card5 = card
False
C4 == i
True
card4 = card
False
C3 == i
True
card3 = card
False
C2 == i
True
card2 = card
False
C1 == i
True
card1 = card
Declare and Initialize Out of Loop
floor = 40
Declare and Initialize In For Loop
i = 0
i++
i <= Floop
True
" * "
False
"Welcome to Blackjack!
You will be given two cards.
You can draw only three more cards from the deck.
Your probability of winning is "
round(prob)
"%."
"Do you want to start the game? [y/n] "
cin >> start
True
start != 'y'
False
page 3

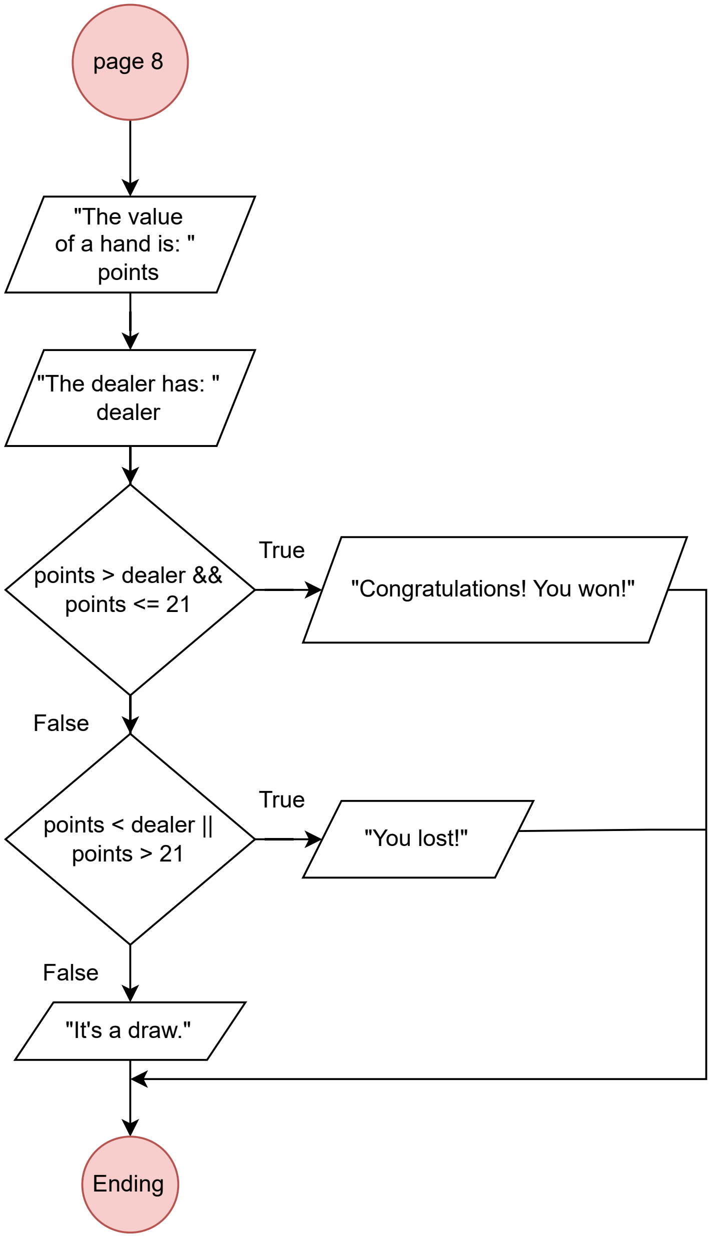

page 3
dealer = rand() % (21 - 18) + 18;
"Here are your first two cards: "
card1
card2
card1 == "A♠" ||
card1 == "A♦" ||
card1 == "A♣" ||
card1 == "A♥"
True
"Ace can be counted as 1 or 11. "
"Do you want to count Ace as 11? [y/n] "
cin >> answer
answer == 'y'
True
points += 11
False
points += 1
False
card1 == "9♠" ||
card1 == "9♦" ||
card1 == "9♣" ||
card1 == "9♥"
True
points += 9
False
card1 == "8♠" ||
card1 == "8♦" ||
card1 == "8♣" ||
card1 == "8♥"
True
points += 8
False
card1 == "7♠" ||
card1 == "7♦" ||
card1 == "7♣" ||
card1 == "7♥"
True
points += 7
False
card1 == "6♠" ||
card1 == "6♦" ||
card1 == "6♣" ||
card1 == "6♥"
True
points += 6
False
card1 == "5♠" ||
card1 == "5♦" ||
card1 == "5♣" ||
card1 == "5♥"
True
points += 5
False
card1 == "4♠" ||
card1 == "4♦" ||
card1 == "4♣" ||
card1 == "4♥"
True
points += 4
False
card1 == "3♠" ||
card1 == "3♦" ||
card1 == "3♣" ||
card1 == "3♥"
True
points += 3
False
card1 == "2♠" ||
card1 == "2♦" ||
card1 == "2♣" ||
card1 == "2♥"
True
points += 2
False
card1 == "J♠" ||
card1 == "J♦" ||
card1 == "J♣" ||
card1 == "J♥" ||
card1 == "Q♠" ||
card1 == "Q♦" ||
card1 == "Q♣" ||
card1 == "Q♥" ||
card1 == "K♠" ||
card1 == "K♦" ||
card1 == "K♣" ||
card1 == "K♥" ||
card1 == "10♠" ||
card1 == "10♦" ||
card1 == "10♣" ||
card1 == "10♥"
True
points += 10
False
page 4

