CSCI 145 PA __6__ Submission

Due Date:___April 10, 2023___ Late (date and time):_____

Name(s):_____Ivan Leung_____ & _____

Exercise 1 -- need to submit source code and I/O
-- check if completely done __x__ ; otherwise, discuss issues below

Pseudocode below if applicable:

Source code below:

```
package pa6;

/*  Java Class: CSCI 145
Modified by: Ivan Leung
Class: Mon/Wed
Date: Apr 03 2023
Description: Play Rock, Paper, Scissors between the user and the
computer

I certify that the code below is my own work.

Exception(s): N/A

*/

//*************************************************************
//Rock.java
//
//Play Rock, Paper, Scissors with the user
//
//*************************************************************
import java.util.Scanner;
import java.util.Random;

public class Rock {
	public static void main(String[] args)
	{
		String personPlay; //User's play -- "R", "P", or "S"
```

```
            String computerPlay; //Computer's play -- "R", "P", or
"S"
            int computerInt; //Randomly generated number used to
determine
            //computer's play
            Scanner scan = new Scanner(System.in);
            Random generator = new Random();
            //Get player's play -- note that this is stored as a
string
            System.out.println("Enter your play: R, P, S");
            personPlay = scan.next();
            scan.close();
            //Make player's play uppercase for ease of comparison
            personPlay = personPlay.toUpperCase();
            //Generate computer's play (0,1,2)
            computerInt = generator.nextInt(3);
            //Translate computer's randomly generated play to
string
            switch (computerInt)
            {
            case 1:
                  computerPlay = "R";
                  break;
            case 2:
                  computerPlay = "P";
                  break;
            default:
                  computerPlay = "S";
                  break;
            }
            //Print computer's play
            System.out.println("Computer play is " +
computerPlay);
            //See who won. Use nested ifs instead of &&.
            if (personPlay.equals(computerPlay))
                  System.out.println("It's a tie!");
            else if (personPlay.equals("R"))
                  if (computerPlay.equals("S"))
                        System.out.println("Rock crushes scissors.
You win!!");
                  else
                        System.out.println("Paper covers rock. You
lose!!");//... Fill in rest of code
            else if (personPlay.equals("P"))
                  if (computerPlay.equals("R"))
```

```
                    System.out.println("Paper covers rock. You
win!!");
               else
                    System.out.println("Scissors cuts paper.
You lose!!");
          else
               if (computerPlay.equals("P"))
                    System.out.println("Scissors cuts paper.
You win!!");
               else
                    System.out.println("Rock crushes scissors.
You lose!!");
     }

}
```

Input/output below:

```
Enter your play: R, P, S
R
Computer play is R
It's a tie!

Enter your play: R, P, S
p
Computer play is R
Paper covers rock. You win!!

Enter your play: R, P, S
S
Computer play is P
Scissors cuts paper. You win!!

Enter your play: R, P, S
R
Computer play is S
Rock crushes scissors. You win!!

Enter your play: R, P, S
p
Computer play is S
Scissors cuts paper. You lose!!
```

Exercise 2 -- need to submit source code and I/O
-- check if completely done __x__ ; otherwise, discuss issues below

Pseudocode below if applicable:

Source code below:

```
package pa6;

/*  Java Class: CSCI 145
Modified by: Ivan Leung
Class: Mon/Wed
Date: Apr 03 2023
Description: Determines the result of the elections in various
formats

I certify that the code below is my own work.

Exception(s): N/A

*/

//*************************************************************
//Election.java
//
//This file contains a program that tallies the results of
//an election. It reads in the number of votes for each of
//two candidates in each of several precincts. It determines
//the total number of votes received by each candidate, the
//percent of votes received by each candidate, the number of
//precincts each candidate carries, and the
//maximum winning margin in a precinct.
//*************************************************************

import java.util.Scanner;
import java.text.NumberFormat;

public class Election {
     public static void main(String[] args) {
          int votesForPolly;  // number of votes for Polly in
each precinct
```

```
            int votesForErnest; // number of votes for Ernest in
each precinct
            int totalPolly;       // running total of votes for
Polly
            int totalErnest;// running total of votes for Ernest
            int wonByPolly;
            int wonByErnest;
            int ties;
            String response;// answer (y or n) to the "more
precincts" question
            Scanner scan = new Scanner(System.in);
            NumberFormat percent =
NumberFormat.getPercentInstance();
            percent.setMinimumFractionDigits(1);
            System.out.println();
            System.out.println("Election Day Vote Counting
Program");
            System.out.println();
            // Initializations
            totalPolly = 0;
            totalErnest = 0;
            wonByPolly = 0;
            wonByErnest = 0;
            ties = 0;
            // Loop to "process" the votes in each precinct
            do {
                  System.out.print("Vote for Polly: ");
                  votesForPolly = scan.nextInt();
                  System.out.print("Vote for Ernest: ");
                  votesForErnest = scan.nextInt();
                  totalPolly += votesForPolly;
                  totalErnest += votesForErnest;
                  if (votesForPolly == votesForErnest)
                        ++ties;
                  else if (votesForPolly > votesForErnest)
                        ++wonByPolly;
                  else
                        ++wonByErnest;
                  System.out.print("More precincts? ");
                  response = scan.next();
            } while (response.equalsIgnoreCase("Y"));
            // Print out the results
            scan.close();
            System.out.println("Total votes for Polly: " +
totalPolly + " (" + percent.format((double) totalPolly /
(totalPolly + totalErnest)) + ")");
```

```
            System.out.println("Total votes for Ernest: " +
totalErnest + " (" + percent.format((double) totalErnest /
(totalPolly + totalErnest)) + ")");
            System.out.println("Precincts won by Polly: " +
wonByPolly);
            System.out.println("Precincts won by Ernest: " +
wonByErnest);
            System.out.println("Precincts tie: " + ties);
      }

}
```

