NATIONAL INSTITUTE OF TECHNOLOGY SILCHAR

Cachar, Assam

B.Tech. IVth Sem

Subject Code: CS213

Subject Name: Object Oriented Programming

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QoLo

B. Techo Win Sem

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```
Ams:
     import java. util. *;
      class Matrix {
             int row, col;
             intists output;
              Public Matrix (int r-row, int c-col) {
                     You = r-row;
                     col = c-col;
                    output = new int [row][col];
               3
               public int get Row () {
                      return row;
                public int getColumn() {
                        return col;
                 3
                 public int get Elements (int r-row, int c-col) {
                           return output [r-row] [c-col];
                   3
                  public void SetAt (int r-row, int c-col, int element) {
                           output [r-row][c-col] = element;
```

```
Static Matrix addMat (Matrix MI, Matrix M2) {
public
        if ((m1. row == m2.row) && (m1.col == m2.col)) {
               Matrix m = new Matrix (m1.row, m2.col);
               for (int i=0; icm.vow; ++i) {
                    for (int = 0; j < m. col; ++;1) $
                       m. set At (i, j, (ml. get Elements (i, j)+
                                           m2.getElements(i, j)));
                     3
                 return m;
           else {
               System. out. println ("Matrices cannot be added"):
               return new Matrix (0, 0);
            3
    3
         Static Matrix product (Matrix M1, Matrix M2) {
         Matrix m = new Matrix (MI. row, M2. col);
          for (int i = 0; i < m1. row; ++i) {
               for (int K=0; K<m2, col; ++K) {
                      int sum = 0;
                      for (int 1=0; 1< M1.col; ++1) }
                          sum + = ml. get Elements (i, j) *
                                             m2.get Elements (j. N);
                       m. setAt (i, K, Sum):
                 3
            return m;
```

```
SUBHOTIT GHIMIRE
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       public void print Matrix (char num) {
               System. out. println ("The matrix "+ num + " is: ");
              for (int i = 0; i< row; ++i) {
                    for lint 1 = 0; 1<col; ++1) &
                         System. out. print (output [:][]+ "It");
                      System.out. print ("In");
                3
         3
3
public
        class Main {
        public static void main (String[] args) {
          Matrix mat 1 = new Matrix (3,3);
           Matrix mat 2 = new Matrix (3,3);
            int random Value = 1;
            for (int i=0; i<3; ++i) {
                  for (int '=0; '<3; ++')) {
                       mat1. setAt (i, j, random Value);
                        ++ random/2/ue:
                        mat 2. set At (i, j, random value);
                         ++ random Value;
                    3
              math privat Matrix ('I');
               mate. print Matrix ('21);
```

Matrix Sum = Matrix. addMat (mat1, mat2);

Matrix pro = Matrix. product (mat1, mat2);

sum printMatrix ('+1);

ProprintMatrix ('*1)

```
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Q020
Ans:
       import java.io. *;
       impost java. util. *;
        import java. lang. Math;
       class Shape {
               protected Static int L, B;
              public void enter Dimension () {
                     Scanner Scan = new Scanner (System.in);
                      int L, b;
                      System. out . print (" Enter length: ");
                       L=Scan.nextInt();
                       System. out. print ("Enter breadth: ");
                       b = Scan. next Int ();
                       this.L = L;
                       this. B = b;
                3
               double area () {
                      return 0;
                3:
      3
              Circle extends Shape {
       class
                 double area () {
```

3

3

int R = super.L; return (Math.PI * Math.pow (R,2));

```
class Rectangle entends Shape {
        double area () {
              int 1, b;
               1 = super. L;
               b = Super. B:
               return L+b;
          Ž
 3
 class Trapezoid extends Shape {
        double grea () {
             int h. b:
                h = super.L;
                b = super. B;
                return (0.5*h*b);
          3
  3
 public class Main &
          public Static void main (String[] args) {
               Shape new Shape = new Shape ();
               new Shape. enter Dimension ();
               Circle ( = new Circle ();
               System. out printly ("Area of circle is "+ C. area());
               Rectangle R = new Rectangle ();
              System.out. printly ("Area of rectangle is "+ R. areaU);
               Trapezoid T = new Trapezoid ();
               System.out. println ("Area of trapezoid is "+ T. area()).
          3
```

- 1. Create a class called 'Matrix' containing a constructor that initializes the number of rows and number of columns of a new Matrix object. The Matrix class has the following information:
 - number of rows of matrix
 - number of columns of matrix
 - elements of matrix in the form of 2D array

The Matrix class has the following methods:

- get the number of rows
- get the number of columns
- set the elements of the matrix at given position (i,j)
- adding two matrices. If the matrices are not addable, "Matrices cannot be added" will be displayed.
- multiplying the two matrices

ANS:

```
//Program saved as "Q1.java"
import java.util.*;
class Matrix {
   int row, col;
    int[][] output;
    public Matrix (int r_row, int c_col) {
        row = r_row;
        col = c_col;
        output = new int[row][col];
    public int getRow () {
        return row;
    public int getColumn () {
        return col;
    public int getElements (int r_row, int c_col) {
        return output[r_row][c_col];
    public void setAt (int r_row, int c_col, int element) {
        output[r row][c col] = element;
```