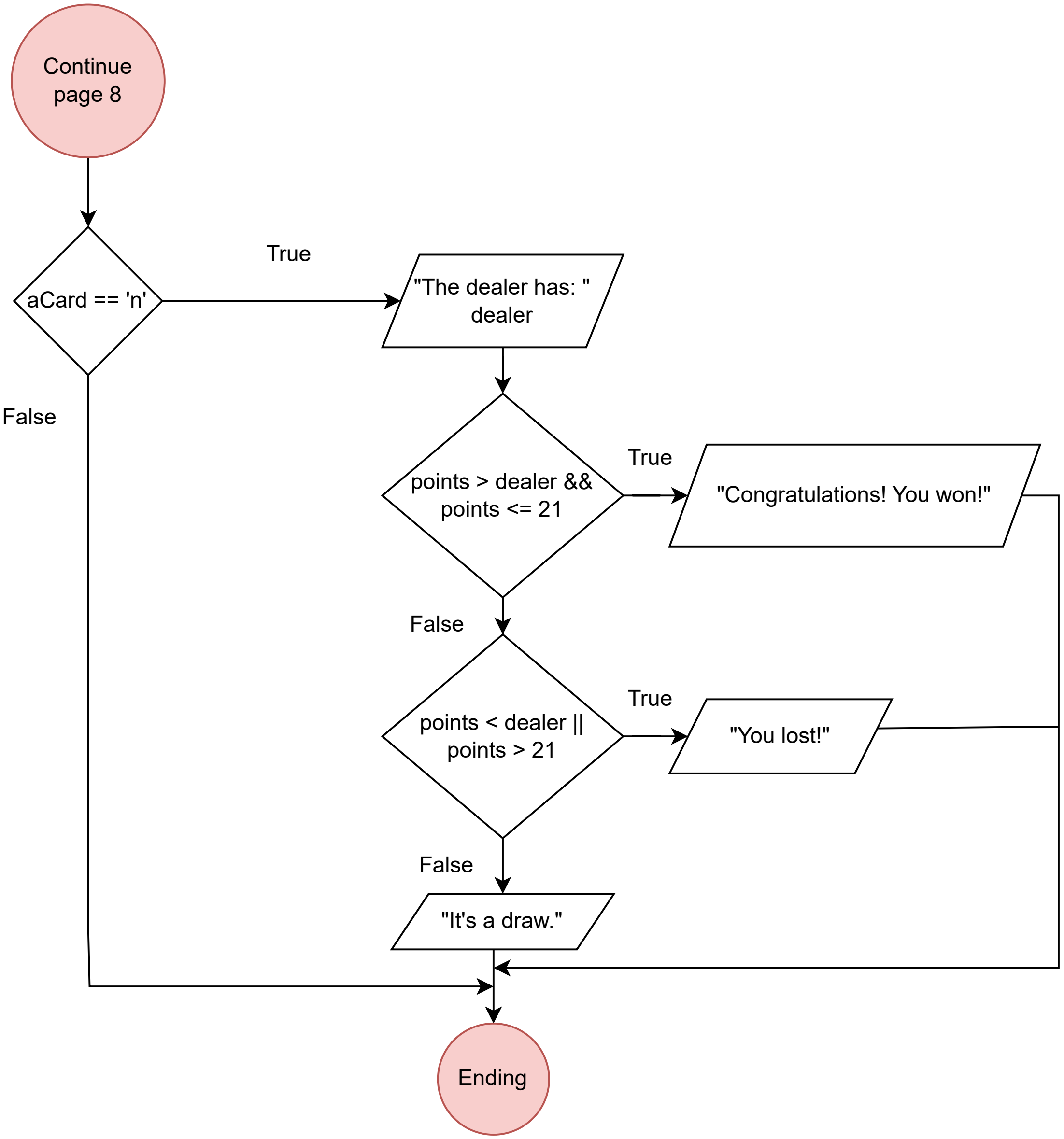

page 4
card2 == "A♠" ||
card2 == "A♦" ||
card2 == "A♣" ||
card2 == "A♥"
True
"Ace can be counted as 1 or 11. "
"Do you want to count Ace as 11? [y/n] "
cin >> answer
answer == 'y'
True
points += 11
False
points += 1
False
card2 == "9♠" ||
card2 == "9♦" ||
card2 == "9♣" ||
card2 == "9♥"
True
points += 9
False
card2 == "8♠" ||
card2 == "8♦" ||
card2 == "8♣" ||
card2 == "8♥"
True
points += 8
False
card2 == "7♠" ||
card2 == "7♦" ||
card2 == "7♣" ||
card2 == "7♥"
True
points += 7
False
card2 == "6♠" ||
card2 == "6♦" ||
card2 == "6♣" ||
card2 == "6♥"
True
points += 6
False
card2 == "5♠" ||
card2 == "5♦" ||
card2 == "5♣" ||
card2 == "5♥"
True
points += 5
False
card2 == "4♠" ||
card2 == "4♦" ||
card2 == "4♣" ||
card2 == "4♥"
True
points += 4
False
card2 == "3♠" ||
card2 == "3♦" ||
card2 == "3♣" ||
card2 == "3♥"
True
points += 3
False
card2 == "2♠" ||
card2 == "2♦" ||
card2 == "2♣" ||
card2 == "2♥"
True
points += 2
False
card2 == "J♠" ||
card2 == "J♦" ||
card2 == "J♣" ||
card2 == "J♥" ||
card2 == "Q♠" ||
card2 == "Q♦" ||
card2 == "Q♣" ||
card2 == "Q♥" ||
card2 == "K♠" ||
card2 == "K♦" ||
card2 == "K♣" ||
card2 == "K♥" ||
card2 == "10♠" ||
card2 == "10♦" ||
card2 == "10♣" ||
card2 == "10♥"
True
points += 10
False
page 5

