Java Lab Week 2 Assignment

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1. Write a Java program to read the First name and Last name of a person, his weight and height using command line arguments. Calculate the BMI Index which is defined as the individual's body mass divided by the square of their height.

Code:

```java
public class BMI{
    public static void main(String[] args) {
        float height=Float.parseFloat(args[2]);
        float weight=Float.parseFloat(args[3]);
        float BMI=weight/(height*height);
        System.out.println("The BMI of "+args[0]+" "+args[1]+" is: "+BMI);
        if(BMI<18.5){
            System.out.println(args[0]+" "+args[1]+" is Underweight");
        }else if(BMI>=18.5 && BMI<25){
            System.out.println(args[0]+" "+args[1]+" is Normal");
        }else if(BMI>=25 && BMI<30){
            System.out.println(args[0]+" "+args[1]+" is Overweight");
        }else{
            System.out.println(args[0]+" "+args[1]+" is Obese");
        }
    }
}
```

Output:

```
PROBLEMS    OUTPUT    TERMINAL    JUPYTER    DEBUG CONSOLE                    bash
stark@Suryakumar:~/Programming/Fall_Sem/Java/21MIS1146/Week2$ javac BMI.java
stark@Suryakumar:~/Programming/Fall_Sem/Java/21MIS1146/Week2$ java BMI Suryakumar P 1.86 85
The BMI of Suryakumar P is: 24.569315
Suryakumar P is Normal
stark@Suryakumar:~/Programming/Fall_Sem/Java/21MIS1146/Week2$
```

2. The computer will come up with a random number within a range (for example, 1 to 100). The player (user) is asked to guess this number. If the guessed number is bigger than the actual number, the computer will respond with the message "too high". If the guessed number is smaller than the actual number, computer will respond with the message "too low". This process repeats until the number is found within 5 trails. Write a Java Program for the above scenario.

Code:

```java
import java.util.Scanner;
import java.lang.Math;
public class RandomNum {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        double a = Math.random()*100;
        int randomNum = (int) a;
        for(int i=0;i<5;i++)
        {
        System.out.println("Enter your Guessed Number : ");
        int num = scanner.nextInt();
        if(num>randomNum)
            System.out.println("Too High");
        else if(num<randomNum)
            System.out.println("Too Low");
        else if(num==randomNum)
        {
            System.out.println("Correct Guess !! ");
            break;
        }
        }
        scanner.close();
        System.out.println("Choices Over, The random number is : " +
randomNum);
    }
}
```

Output:

3. Write a java Program to check the entered matrix is a lower triangular matrix or not? Note: A square matrix is called lower triangular if all the entries above the main diagonal is zero.

Code:

```java
import java.util.Scanner;
class LowTriMatrix
{
    boolean isLowerTriangularMatrix(int N,int mat[][])
    {
        for (int i = 0; i < N-1; i++)
            for (int j = i + 1; j < N; j++)
                if (mat[i][j] != 0)
                    return false;

        return true;
    }
    public static void main(String args[])
    {
        int n;
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter the no of Rows and Columns [Square Matrix] :
");
        n = scanner.nextInt();

        LowTriMatrix lt = new LowTriMatrix();
        int mat[][] = new int[5][5];
        System.out.println("Enter the elements : ");
        for(int i =0;i<n;i++)
        {
```

```java
            for(int j=0;j<n;j++)
            {
                mat[i][j] = scanner.nextInt();
            }
        }
        scanner.close();
        System.out.println("The Matrix is : ");
        for(int i =0;i<n;i++)
        {
            for(int j=0;j<n;j++)
            {
                System.out.print(mat[i][j]+"\t");
            }
            System.out.println("\n");
        }
        if (lt.isLowerTriangularMatrix(n,mat))
            System.out.println("Yes, It is a Lower Triangular Matrix");
        else
            System.out.println("No, It is not a Lower Triangular Matrix");
    }
}
```

Output:

```
PROBLEMS    OUTPUT    TERMINAL    JUPYTER    DEBUG CONSOLE              bash  +  ⌄  ⊟  🗑  <  ×
● stark@Suryakumar:~/Programming/Fall_Sem/Java/21MIS1146/Week2$ java LowTriMatrix.java
  Enter the no of Rows and Columns [Square Matrix] :
  3
  Enter the elements :
  1
  0
  0
  4
  2
  0
  6
  9
  1
  The Matrix is :
  1       0       0

  4       2       0

  6       9       1

  Yes, It is a Lower Triangular Matrix
○ stark@Suryakumar:~/Programming/Fall_Sem/Java/21MIS1146/Week2$ ▌
```

4. Write a Java Program to check the entered matrix is a sparse matrix or not? Note: A sparse matrix is one which contains more number of zeros than non-zeros as elements.