Input/output below:

```
Election Day Vote Counting Program

Vote for Polly: 8
Vote for Ernest: 4
More precincts? y
Vote for Polly: 7
Vote for Ernest: 10
More precincts? Y
Vote for Polly: 8
Vote for Ernest: 8
More precincts? n
Total votes for Polly: 23 (51.1%)
Total votes for Ernest: 22 (48.9%)
Precincts won by Polly: 1
Precincts won by Ernest: 1
Precincts tie: 1
```

Exercise 3 -- need to submit source code and I/O
-- check if completely done __x__ ; otherwise, discuss issues below

Pseudocode below if applicable:

Source code below:

```
package pa6;

/*  Java Class: CSCI 145
Modified by: Ivan Leung
Class: Mon/Wed
```

```
Date: Apr 03 2023
Description: Determines the result of the elections in various
formats

I certify that the code below is my own work.

Exception(s): N/A

 */

//*************************************************************
//Temps.java
//
//This program reads in a sequence of hourly temperature
//readings (beginning with midnight) and prints the maximum
//temperature (along with the hour, on a 24-hour clock, it
//occurred) and the minimum temperature (along with the hour
//it occurred).
//*************************************************************

import java.util.Scanner;

public class Temps {
	// --------------------------------------------------
	// Reads in a sequence of temperatures and finds the
	// maximum and minimum read in.
	// --------------------------------------------------

	public static void main(String[] args) {
		final int HOURS_PER_DAY = 8;
		int temp; // a temperature reading
		int maxTemp = -1000;
		int timeOfMax = 0;
		int minTemp = 1000;
		int timeOfMin = 0;
		Scanner scan = new Scanner(System.in);
		// print program heading
		System.out.println();
		System.out.println("Temperature Readings for 8 Hour
Period");
		System.out.println();
		for (int hour = 0; hour < HOURS_PER_DAY; hour++) {
			System.out.print("Enter the temperature reading
at " + hour + " hours: ");
			temp = scan.nextInt();
			if (temp > maxTemp) {
```

```
                        maxTemp = temp;
                        timeOfMax = hour;
                  }
                  if (temp < minTemp) {
                        minTemp = temp;
                        timeOfMin = hour;
                  }
            }
            scan.close();
            // Print the results
            System.out.println("Maximum temperature is " + maxTemp
+ " and occurred at hour " + timeOfMax);
            System.out.println("Minimum tempreature is " + minTemp
+ " and occurred at hour " + timeOfMin);
      }

}
```

Input/output below:

```
Temperature Readings for 8 Hour Period

Enter the temperature reading at 0 hours: 75
Enter the temperature reading at 1 hours: 78
Enter the temperature reading at 2 hours: 77
Enter the temperature reading at 3 hours: 80
Enter the temperature reading at 4 hours: 85
Enter the temperature reading at 5 hours: 83
Enter the temperature reading at 6 hours: 76
Enter the temperature reading at 7 hours: 74
Maximum temperature is 85 and occurred at hour 4
Minimum tempreature is 74 and occurred at hour 7
```

Add more exercises as needed

Exercise 4 -- need to submit source code and I/O
-- check if completely done __x__ ; otherwise, discuss issues below

Pseudocode below if applicable:

Source code below:

```
package pa6;

//Class Roulette for CSCI 145 PA 4 Spring 2023
//Modified by: Ivan Leung

/*  Java Class: CSCI 145
Modified by: Ivan Leung
Class: Mon/Wed
Date: Apr 04 2023
Description:

I certify that the code below is my own work.

Exception(s): N/A

*/

import java.util.*;

//Class Roulette represents a roulette betting game.
class Roulette {
	// public name constants -- accessible to others
	public final static int BLACK = 0; // even numbers
	public final static int RED = 1; // odd numbers
	public final static int GREEN = 2; // 00 OR 0
	public final static int NUMBER = 3; // number bet
	public final static int MIN_NUM = 1; // smallest number to
bet
	public final static int MAX_NUM = 36; // largest number to
bet
	public final static int MIN_BET = 1; // minimum amount to
bet

	// private name constants -- internal use only
	private final static int MAX_POSITIONS = MAX_NUM + 2; //
number of positions on wheel
	private final static int NUMBER_PAYOFF = MAX_NUM - 1; //
payoff for number bet
	private final static int COLOR_PAYOFF = 2; // payoff for
color bet

	// private variables -- internal use only
	private static int ballPosition = 0; // 00, 0, 1 .. MAX_NUM
```

```
	private static int color = GREEN; // GREEN, RED, OR BLACK

	// private variables -- testing only
//	private static int next = 0; // next value in the list
//	private static int[] randValues = { 20, 5, 0, 1, 36 }; // 5
values

	// Contains the main processing loop for the roulette game.
	public static void main(String[] args) {
		Scanner scan = new Scanner(System.in);
		Player player = new Player("Jane", 100); // $100 to
start for Jane
		boolean done = false;
//		int currentSpin;
		int initialAmount = player.getMoney();
		int totalPayment;

		System.out.println("Author: Ivan Leung\n");
		welcomeMessage();

		while (!done) {
			System.out.println("Money available for " +
player.getName() + ": " + player.getMoney());
			betOptions();

			// Add code so player can make a bet
			player.makeBet(scan);
			System.out.println();
			// spin() and display value
//			currentSpin = spin();
			spin();
			System.out.println();
			// Determines payment
			player.payment(payoff(player.getBet(),
player.getBetType(), player.getNumber()));

			done = !player.playAgain(scan);

			System.out.println();
		}
		totalPayment = player.getMoney() - initialAmount;
		System.out.println(player.getName() + (totalPayment >=
0 ? " won " : " lost ") + (int) Math.abs((double) totalPayment) +
" for this game.");
		System.out.println("Game over!  Thanks for playing.");
		scan.close();
```

```
	}

	//
==========================================================================
====
	// Presents welcome message
	//
==========================================================================
====
	public static void welcomeMessage() {
		System.out.println("Welcome to a simple version of
roulette game.");
		System.out.println("You can place a bet on black, red,
or a number.");
		System.out.println("A color bet is paid " +
COLOR_PAYOFF + " times the bet amount.");
		System.out.println("A number bet is paid " +
NUMBER_PAYOFF + " times the bet amount.");
		System.out.println("You can bet on a number from " +
MIN_NUM + " to " + MAX_NUM + ".");
		System.out.println("Gamble responsibly.  Have fun and
good luck!\n");
	}

	//
==========================================================================
====
	// Presents betting options
	//
==========================================================================
====
	public static void betOptions() {
		System.out.println("Betting Options:");
		System.out.println("    1. Bet on black (even
numbers)");
		System.out.println("    2. Bet on red (odd numbers)");
		System.out.println("    3. Bet on a number between " +
MIN_NUM + " and " + MAX_NUM);
		System.out.println();
	}

	// Spins the wheel
	public static int spin() {
		int result;

		// use nextRandom() for testing now
```

```
            result = nextRandom();
            Roulette.ballPosition = result;

            if (result == 0 || result == 37)
                  Roulette.color = Roulette.GREEN;
            else if ((result & 1) == 0)
                  Roulette.color = Roulette.BLACK;
            else
                  Roulette.color = Roulette.RED;

            System.out.println("Spinning ...");
            System.out.print("Current number: ");

            if (result == 37)
                  System.out.print("00, color: ");
            else
                  System.out.print(result + ", color: ");

            if (Roulette.color == Roulette.GREEN)
                  System.out.println("Green");
            else if (Roulette.color == Roulette.BLACK)
                  System.out.println("Black");
            else
                  System.out.println("Red");

            return result;

            // comment above code and add your code to spin
      }

      // Payoff method for number bet
      public static int payoff(int betAmt, int betType, int
numberBet) {
            int pay = 0;
            if (Roulette.ballPosition == 0 ||
Roulette.ballPosition == 37) {
                  return pay;
            }
            else if (betType == 1) {
                  if (Roulette.color == Roulette.BLACK)
                        return pay = betAmt *
Roulette.COLOR_PAYOFF;
            }
            else if (betType == 2) {
                  if (Roulette.color == Roulette.RED)
```

```
                        return pay = betAmt *
Roulette.COLOR_PAYOFF;
            }
            else {
                  if (numberBet == Roulette.ballPosition)
                        return pay = betAmt *
Roulette.NUMBER_PAYOFF;
            }


            return pay;
      }

      // Returns a simulated "random" value for testing
      // Assume a value between 0 and 36
      public static int nextRandom() {
//          int num = randValues[next];
//          next++;
//          next = next % randValues.length; // back to 0 if
needed
            Random rand = new Random();
            int num = rand.nextInt(Roulette.MAX_POSITIONS);
            return num;
      }

}
package pa6;

//Class Player for CSCI 145 PA 4 Spring 2023
//Modified by: Ivan Leung

/*  Java Class: CSCI 145
Modified by: Ivan Leung
Class: Mon/Wed
Date: Apr 04 2023
Description:

I certify that the code below is my own work.

Exception(s): N/A

*/

import java.util.*;

//Class Player represents one roulette player.
```

```
class Player {
	private static final int RELOAD_AMOUNT = 100;
	private int bet, money, betType, number;
	private String name;

	// The Player constructor sets up name and initial available
money.
	public Player(String playerName, int initialMoney) {
		name = playerName;
		money = initialMoney;
	}

	// Returns this player's name.
	public String getName() {
		return name;
	}

	// Returns this player's current available money.
	public int getMoney() {
		return money;
	}

	public int getBetType() {
		return betType;
	}

	public int getBet() {
		return bet;
	}

	public int getNumber() {
		return number;
	}

	// Prompts the user and reads betting information.
	public void makeBet(Scanner scan) {
		System.out.print("Enter a bet option, " + name + " (1,
2, or 3): ");
		betType = scan.nextInt();
		while (betType < 1 || betType > 3) {
			System.out.print("Invalid option (must be between
1 and 3).\nEnter a bet option, " + name + " (1, 2, or 3): ");
			betType = scan.nextInt();
		}
		if (betType == 3) {
			System.out.print("Enter a number: ");
```

```
                number = scan.nextInt();
                while (number < Roulette.MIN_NUM || number >
Roulette.MAX_NUM) {
                      System.out.print("Invalid number (must be
between 1 and 36).\nEnter a number: ");
                      number = scan.nextInt();
                }
          }
          System.out.print("How much to bet: ");
          bet = scan.nextInt();
          while (bet < Roulette.MIN_BET || bet > money) {
                System.out.print("Invalid amount (must be at
least 1).\nHow much to bet: ");
                bet = scan.nextInt();
          }
          System.out.print("You chose to bet $" + bet + " on ");
          if (betType == 1)
                System.out.println("Black color");
          else if (betType == 2)
                System.out.println("Red color");
          else
                System.out.println("number " + number + ".");

          money = money - bet;
     }

     // Determines if the player wants to play again.
     public boolean playAgain(Scanner scan) {
          String answer;

          System.out.print("Play again, " + name + "? [y/n] ");
          answer = scan.next();
          return (answer.equals("y") || answer.equals("Y"));
     }

     // payment method (determines winnings)
     public int payment(int pay) {
          money += pay;
          if (pay > 0)
                System.out.println(name + " won " + pay + ".");
          else
                System.out.println(name + " lost this round.");
          return pay;
     }

}
```