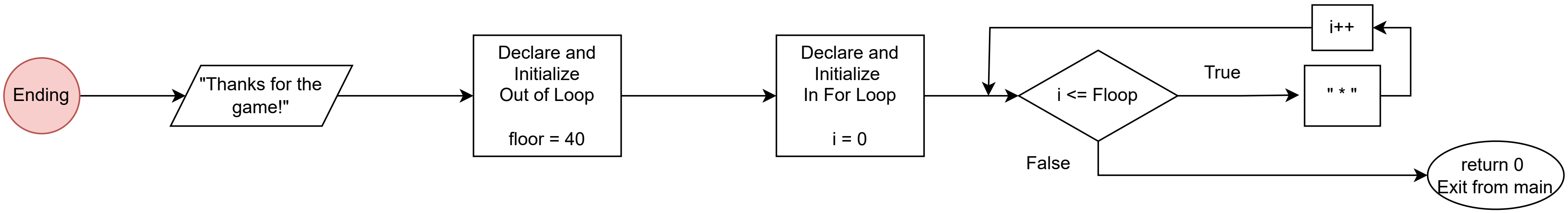

page 5
points == 21
True
"BLACKJACK!"
"You win!"
Ending
page 8
False
"The value
of a hand is: "
points
"Would you like to
draw another card?
[y/n] "
cin >> aCard
cin >> aCard
"INVALID INPUT!"
"Would you like to
draw another card?
[y/n] "
True
aCard != 'y' &&
aCard != 'n'
False
aCard == 'y'
card3
False
Continue1
page 8
card3 == "A♠" ||
card3 == "A♦" ||
card3 == "A♣" ||
card3 == "A♥"
True
"Ace can be counted as 1 or 11. "
"Do you want to count Ace as 11? [y/n] "
cin >> answer
answer == 'y'
True
points += 11
False
points += 1
False
card3 == "9♠" ||
card3 == "9♦" ||
card3 == "9♣" ||
card3 == "9♥"
True
points += 9
False
card3 == "8♠" ||
card3 == "8♦" ||
card3 == "8♣" ||
card3 == "8♥"
True
points += 8
False
card3 == "7♠" ||
card3 == "7♦" ||
card3 == "7♣" ||
card3 == "7♥"
True
points += 7
False
card3 == "6♠" ||
card3 == "6♦" ||
card3 == "6♣" ||
card3 == "6♥"
True
points += 6
False
card3 == "5♠" ||
card3 == "5♦" ||
card3 == "5♣" ||
card3 == "5♥"
True
points += 5
False
card3 == "4♠" ||
card3 == "4♦" ||
card3 == "4♣" ||
card3 == "4♥"
True
points += 4
False
card3 == "3♠" ||
card3 == "3♦" ||
card3 == "3♣" ||
card3 == "3♥"
True
points += 3
False
card3 == "2♠" ||
card3 == "2♦" ||
card3 == "2♣" ||
card3 == "2♥"
True
points += 2
False
card3 == "J♠" ||
card3 == "J♦" ||
card3 == "J♣" ||
card3 == "J♥" ||
card3 == "Q♠" ||
card3 == "Q♦" ||
card3 == "Q♣" ||
card3 == "Q♥" ||
card3 == "K♠" ||
card3 == "K♦" ||
card3 == "K♣" ||
card3 == "K♥" ||
card3 == "10♠" ||
card3 == "10♦" ||
card3 == "10♣" ||
card3 == "10♥"
True
points += 10
False
page 6


page 6
"The value of a hand is: " points
points > 21
True
"You lost"
Ending
"Would you like to draw another card? [y/n] "
cin >> aCard
cin >> aCard
aCard != 'y' && aCard != 'n'
True
"INVALID INPUT!" "Would you like to draw another card? [y/n] "
aCard == 'y'
False
card4
Continue page 8
card4 == "A♠" ||
card4 == "A♦" ||
card4 == "A♣" ||
card4 == "A♥"
True
"Ace can be counted as 1 or 11. " "Do you want to count Ace as 11? [y/n] "
cin >> answer
answer == 'y'
True
points += 11
False
points += 1
False
card4 == "9♠" ||
card4 == "9♦" ||
card4 == "9♣" ||
card4 == "9♥"
True
points += 9
False
card4 == "8♠" ||
card4 == "8♦" ||
card4 == "8♣" ||
card4 == "8♥"
True
points += 8
False
card4 == "7♠" ||
card4 == "7♦" ||
card4 == "7♣" ||
card4 == "7♥"
True
points += 7
False
card4 == "6♠" ||
card4 == "6♦" ||
card4 == "6♣" ||
card4 == "6♥"
True
points += 6
False
card4 == "5♠" ||
card4 == "5♦" ||
card4 == "5♣" ||
card4 == "5♥"
True
points += 5
False
card4 == "4♠" ||
card4 == "4♦" ||
card4 == "4♣" ||
card4 == "4♥"
True
points += 4
False
card4 == "3♠" ||
card4 == "3♦" ||
card4 == "3♣" ||
card4 == "3♥"
True
points += 3
False
card4 == "2♠" ||
card4 == "2♦" ||
card4 == "2♣" ||
card4 == "2♥"
True
points += 2
False
card4 == "J♠" ||
card4 == "J♦" ||
card4 == "J♣" ||
card4 == "J♥" ||
card4 == "Q♠" ||
card4 == "Q♦" ||
card4 == "Q♣" ||
card4 == "Q♥" ||
card4 == "K♠" ||
card4 == "K♦" ||
card4 == "K♣" ||
card4 == "K♥" ||
card4 == "10♠" ||
card4 == "10♦" ||
card4 == "10♣" ||
card4 == "10♥"
True
points += 10
False
page 7