```
public static Matrix addMat (Matrix m1, Matrix m2) {
        if ((m1.row==m2.row) && (m1.col==m2.col)) {
            Matrix m = new Matrix (m1.row, m2.col);
            for (int i=0; i<m.row; ++i) {</pre>
                 for (int j=0; j<m.col; ++j) {</pre>
                     m.setAt(i, j, (m1.getElements(i, j)+m2.getElements(i, j)))
            return m;
        else {
            System.out.println ("Matrices cannot be added");
            return new Matrix(0, 0);
        }
    public static Matrix product (Matrix m1, Matrix m2) {
        Matrix m = new Matrix (m1.row, m2.col);
        for (int i=0; i<m1.row; ++i) {</pre>
            for (int k=0; k<m2.col; ++k) {</pre>
                 int sum = 0;
                 for (int j=0; j<m1.col; ++j) {</pre>
                     sum += m1.getElements(i, j)*m2.getElements(j, k);
                 m.setAt(i, k, sum);
            }
        return m;
    public void printMatrix (char num) {
        System.out.println ("The matrix " + num + " is: ");
        for (int i=0; i<row; ++i) {</pre>
            for (int j=0; j<col; ++j) {</pre>
                 System.out.print (output[i][j] + "\t");
            System.out.print ("\n");
public class Q1 {
    public static void main (String[] args) {
        Matrix mat1 = new Matrix (3, 3);
```

```
Matrix mat2 = new Matrix (3, 3);
int value=1;
for (int i=0; i<3; ++i) {
    for (int j=0; j<3; ++j) {
        mat1.setAt (i, j, value);
        ++value;
        mat2.setAt (i, j, value);
        ++value;
    }
}

mat1.printMatrix('1');
mat2.printMatrix('2');

Matrix sum = Matrix.addMat(mat1, mat2);
sum.printMatrix('+');

Matrix pro = Matrix.product(mat1, mat2);
pro.printMatrix('*');
}</pre>
```

OUTPUT:

```
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6
PS C:\Users\Subhojit Ghimire> & 'c:\Users\Subhojit Ghimire\.vscode\extensions\vscjava.vscode-jav
a-debug-0.32.1\scripts\launcher.bat' 'C:\Users\Subhojit Ghimire\AppData\Local\Programs\AdoptOpenJ
DK\jdk-11.0.9.101-hotspot\bin\java.exe' '-Dfile.encoding=UTF-8' '-cp' 'C:\Users\Subhojit Ghimire\
AppData\Local\Temp\vscodesws_813d5\jdt_ws\jdt.ls-java-project\bin' 'Q1'
The matrix 1 is:
1
                11
13
        15
                17
The matrix 2 is:
2
                6
8
        10
                12
14
        16
                18
The matrix + is:
3
        7
                11
15
        19
                23
27
                35
        31
The matrix * is:
96
        114
                132
240
        294
                348
384
        474
                564
PS C:\Users\Subhojit Ghimire>
```

2. Write a program to create a class shape with functions to find the area of the shapes. Create derived classes circle, rectangle and trapezoid each having overridden functions area and display.

Base class:

- Member Variables: (protected) length, breadth
- Member Function: (public) virtual function area

ANS:

```
import java.io.*;
import java.util.*;
import java.lang.*;
class Shape {
    protected static int L, B;
    public void enterDimension () {
        Scanner Scan = new Scanner (System.in);
        int 1, b;
        System.out.print ("Enter length: ");
        1 = Scan.nextInt ();
        System.out.print ("Enter Breadth: ");
        b = Scan.nextInt ();
        this.L = 1;
        this.B = b;
    double area () {
        return 0;
    };
class Circle extends Shape {
    double area () {
        int R = super.L;
        return (Math.PI*Math.pow(R, 2));
class Rectangle extends Shape {
    double area () {
        int 1, b;
        1 = super.L;
        b= super.B;
        return 1*b;
class Trapezoid extends Shape {
```

```
double area () {
    int h, b;
    h = super.L;
    b = super.B;
    return (0.5*h*b);
}

public class Q2 {
    public static void main (String[] args) {
        Shape newShape = new Shape();
        newShape.enterDimension ();
        Circle C = new Circle ();
        System.out.println ("Area of the circle is " + C.area());
        Rectangle R = new Rectangle ();
        System.out.println ("Area of the Rectangle is " + R.area());
        Trapezoid T = new Trapezoid ();
        System.out.println ("Area of the Trapezoid is " + T.area());
    }
}
```

OUTPUT:

```
1: Java Process Console > + 🖯 🛍 <
 PROBLEMS 9 OUTPUT DEBUG CONSOLE
                                      TERMINAL
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
Try the new cross-platform PowerShell https://aka.ms/pscore6
PS C:\Users\Subhojit Ghimire> & 'c:\Users\Subhojit Ghimire\.vscode\extensions\vscjava.vscode-java-debug-0
.32.1\scripts\launcher.bat' 'C:\Users\Subhojit Ghimire\AppData\Local\Programs\AdoptOpenJDK\jdk-11.0.9.101-
hotspot\bin\java.exe' '-Dfile.encoding=UTF-8' '-cp' 'C:\Users\Subhojit Ghimire\AppData\Local\Temp\vscodesw
s_813d5\jdt_ws\jdt.ls-java-project\bin' 'Q2'
Enter length: 4
Enter Breadth: 5
Area of the circle is 50.26548245743669
Area of the Rectangle is 20.0
Area of the Trapezoid is 10.0
PS C:\Users\Subhojit Ghimire>
```