Input/output below:

```
Author: Ivan Leung

Welcome to a simple version of roulette game.
You can place a bet on black, red, or a number.
A color bet is paid 2 times the bet amount.
A number bet is paid 35 times the bet amount.
You can bet on a number from 1 to 36.
Gamble responsibly.  Have fun and good luck!

Money available for Jane: 100
Betting Options:
    1. Bet on black (even numbers)
    2. Bet on red (odd numbers)
    3. Bet on a number between 1 and 36

Enter a bet option, Jane (1, 2, or 3): 4
Invalid option (must be between 1 and 3).
Enter a bet option, Jane (1, 2, or 3): 1
How much to bet: 10
You chose to bet $10 on Black color

Spinning ...
Current number: 1, color: Red

Jane lost this round.
Play again, Jane? [y/n] Y

Money available for Jane: 90
Betting Options:
    1. Bet on black (even numbers)
    2. Bet on red (odd numbers)
    3. Bet on a number between 1 and 36

Enter a bet option, Jane (1, 2, or 3): 2
How much to bet: 10
You chose to bet $10 on Red color

Spinning ...
Current number: 7, color: Red

Jane won 20.
Play again, Jane? [y/n] y
```

```
Money available for Jane: 100
Betting Options:
    1. Bet on black (even numbers)
    2. Bet on red (odd numbers)
    3. Bet on a number between 1 and 36

Enter a bet option, Jane (1, 2, or 3): 3
Enter a number: 38
Invalid number (must be between 1 and 36).
Enter a number: 18
How much to bet: 10
You chose to bet $10 on number 18.

Spinning ...
Current number: 1, color: Red

Jane lost this round.
Play again, Jane? [y/n] y

Money available for Jane: 90
Betting Options:
    1. Bet on black (even numbers)
    2. Bet on red (odd numbers)
    3. Bet on a number between 1 and 36

Enter a bet option, Jane (1, 2, or 3): 2
How much to bet: 0
Invalid amount (must be at least 1).
How much to bet: 10
You chose to bet $10 on Red color

Spinning ...
Current number: 0, color: Green

Jane lost this round.
Play again, Jane? [y/n] y

Money available for Jane: 80
Betting Options:
    1. Bet on black (even numbers)
    2. Bet on red (odd numbers)
    3. Bet on a number between 1 and 36

Enter a bet option, Jane (1, 2, or 3): 1
How much to bet: 10
```

```
You chose to bet $10 on Black color

Spinning ...
Current number: 9, color: Red

Jane lost this round.
Play again, Jane? [y/n] y

Money available for Jane: 70
Betting Options:
    1. Bet on black (even numbers)
    2. Bet on red (odd numbers)
    3. Bet on a number between 1 and 36

Enter a bet option, Jane (1, 2, or 3): 1
How much to bet: 10
You chose to bet $10 on Black color

Spinning ...
Current number: 0, color: Green

Jane lost this round.
Play again, Jane? [y/n] y

Money available for Jane: 60
Betting Options:
    1. Bet on black (even numbers)
    2. Bet on red (odd numbers)
    3. Bet on a number between 1 and 36

Enter a bet option, Jane (1, 2, or 3): 1
How much to bet: 20
You chose to bet $20 on Black color

Spinning ...
Current number: 6, color: Black

Jane won 40.
Play again, Jane? [y/n] n

Jane lost 20 for this game.
Game over!  Thanks for playing.
```