page 7
"The value of a hand is: " points
points > 21
True
"You lost"
Ending
False
"Would you like to draw another card? [y/n] "
cin >> aCard
aCard != 'y' && aCard != 'n'
True
"INVALID INPUT!" "Would you like to draw another card? [y/n] "
cin >> aCard
False
aCard == 'y'
False
Continue page 8
card5
card5 == "A♠" || card5 == "A♦" || card5 == "A♣" || card5 == "A♥"
True
"Ace can be counted as 1 or 11. " "Do you want to count Ace as 11? [y/n] "
cin >> answer
answer == 'y'
True
points += 11
False
points += 1
False
card5 == "9♠" || card5 == "9♦" || card5 == "9♣" || card5 == "9♥"
True
points += 9
False
card5 == "8♠" || card5 == "8♦" || card5 == "8♣" || card5 == "8♥"
True
points += 8
False
card5 == "7♠" || card5 == "7♦" || card5 == "7♣" || card5 == "7♥"
True
points += 7
False
card5 == "6♠" || card5 == "6♦" || card5 == "6♣" || card5 == "6♥"
True
points += 6
False
card5 == "5♠" || card5 == "5♦" || card5 == "5♣" || card5 == "5♥"
True
points += 5
False
card5 == "4♠" || card5 == "4♦" || card5 == "4♣" || card5 == "4♥"
True
points += 4
False
card5 == "3♠" || card5 == "3♦" || card5 == "3♣" || card5 == "3♥"
True
points += 3
False
card5 == "2♠" || card5 == "2♦" || card5 == "2♣" || card5 == "2♥"
True
points += 2
False
card5 == "J♠" || card5 == "J♦" || card5 == "J♣" || card5 == "J♥" || card5 == "Q♠" || card5 == "Q♦" || card5 == "Q♣" || card5 == "Q♥" || card5 == "K♠" || card5 == "K♦" || card5 == "K♣" || card5 == "K♥" || card5 == "10♠" || card5 == "10♦" || card5 == "10♣" || card5 == "10♥"
True
points += 10
False
page 8


page 8
"The value of a hand is: " points
"The dealer has: " dealer
points > dealer && points <= 21
True
"Congratulations! You won!"
False
points < dealer || points > 21
True
"You lost!"
False
"It's a draw."
Ending


Continue page 8
aCard == 'n'
True
False
"The dealer has: " dealer
points > dealer && points <= 21
True
"Congratulations! You won!"
False
points < dealer || points > 21
True
"You lost!"
False
"It's a draw."
Ending


Ending
"Thanks for the game!"
Declare and Initialize Out of Loop
floor = 40
Declare and Initialize In For Loop
i = 0
i <= Floop
True
" * "
i++
False
return 0 Exit from main

Cross Reference

Chapter	Section	Topic	Where Line #'s	Example
2	2	Cout	116	cout << "Welcome to Blackjack!" << endl;

	3	Libraries	9 - 14	#include <iostream>
				cout << setw(31) << "Welcome to Blackjack!" << endl;
				
				#include <fstream>
				myfile.open (fName, ios::out);
				
				#include <cstdlib>
				C1 = rand()%nCards + 1;
				