Code:

```java
import java.util.Scanner;
public class SparseMatrix {
    public static void main(String[] args) {
            Scanner scanner =new Scanner(System.in);
            int m,n;
            int matrix[][]=new int[5][5];
            System.out.println("Enter no of rows: ");
            m=scanner.nextInt();
            System.out.println("Enter no of cols: ");
            n=scanner.nextInt();
            System.out.println("Enter elements of matrix: ");
            for(int i=0;i<m;i++){
                for(int j=0;j<n;j++){
                    System.out.print("Enter ("+i+","+j+") th element: ");
                    matrix[i][j]=scanner.nextInt();
                }
            }
            int count_zero=0,count_nonzero=0;
            for(int i=0;i<m;i++){
                for(int j=0;j<n;j++){
                    if(matrix[i][j]==0){
                        count_zero++;
                    }else{
                        count_nonzero++;
                    }
                }
            }
            System.out.println("The Matrix is : ");
        for(int i =0;i<m;i++)
        {
            for(int j=0;j<n;j++)
            {
                System.out.print(matrix[i][j]+"\t");
            }
            System.out.println("\n");
        }
            if(count_zero>count_nonzero){
                System.out.println("It is a Sparse Matrix ");
            }else{
                System.out.println("It is not a Sparse Matrix ");
            }
            scanner.close();
        }
    }
```

Output:

5. Write a Java Program to guess the zodiac sign of the person by taking the date and month of birth from the user.

Code:

```java
import java.util.Scanner;
public class Zodiac {
    public static void main (String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the Exact Day : ");
        int day = scanner.nextInt();
        System.out.print("Enter the Exact Month : ");
        String month = scanner.next();
        scanner.close();
        String sign = " ";
        if (month.equals("Jan")) {
            if (day < 20)
                sign = "Capricorn";
            else
                sign = "Aquarius";
        }
        else if (month.equals("Feb")) {
            if (day < 19)
                sign = "Aquarius";
            else
                sign = "Pisces";
```

```java
        }
        else if(month.equals("Mar")) {
            if (day < 21)
                sign = "Pisces";
            else
                sign = "Aries";
        }
        else if (month.equals("Apr")) {
            if (day < 20)
                sign = "Aries";
            else
                sign = "Taurus";
        }
        else if (month.equals("May")) {
            if (day < 21)
                sign = "Taurus";
            else
                sign = "Gemini";
        }
        else if( month.equals("Jun")) {
            if (day < 21)
                sign = "Gemini";
            else
                sign = "Cancer";
        }
        else if (month.equals("Jul")) {
            if (day < 23)
                sign = "Cancer";
            else
                sign = "Leo";
        }
        else if( month.equals("Aug")) {
            if (day < 23)
                sign = "Leo";
            else
                sign = "Virgo";
        }
        else if (month.equals("Sep")) {
            if (day < 23)
                sign = "Virgo";
            else
                sign = "Libra";
        }
        else if (month.equals("Oct")) {
            if (day < 23)
                sign = "Libra";
            else
                sign = "Scorpio";
```

```java
                }
            else if (month.equals("Nov")) {
                if (day < 22)
                    sign = "Scorpio";
                else
                    sign = "Sagittarius";
            }
            else if (month.equals("Dec")) {
                if (day < 22)
                    sign = "Sagittarius";
                else
                    sign ="Capricorn";
            }
            System.out.println("The astrological sign for " + day + " " + month
 + " is " + sign );
        }
}
```

