EAST WEST UNIVERSITY

Assignment 01

Submitted to:

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Lecturer

Department of Computer Science & Engineering

Submitted by:

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ID: **2023-1-60-130**

Course: **CSE110**

Section: **16**

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// App.java

```java
package academic.cse110.assignment01;

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import academic.cse110.assignment01.assignments.T02_Lottery;
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academic.cse110.assignment01.assignments.T03_GameRockPaperScis
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import
academic.cse110.assignment01.assignments.T04_PointInsideCircle
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ateNumbers;
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import
academic.cse110.assignment01.assignments.T11_CompareLoans;
```

```java
import academic.cse110.assignment01.assignments.T12_ComputeE;
import
academic.cse110.assignment01.assignments.T13_DecimalToOctal;
import
academic.cse110.assignment01.assignments.T14_BitLevelOperation
s;
import
academic.cse110.assignment01.assignments.T15_ComputeMeanAndSta
ndardDeviation;

public class App {
    public static void main(String[] args) {
        try (Scanner cliInput = new Scanner(System.in)) {
            int assignmentChoice;

            System.out.println();
            System.out.println("Assignment\t: 01");
            System.out.println("\tSubmitted to\t: Ahmed Abdal
Shafi Rasel (AASR), Lecturer, Department of CSE");
            System.out.println();
            System.out.println("Name\t\t: Md Asaduzzaman
Atik");
            System.out.println("Student ID\t: 2023-1-60-130");
            System.out.println("Couse title\t: Object Oriented
Programming");
            System.out.println("Couse code\t: CSE110");
            System.out.println("Section\t\t: 16");
            System.out.println("Semester\t: Spring 2024");

            do {
                System.out.println();
                System.out.println();
                System.out.println("Choose an assignment
number to explore:");
                System.out.println("\t1. Random month");
```

```
                System.out.println("\t2. Lottery");
                System.out.println("\t3. Game - Rock, Paper,
Scissors");
                System.out.println("\t4. Point Inside
Circle");
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                System.out.println("\t9. Generate Vehicle
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Character Table");
                System.out.println("\t11. Financial
Application: Compare Loans");
                System.out.println("\t12. Compute e");
                System.out.println("\t13. Decimal to Octal");
                System.out.println("\t14. Computer
Architecture: Bit-Level Operations");
                System.out.println("\t15. Statistics: Compute
Mean and Standard Deviation");

                System.out.println("\t0. Exit");
                System.out.print("\nEnter your choice: ");

                assignmentChoice = cliInput.nextInt();

                System.out.println();
                System.out.println();

                switch(assignmentChoice) {
                    case 1 ->
T01_RandomMonth.getRandomMonth();
```

```
                    case 2 ->
T02_Lottery.lotteryPrize(cliInput);
                    case 3 ->
T03_GameRockPaperScissors.playRockPaperScissor(cliInput);
                    case 4 ->
T04_PointInsideCircle.checkPointInsideCircle(cliInput);
                    case 5 ->
T05_AreaRegularPolygon.calculatePolygonArea(cliInput);
                    case 6 ->
T06_UnicodeConversion.convertCharToUnicode(cliInput);
                    case 7 ->
T07_HexToBinary.convertHextToBinary(cliInput);
                    case 8 ->
T08_OrderThreeCities.orderCities(cliInput);
                    case 9 ->
T09_GenerateVehiclePlateNumbers.generatePlateNumber();
                    case 10 ->
T10_ASCIICharacterTable.displayASCIICharacterTable();
                    case 11 ->
T11_CompareLoans.compareLoans(cliInput);
                    case 12 ->
T12_ComputeE.computeEValues(cliInput);
                    case 13 ->
T13_DecimalToOctal.convertDecimalToOctal(cliInput);
                    case 14 ->
T14_BitLevelOperations.showBits(cliInput);
                    case 15 ->
T15_ComputeMeanAndStandardDeviation.calculateStatistics(cliInp
ut);
                    case 0 -> {
                        System.out.println("Exiting the
program...");
                        break;
                    }
```

```
                    default -> System.out.println("Invalid
choice. Please try again.");
                }

            } while (assignmentChoice != 0);
        }
    }
}
```