				#include <ctime>
				srand (static_cast <unsigned int> (time(0)));
				
				#include <cmath>
				cout << round(prob) << "%." << endl;
				
				#include <iomanip>
				cout << setw(31) << "Welcome to Blackjack!" << endl;

	4	Variables/Literals	26 - 39	const unsigned short unsigned short unsigned char unsigned int float string fstream

	5	Identifiers	26 - 39	cards = 52;
				C1, C2, C3, C4, C5, dealer;
				nCards, start, again, answer, aCard;
				points = 0;
				prob = 42.22;
				card1, card2, card3, card4, card5;
				face, suit;
				myfile;
				fName;

	6	Integers	34	unsigned int points = 0;
	7	Characters	30	unsigned char start;

Chapter	Section	Topic	Where Line #'s	Example
	8	Strings	39	string fName;
	9	Floats	35	float prob = 42.22;

	10	Bools	144	if (answer == 'y') points += 11;
				else points += 1;

	14	Arithmetic operators	131	dealer = rand() % (21 - 18) + 18;
	16	Named Constants	26	const unsigned short cards = 52;

Chapter	Section	Topic	Where Line #'s	Example
3	1	Cin	127	cin >> start;
	2	Math Expression	131	dealer = rand() % (21 - 18) + 18;
	5	Type Casting	23	srand (static_cast <unsigned int> (time(0)));
	7	Formatting output	116	cout << setw(31) << "Welcome to Blackjack!" << endl;
	8	Strings	37	string face;
	9	Math Library	122	cout << round(prob) << "%." << endl;

Chapter	Section	Topic	Where Line #'s	Example

4	1	Relational operators	323	if (points > 21) {
				cout << "You lost" << endl;
				}

	2	If	94	if (C1 == i) card1 = card;

	4	If-else	144	if (answer == 'y') points += 11;
				else points += 1;

Chapter	Section	Topic	Where Line #'s	Example

	5	Nesting	190	if (card2 == "A♠" || card2 == "A◆"
				|| card2 == "A♣" || card2 == "A♥")
				{
				cout << "Ace can be counted as
				1 or 11. ";
				cout << "Do you want to count
				Ace as 11? [y/n] ";
				cin >> answer;
				if (answer == 'y') points += 11;
				else points += 1;
				}

	6	If-else-if	480	if (points > dealer && points <= 21)
				{
				cout << "Congratulations! You
				won!" << endl;
				}
				else if (points < dealer ||
				points > 21) {
				cout << "You lost!" << endl;
				}
				else {
				cout << "It's a draw." << endl;
				}

	8	Logical operators	333	while (aCard != 'y' && aCard != 'n')
				{
				cout << "Invalid input" << endl;
				cout << "Would you like to draw
				another card? [y/n] ";
				cin >> aCard;
				};

	11	Validating user input	333	while (aCard != 'y' && aCard != 'n')
				{
				cout << "Invalid input" << endl;
				cout << "Would you like to draw
				another card? [y/n] ";
				cin >> aCard;
				};

Chapter	Section	Topic	Where Line #’s	Example
	13	Conditional operator	59	face = x == 0 ? "A": x == 1 ? "2": x == 2 ? "3": x == 3 ? "4": x == 4 ? "5": x == 5 ? "6": x == 6 ? "7": x == 7 ? "8": x == 8 ? "9": x == 9 ? "10": x == 10 ? "J": x == 11 ? "Q" : "K";

	14	Switch	48	switch (i / 13) {
				case 0: suit = "♠"; break;
				case 1: suit = "◆"; break;
				case 2: suit = "♣"; break;
				default: suit = "♥"; break;
				}

Chapter	Section	Topic	Where Line #’s	Example

5	1	Increment	110	for (int i = 0; i <= 40; i++) {
				cout << “*";
				}

	2	While	333	while (aCard != 'y' && aCard != 'n')
				{
				cout << "Invalid input" << endl;
				cout << "Would you like to draw another card? [y/n] ";
				cin >> aCard;
				};