Output:

```
PROBLEMS    OUTPUT    TERMINAL    JUPYTER    DEBUG CONSOLE              ▶ bash  + ∨  ⊟  🗑  <  ✕
● stark@Suryakumar:~/Programming/Fall_Sem/Java/21MIS1146/Week2$ java Zodiac.java
  Enter the Exact Day : 19
  Enter the Exact Month : Apr
  The astrological sign for 19 Apr is Aries
○ stark@Suryakumar:~/Programming/Fall_Sem/Java/21MIS1146/Week2$ []
```

6. Write a Java Program to remove the duplicate elements in the entered array.

Code:

```java
import java.util.*;
public class Duplicate {
    public static void main(String[] args) {
        LinkedHashSet<Integer>set=new LinkedHashSet<Integer>();
        Scanner scanner = new Scanner(System.in);
        int n;
        System.out.println("Enter no of elements in the array: ");
        n=scanner.nextInt();
        int a[]= new int[10];
        //Adding elements to array
        System.out.println("Enter the elements of the array: ");
        for(int i=0;i<n;i++){
            a[i]=scanner.nextInt();
        }
        scanner.close();
        //Printing the array with duplicates
```

```java
        System.out.print("The array with duplicate elements: [");
        for(int i=0;i<n;i++){
            System.out.print(a[i]+" ");
        }
        System.out.println("]");
        //Adding elements of array to a set to remove duplicates
        for(int i=0;i<n;i++){
            set.add(a[i]);
        }
        System.out.println("Array without duplicates: "+set);
    }
}
```

Output:

7. Write a Java Program to simulate the 3 X 3 Tic-Tac-Toe Game.

Code:

```java
import java.util.Scanner;
public class TicTacToe {
    public static void main(String[] args) {
        Scanner scanner=new Scanner(System.in);
        String a[][]=new String[3][3];
        int row,col,i,count=0;
        boolean winner=false,xturn=true;
        for(i=0;i<3;i++){
            for(int j=0;j<3;j++){
                int num=i*3+j+1;
                a[i][j]=Integer.toString(num);
            }
        }
        System.out.println("X plays first!");
        while(!winner){
```

```java
            System.out.println("Enter row and column: ");
            row=scanner.nextInt();
            col=scanner.nextInt();
            if(xturn){
                a[row-1][col-1]="X";
            }
            else{
                a[row-1][col-1]="O";
            }
            for(i=0;i<3;i++){
                for(int j=0;j<3;j++){
                    System.out.print(" | "+a[i][j]);
                }
                System.out.println(" | ");
            }
            for(i=0;i<3;i++){
                if(a[i][0].equals(a[i][1]) && a[i][0].equals(a[i][2])){
                    winner=true;
                    System.out.println("The winner is: "+a[i][0]);
                }
                else if(a[0][i].equals(a[1][i]) && a[0][i].equals(a[2][i])){
                    winner=true;
                    System.out.println("The winner is: "+a[0][i]);
                }
                if(i==0){
                    if(a[i][i].equals(a[i+1][i+1]) &&
a[i][i].equals(a[i+2][i+2])){
                        winner=true;
                        System.out.println("The winner is: "+a[i][i]);
                    }
                    else if(a[i][i+2].equals(a[i+1][i+1]) &&
a[i][i+2].equals(a[i+2][i])){
                        winner=true;
                        System.out.println("The winner is: "+a[i][i+2]);
                    }
                }
            }
            count++;
            xturn=!xturn;
            if(count==9){
                winner=true;
                System.out.println("Draw!");
            }

        }
        scanner.close();
    }
}
```

Output:

```
stark@Suryakumar:~/Programming/Fall_Sem/Java/21MIS1146/Week2$ java TicTacToe.java
X plays first!
Enter row and column:
1
2
 | 1 | X | 3 |
 | 4 | 5 | 6 |
 | 7 | 8 | 9 |
Enter row and column:
1
3
 | 1 | X | O |
 | 4 | 5 | 6 |
 | 7 | 8 | 9 |
Enter row and column:
1
1
 | X | X | O |
 | 4 | 5 | 6 |
 | 7 | 8 | 9 |
Enter row and column:
2
2
 | X | X | O |
 | 4 | O | 6 |
 | 7 | 8 | 9 |
Enter row and column:
1
3
 | X | X | X |
 | 4 | O | 6 |
 | 7 | 8 | 9 |
The winner is: X
stark@Suryakumar:~/Programming/Fall_Sem/Java/21MIS1146/Week2$
```