Task 01: Random Month

// T01_RandomMonth.java

```java
package academic.cse110.assignment01.assignments;

/**
 *
 * @author mrasadatik
 */
public class T01_RandomMonth {
    public static void getRandomMonth() {
        String[] months = {"January", "February", "March",
"April", "May", "June", "July", "August", "September",
"October", "November", "December"};
        int randomIndex = (int) (Math.random() *
months.length);

        System.out.println("The corresponding month name for
the randomly generated number \"" + (randomIndex + 1) + "\" is
\"" + months[randomIndex] + "\"");
    }
}
```

Task 2: Lottery

// T02_Lottery.java

```java
package academic.cse110.assignment01.assignments;

import java.util.Random;
import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T02_Lottery {
    public static void lotteryPrize(Scanner scanner) {
        Random random = new Random();
        int lotteryNumber = random.nextInt(900) + 100;

        int lotteryDigit1 = lotteryNumber / 100;
        int lotteryDigit2 = (lotteryNumber / 10) % 10;
        int lotteryDigit3 = lotteryNumber % 10;

        int userInputtedLotteryNumber;
        System.out.print("Please enter yout 3-digit lottery
number: ");
        userInputtedLotteryNumber = scanner.nextInt();

        if (userInputtedLotteryNumber < 100 ||
userInputtedLotteryNumber > 999) {
            System.out.println("Invalid input. Please enter a
3-digit number.");
            return;
        }
```

```
        int userInputtedLotteryDigit1 =
userInputtedLotteryNumber / 100;
        int userInputtedLotteryDigit2 =
(userInputtedLotteryNumber / 10) % 10;
        int userInputtedLotteryDigit3 =
userInputtedLotteryNumber % 10;

        boolean exactMatch = (userInputtedLotteryNumber ==
lotteryNumber);
        boolean allDigitsMatch =
                (userInputtedLotteryDigit1 == lotteryDigit1 ||
userInputtedLotteryDigit1 == lotteryDigit2 ||
userInputtedLotteryDigit1 == lotteryDigit3) &&
                (userInputtedLotteryDigit2 == lotteryDigit1 ||
userInputtedLotteryDigit2 == lotteryDigit2 ||
userInputtedLotteryDigit2 == lotteryDigit3) &&
                (userInputtedLotteryDigit3 == lotteryDigit1 ||
userInputtedLotteryDigit3 == lotteryDigit2 ||
userInputtedLotteryDigit3 == lotteryDigit3);
        boolean anyDigitMatch =
                (userInputtedLotteryDigit1 == lotteryDigit1 ||
userInputtedLotteryDigit1 == lotteryDigit2 ||
userInputtedLotteryDigit1 == lotteryDigit3) ||
                (userInputtedLotteryDigit2 == lotteryDigit1 ||
userInputtedLotteryDigit2 == lotteryDigit2 ||
userInputtedLotteryDigit2 == lotteryDigit3) ||
                (userInputtedLotteryDigit3 == lotteryDigit1 ||
userInputtedLotteryDigit3 == lotteryDigit2 ||
userInputtedLotteryDigit3 == lotteryDigit3);

        if (exactMatch) {
            System.out.println("Congratulations! You won the
grand prize of $10,000!");
        } else if (allDigitsMatch) {
```

```
            System.out.println("Congratulations! You won
$3,000! All digits match.");
        } else if (anyDigitMatch) {
            System.out.println("You won $1,000! At least one
digit matches.");
        } else {
            System.out.println("Sorry, no match this time.
Better luck next time!");
        }

        System.out.println("The winning number was: " +
lotteryNumber);
    }
}
```