	5	Do-while	125	do {
				cout << "Do you want to start the game? [y/n] ";
				cin >> start;
				} while (start != 'y');

	6	For loop	110	for (int i = 0; i <= 40; i++) {
				cout << “*";
				}

Chapter	Section	Topic	Where Line #'s	Example

	11	Files input/output both	43 - 107	myfile.open (fName, ios::out);
				myfile.close();
				myfile.open(fName, ios::in);
				myfile.close();

Pseudo Code

```
/*
 * File:   main.cpp
 * Author: Diana Marciniak
 * Created on January 30, 2024, 2:52 PM
 * Purpose : Project1 Final Version
 */

// System Libraries
            // I/O Library
            // File Library
            // Random Function Library
            // Time Library
            // Math Library
            // Formatting Library
            // Global Constants - Math Physics, Chemistry, Conversions

// Program Execution Begins Here

    // Set a random seed

    // Declare all variables

            // The deck of cards
            // Random numbers
            // The dealer's points
            // Number of cards
            // Start the game [y/n]
            // Play again [y/n]
            // Counting Ace as 11 [y/n]
            // Another card [y/n]
            // The user's points start from 0
            // Probability of winning the game is 42.22%
            // Random cards
            // Suits and faces of the cards
            // Create file
            // Naming the file

    // Initialize file parameters

    // The deck of cards
```

```
        // Generating suits
        // Generating faces

// Write to the file

// Close the file

// Open the file
        // Random numbers C1-C5 in the range 1-52
        // Pulling random cards from the file

// Close the file

// Process or Map solutions

        // The introduction
        // Asking the user if they want to start the game
        // Dealer's random number of points
        // Two random cards
        // Calculating points for card1

                // The user chooses to count Ace as 1 or 11
                // The cards from 2 through 9 are valued at their face value
                // The 10, Jack, Queen, and King are all valued at 10

        // Calculating points for card2

                // The user chooses to count Ace as 1 or 11
                // The cards from 2 through 9 are valued at their face value
                // The 10, Jack, Queen, and King are all valued at 10

        // If points = 21 - Blackjack; the user wins
        // Else, continue the game
        // If the input is invalid, repeat the question
        // Drawing a third card - yes
        // Calculating points for card3

                // The user chooses to count Ace as 1 or 11
                // The cards from 2 through 9 are valued at their face value
                // The 10, Jack, Queen, and King are all valued at 10

       // If points are > 21 - end the game
        // If the points are not > 21 - continue the game
        // User chooses if he/she wants to draw another card
        // If the input is invalid, repeat the question
        // Drawing a fourth card - yes
        // Calculating points for card4

                // The user chooses to count Ace as 1 or 11
                // The cards from 2 through 9 are valued at their face value
                // The 10, Jack, Queen, and King are all valued at 10

        // If points are > 21 - end the game
        // User chooses if he/she wants to draw another card
        // If the input is invalid, repeat the question
        // Drawing a fifth card - yes
        //Calculating points for card5

            // The user chooses to count Ace as 1 or 11
            // The cards from 2 through 9 are valued at their face value
            // The 10, Jack, Queen, and King are all valued at 10

        // The user's points
        // The dealer's points
        // If the user has more points than the dealer and the points are <= 21 - the user wins
        //If the user has less points than the dealer or the points are > 21 - the user looses
        // If user's points = the dealer's points
        // Drawing a fifth card - no

            // The dealer's points
            // If the user has more points than the dealer and the points are <= 21 - the user wins
            //If the user has less points than the dealer or the points are > 21 - the user looses

        // Drawing a fourth card - no

            // The dealer's points
            // If the user has more points than the dealer and the points are <= 21 - the user wins
             // If the user has less points than the dealer or the points are > 21 - the user looses
            // If user's points = the dealer's points

        // Drawing a third card - no

            // The dealer's points
            // If the user has more points than the dealer and the points are <= 21 - the user wins
            // If the user has less points than the dealer or the points are > 21 - the user looses
            // If user's points = the dealer's points

    // End the game

//Exit the Program
```

Reference

- Github

- https://www.blackjackinfo.com/blackjack-rules/