Answer for Question 1

The conditional operator is a ternary operator which requires a condition and two results. The condition is placed before a question mark and the two results are placed after the question mark separated by a colon. If the condition is evaluated to be true, then the first result will be executed, otherwise the second result will be executed. Here is a basic format of a conditional operator below:

(condition ? true : false)

The conditional operator can be used wherever an if-else statement (exactly one if and one else) is being used because they are interchangeable. The conditional operator usually provide better readability because it can be written in one single line instead of four lines in if-else statement.

Answer for Question 2

Among the three loop, do-while loop is different from the other two. The main difference is that do-while loop statement is executed at least one time or more while for loop and while loop are executed at least zero times or more.

Extra Credit – provide if applicable

Pseudocode below if applicable:

Source code below:

```
package pa6;

//Class Player for CSCI 145 PA 4 Spring 2023
//Modified by: Ivan Leung

/*  Java Class: CSCI 145
Modified by: Ivan Leung
Class: Mon/Wed
Date: Apr 04 2023
Description:

I certify that the code below is my own work.

Exception(s): N/A
```

```
*/

//*************************************************************
***
//Runs.java
//
//Finds the length of the longest run of heads in 100 flips of a
coin.
//*************************************************************
****
public class Runs {
	public static void main(String[] args) {
		final int FLIPS = 100; // number of coin flips
		int currentRun = 0; // length of the current run of
HEADS
		int maxRun = 0; // length of the maximum run so far
		// Create a coin object
		Coin coin = new Coin();
		// Flip the coin FLIPS times
		for (int i = 0; i < FLIPS; i++) {
			// Flip the coin & print the result
			coin.flip();
			System.out.println(coin);
			// Update the run information
			if (coin.isHeads()) {
				++currentRun;
			}
			else {
				if (currentRun > maxRun) {

					maxRun = currentRun;
				}
				currentRun = 0;
			}
		}
		// Print the results
		System.out.println("\nThe longest run of Head is " +
maxRun + " Heads.");
	}

}
```

Input/output below:

```
Tails
Heads
Heads
Heads
Heads
Heads
Heads
Tails
Heads
Tails
Heads
Heads
Tails
Heads
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```
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Tails

The longest run of Head is 10 Heads.
```