Task 3: Game - Rock, Paper, Scissors

// T03_GameRockPaperScissors.java

```java
package academic.cse110.assignment01.assignments;

import java.util.Random;
import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T03_GameRockPaperScissors {
    public static void playRockPaperScissor(Scanner scanner)
{
        scanner.nextLine();

        Random random = new Random();

        String[] moves = {"scissors", "rock", "paper"};

        while (true) {
            System.out.println("Rock Paper Scissors! Let's
play!");
            System.out.println("Choose:");
            System.out.println("\t0. Scissors");
            System.out.println("\t1. Rock");
            System.out.println("\t2. Paper");
            System.out.println("\tOr type \"quit\" to
EXIT!");

            String userChoice;
```

```
            do {
                System.out.print("Enter your choice: ");
                userChoice = scanner.nextLine();
                if (!userChoice.equalsIgnoreCase("quit") &&
!userChoice.matches("[012]")) {
                    System.out.println("Invalid option.
Please choose scissors (0), rock (1), or paper (2), or type
\"quit\" to exit.");
                }
            } while (!userChoice.equalsIgnoreCase("quit") &&
!userChoice.matches("[012]"));

            if (userChoice.equalsIgnoreCase("quit")) {
                System.out.println("Thanks for playing!");
                break;
            }

            int userMove = Integer.parseInt(userChoice);

            int computerMove = random.nextInt(3);

            System.out.println("You chose: " +
moves[Integer.parseInt(userChoice)]);
            System.out.println("Computer chose: " +
moves[computerMove]);

            if (userMove == computerMove) {
                System.out.println("It's a tie!");
            } else if ((userMove == 0 && computerMove == 2)
||
                (userMove == 1 && computerMove == 0) ||
                (userMove == 2 && computerMove == 1)) {
                System.out.println("You won!");
            } else {
                System.out.println("You lose.");
```

```
                }
            }
        }
    }
```

Task 4: Point Inside Circle

// T04_PointInsideCircle.java

```java
package academic.cse110.assignment01.assignments;

import java.util.Scanner;

/**
 *
 * @author mrasaadatik
 */
public class T04_PointInsideCircle {
    public static void checkPointInsideCircle(Scanner
scanner) {
        System.out.print("Enter the x-coordinate of the
point: ");
        double x = scanner.nextDouble();

        System.out.print("Enter the y-coordinate of the
point: ");
        double y = scanner.nextDouble();

        double distanceSquared = Math.pow(x, 2) + Math.pow(y,
2);

        if (distanceSquared <= 10 * 10) {
            System.out.println("(" + x + ", " + y + ") is
inside the circle.");
        } else {
            System.out.println("(" + x + ", " + y + ") is
outside the circle.");
        }
```

```
    }
}
```

Task 5: Area of a Regular Polygon

// T05_AreaRegularPolygon.java

```java
package academic.cse110.assignment01.assignments;

import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T05_AreaRegularPolygon {
    public static void calculatePolygonArea(Scanner scanner) {
        int n;
        double s;

        do {
            System.out.print("Enter the number of sides: ");
            n = scanner.nextInt();
            if (n < 3) {
                System.out.println("Invalid: The number of
sides must be greater than or equal to 3.");
            }
            if (n % 180 == 0) {
                System.out.println("Invalid: The formula
involves division by zero. Please choose a different number of
sides.");
            }
        } while(n < 3 || (n % 180 == 0));

        do {
            System.out.print("Enter the side: ");
            s = scanner.nextDouble();
```

```
            if (s <= 0) {
                System.out.println("Invalid: The side length
must be greater than 0.");
            }
        } while(s <= 0);

        double area = (n * Math.pow(s, 2)) / (4 *
Math.tan(Math.PI / n));

        System.out.println("The area of the polygon is " +
area);
    }
}
```

Task 6: Unicode Conversion

// T06_UnicodeConversion.java

```java
package academic.cse110.assignment01.assignments;

import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T06_UnicodeConversion {
    public static void convertCharToUnicode(Scanner scanner) {
        System.out.print("Enter a character: ");
        char inputChar = scanner.next().charAt(0);

        System.out.println("The Unicode for the character " +
inputChar + " is " + (int) inputChar);
    }
}
```

Task 7: Hex to Binary

// T07_HexToBinary.java

```java
package academic.cse110.assignment01.assignments;

import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T07_HexToBinary {
    public static void convertHextToBinary(Scanner scanner) {
        System.out.print("Enter a hex digit: ");
        char hexDigit = scanner.next().charAt(0);

        int decimalValue = Character.digit(hexDigit, 16);
        String binaryValue =
Integer.toBinaryString(decimalValue);

        System.out.println("The binary value is " +
binaryValue);
    }
}
```

Task 8: Order Three Cities

// T08_OrderThreeCities.java

```
package academic.cse110.assignment01.assignments;

import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T08_OrderThreeCities {
    public static void orderCities(Scanner scanner) {
        scanner.nextLine();

        System.out.print("Enter the first city: ");
        String city1 = scanner.nextLine();

        System.out.print("Enter the second city: ");
        String city2 = scanner.nextLine();

        System.out.print("Enter the third city: ");
        String city3 = scanner.nextLine();

        String firstCity, secondCity, thirdCity;

        if (city1.compareToIgnoreCase(city2) < 0 &&
city1.compareToIgnoreCase(city3) < 0) {
            firstCity = city1;
            if (city2.compareToIgnoreCase(city3) < 0) {
                secondCity = city2;
                thirdCity = city3;
            } else {
```

```
                secondCity = city3;
                thirdCity = city2;
            }
        } else if (city2.compareToIgnoreCase(city1) < 0 &&
city2.compareToIgnoreCase(city3) < 0) {
            firstCity = city2;
            if (city1.compareToIgnoreCase(city3) < 0) {
                secondCity = city1;
                thirdCity = city3;
            } else {
                secondCity = city3;
                thirdCity = city1;
            }
        } else {
            firstCity = city3;
            if (city1.compareToIgnoreCase(city2) < 0) {
                secondCity = city1;
                thirdCity = city2;
            } else {
                secondCity = city2;
                thirdCity = city1;
            }
        }

        System.out.println("The three cities in alphabetical
order are " + firstCity + " " + secondCity + " " + thirdCity);
    }
}
```

Task 9: Generate Vehicle Plate Numbers

// T09_GenerateVehiclePlateNumbers.java

```java
package academic.cse110.assignment01.assignments;

/**
 *
 * @author mrasadatik
 */
public class T09_GenerateVehiclePlateNumbers {
    public static void generatePlateNumber() {
        String plateNumber = "";
        for (int i = 0; i < 3; i++) {
            char randomLetter = (char) ('A' + Math.random() *
('Z' - 'A' + 1));
            plateNumber += randomLetter;
        }

        for (int i = 0; i < 4; i++) {
            int randomDigit = (int) (Math.random() * 10);
            plateNumber += randomDigit;
        }

        System.out.println("Generated Plate Number: " +
plateNumber);
    }
}
```

Task 10: Display the ASCII Character Table

// T10_ASCIICharacterTable.java

```
package academic.cse110.assignment01.assignments;

/**
 *
 * @author mrasadatik
 */
public class T10_ASCIICharacterTable {
    final private static int CHAR_PER_LINE = 10;
    public static void displayASCIICharacterTable() {
        for (char ch = '!'; ch <= '~'; ch++) {
            System.out.print(ch);

            if ((ch - '!') % CHAR_PER_LINE == CHAR_PER_LINE -
1) {
                System.out.println();
            } else {
                System.out.print("\t");
            }
        }
    }
}
```

Task 11: Financial Application: Compare Loans

// T11_CompareLoans.java

```
package academic.cse110.assignment01.assignments;

import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T11_CompareLoans {
    public static void compareLoans(Scanner scanner) {
        System.out.print("Loan Amount: ");
        double loanAmount = scanner.nextDouble();

        System.out.print("Number of Years: ");
        int numberOfYears = scanner.nextInt();

        System.out.println("Interest Rate\t\tMonthly
Payment\t\tTotal Payment");

        for (double annualInterestRate = 5.0;
annualInterestRate <= 8.0; annualInterestRate += 0.125) {
            double monthlyInterestRate = annualInterestRate /
1200;
            double monthlyPayment = (loanAmount *
monthlyInterestRate) / (1 - Math.pow(1 + monthlyInterestRate,
-numberOfYears * 12));

            double totalPayment = monthlyPayment *
numberOfYears * 12;
```

```
            System.out.printf("%.3f%%\t\t\t%.2f\t\t\t%.2f\n",
annualInterestRate, monthlyPayment, totalPayment);
        }
    }
}
```

Task 12: Compute e

// T12_ComputeE.java

```
package academic.cse110.assignment01.assignments;

import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T12_ComputeE {
    public static void computeEValues(Scanner scanner) {
        for (int i = 10000; i <= 100000; i += 10000) {
            double eValue = computeE(i);
            System.out.println("e for i = " + i + ": " +
eValue);
        }

        int userInput;

        do {
            System.out.print("Enter the value of i: ");
            userInput = scanner.nextInt();
            if (userInput < 0) {
                System.out.println("Invalid input: i must be
a non-negative integer");
            }
        } while (userInput < 0);

        double eValue = computeE(userInput);
```

```
        System.out.println("e for i = " + userInput + ": " +
eValue);
    }

    private static double computeE(int i) {
        double e = 1.0;
        double factorial = 1.0;

        for (int j = 1; j <= i; j++) {
            factorial *= j;
            e += 1.0 / factorial;
        }

        return e;
    }
}
```

Task 13: Decimal to Octal

// T13_DecimalToOctal.java

```java
package academic.cse110.assignment01.assignments;

import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T13_DecimalToOctal {
    public static void convertDecimalToOctal(Scanner scanner)
{
        int decimalNumber;
        String octalValue = "";

        do {
            System.out.print("Enter a decimal integer: ");
            decimalNumber = scanner.nextInt();
            if (decimalNumber < 0) {
                System.out.println("Invalid: Please enter a
non-negative decimal integer.");
            }
        } while (decimalNumber < 0);

        if (decimalNumber == 0) {
            octalValue = "0";
        } else {
            while (decimalNumber > 0) {
                int remainder = decimalNumber % 8;
                octalValue = remainder + octalValue;
                decimalNumber /= 8;
```

```
            }
        }

        System.out.println("The octal value is: " +
octalValue);
    }
}
```

Task 14: Computer Architecture: Bit-Level Operations

// T14_BitLevelOperations.java

```java
package academic.cse110.assignment01.assignments;

import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T14_BitLevelOperations {
    public static void showBits(Scanner scanner) {
        short number;

        System.out.print("Enter a short integer: ");
        number = scanner.nextShort();

        System.out.print("The bits are ");
        for (int i = 15; i >= 0; i--) {
            int bit = (number >> i) & 1;
            System.out.print(bit);
        }
        System.out.println();
    }
}
```

Task 15: Statistics: Compute Mean and Standard Deviation

// T15_ComputeMeanAndStandardDeviation.java

```
package academic.cse110.assignment01.assignments;

import java.util.Scanner;

/**
 *
 * @author mrasadatik
 */
public class T15_ComputeMeanAndStandardDeviation {
    public static void calculateStatistics(Scanner scanner) {
        double sum = 0;
        double sumOfSquares = 0;

        System.out.println("Enter ten numbers:");

        double[] numbers = new double[10];
        for (int i = 0; i < 10; i++) {
            System.out.print("Enter number " + (i + 1) + ":
");
            numbers[i] = scanner.nextDouble();
        }

        for (double number : numbers) {
            sum += number;
        }
        double mean = sum / numbers.length;
        System.out.println("Mean: " + mean);

        for (double number : numbers) {
            sumOfSquares += Math.pow((number - mean), 2);
```

```
        }
        if (numbers.length - 1 == 0) {
            System.out.println("Division by zero. Unable to
calculate standard deviation.");
            System.out.println("Exiting...");
            return;
        }
        double standardDeviation = Math.sqrt(sumOfSquares /
(numbers.length - 1));
        System.out.println("Standard Deviation: " +
standardDeviation);
    }
}
```

THE END