W12_COMPUTER PROGRAMMINING 2019 SPRING

W12 Graphic (Graphic user interphase) programming

We will use the class FrameGraphic

```
 import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;
public class FrameGraphic extends JFrame
{
  JPanel d;
   public FrameGraphic(String a,JPanel di)
   {    super(a);
        d=di;
        add(d);
   }
   public static void plot(String a,JPanel di)
   {
        FrameGraphic f = new FrameGraphic(a,di);
        f.setDefaultCloseOperation( JFrame.EXIT_ON_CLOSE );
        f.setSize(800,500);
        f.setVisible(true);
   }
}
```

EX 1: Welcome to Graphic programming

```
import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;

public class button1P extends JPanel implements ActionListener
{
  JButton b;
  public button1P()
  { b=new JButton("Push button to change screen color");
    b.addActionListener(this);
    add(b);
  }
  public void actionPerformed( ActionEvent e)
  {
  int red    =(int)(255.0*Math.random());
  int green  =(int)(255.0*Math.random());
  int blue   =(int)(255.0*Math.random());
  Color c=new Color(red,green, blue);
  setBackground(c);
  repaint();
  }
}
```

```
class W12E1 {
public static void main(String args[])
{FrameGraphic.plot("Graphic window:button1P",new button1P());}}
```

```
import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;

public class button2P extends JPanel
{ JButton b;
  public button2P()
  { b=new JButton("Push button to change screen color");
    b.addActionListener(e->{
    int red    =(int)(255.0*Math.random());
    int green  =(int)(255.0*Math.random());
    int blue   =(int)(255.0*Math.random());
    Color c=new Color(red,green, blue);
    setBackground(c);
    repaint();
    });
```

```
    add(b);
  }
}
```

```
class W12E1a {
public static void main(String args[])
{FrameGraphic.plot("Graphic window:button1P",new button2P());}}
```

```
import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;

public class button3P extends JPanel implements ActionListener
{
  JButton b;
  Color c;
  public button3P()
  { b=new JButton("Push button to change screen color");
    c=Color.blue;
    b.addActionListener(this);
    add(b);
  }
  public void actionPerformed( ActionEvent e)
  {
  c=JColorChooser.showDialog(null,"color of the background ",c );
  setBackground(c);
  repaint();
  }
}
```

```
class W12E1b {
public static void main(String args[])
{FrameGraphic.plot("Graphic window:button3P",new button3P());}}
```

EX2:

```
 import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;
import java.awt.geom.*;

public class star1P extends JPanel
{
Color c1=Color.blue;//for shape
Color c2=Color.white;//for background
public boolean fill=false;

public void setFill() {fill=true;}
public void setDraw() {fill=false;}
public void setColor(Color c) {c1=c;}
public void setColor(int red,int green, int blue) {c1=new Color(red,green,blue);}
public void setBColor(Color c) {c2=c;}
public void setBColor(int red,int green, int blue) {c2=new Color(red,green,blue);}

public void paint(Graphics g)
{
super.paintComponent(g);
Graphics2D g2=(Graphics2D)g;
GeneralPath star=new GeneralPath();
int x[]={55,67,109,73,83,55,27,37,1,43};
int y[]={0,36,36,54,96,72,96,54,36,36};
star.moveTo(x[0],y[0]);
for(int i=1;i<x.length;i++)
   {star.lineTo(x[i],y[i]);}
star.closePath();
g2.setColor(c1);
this.setBackground(c2);
if(fill) g2.fill(star);
else g2.draw(star);
  }
}
```

```
 import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;

public class button4P extends JPanel implements ActionListener
{
  JButton b;
  star1P d;

  public button4P()
  {
      setLayout(new BorderLayout());
      d=new star1P();
      d.setFill();
      b=new JButton("Push button to change between draw and fill");
      b.addActionListener(this);
      add(b,BorderLayout.NORTH);
      add(d,BorderLayout.CENTER);
  }
  public void actionPerformed( ActionEvent e)
  { if(d.fill) d.setDraw();
    else       d.setFill();
    repaint();
  }
}
```

```
class W12E2 {
public static void main(String args[])
{FrameGraphic.plot("Graphic window:button4P (with star1P)",new button4P());}}
```

```
import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;

public class button5P extends JPanel implements ActionListener
{ JButton b1,b2;
  star1P d;
  int red,green,blue;
  Color c;

  public button5P()
  {
      setLayout(new BorderLayout());
      d=new star1P();
      d.setFill();
      b1=new JButton("Push button to change between draw and fill");
      b1.addActionListener(this);
      b2=new JButton("Push button to change color");
      b2.addActionListener(this);
      add(b1,BorderLayout.NORTH);
      add(d,BorderLayout.CENTER);
      add(b2,BorderLayout.SOUTH);
  }
  public void actionPerformed( ActionEvent e)
  {   if(e.getSource()==b1)
  {
  if(d.fill) d.setDraw();
  else       d.setFill();
  }
  else if(e.getSource()==b2)
  {
  red    =(int)(255.0*Math.random());
  green  =(int)(255.0*Math.random());
  blue   =(int)(255.0*Math.random());
  d.setColor(red,green,blue);
  }
  repaint();

  }
}
```

```
class W12E2a {
public static void main(String args[])
{FrameGraphic.plot("Graphic window:button5P (with star1P)",new button5P());}}
```

EX3:

```
 import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;
public class textP extends JPanel implements ActionListener
{ JLabel label1;
  JPanel inputPanel;
  JTextField namebox;
  JTextArea t;
  String name;
  public textP()
  { label1=new JLabel("enter your name : ");
              t=new JTextArea("                                    ");
              t.setFont(new Font("Serif",Font.BOLD,24));
              namebox=new JTextField("                              ");
    setLayout(new BorderLayout());
    inputPanel=new JPanel();
    inputPanel.add(label1);
    inputPanel.add(namebox);
    add(inputPanel,BorderLayout.NORTH);
    add(t,BorderLayout.CENTER);
    namebox.addActionListener(this);
  }
  public void actionPerformed( ActionEvent e)
  { if(e.getSource()==namebox)
    {name=namebox.getText();
              t.setText("Welcome to java graphic programming environment "+name); }
  }
}
```

```
class W12E3 {
public static void main(String args[])
{FrameGraphic.plot("Graphic window:textP",new textP());}}
```

EX4:

```
 import java.awt.event.*;
import java.util.*;
import javax.swing.*;
import javax.swing.table.*;
import java.awt.*;
import java.awt.event.*;
import javax.swing.event.*;
import java.awt.geom.*;


public class  mouseP extends JPanel implements MouseListener,MouseMotionListener
{
  //push-move-release line draw
  int x1,y1,x2,y2;
  Color c;
  boolean first;
  Line2D x;

 public mouseP()
 {super();
  x1=0;y1=0;x2=0;y2=0;
  first=true;
  addMouseListener(this);
  addMouseMotionListener(this);
 }

 public mouseP(int x1i,int y1i,int x2i,int y2i)
 {super();
  x1=x1i;y1=y1i;x2=x2i;y2=y2i;
  first=true;
```

```
 addMouseListener(this);
 addMouseMotionListener(this);
 }

 public void setLine(int x1i,int y1i,int x2i,int y2i)
 {x1=x1i;y1=y1i;x2=x2i;y2=y2i;}


 public void paint(Graphics g)
 {
 super.paintComponent(g);
 Graphics2D g2=(Graphics2D)g;
 g2.setFont(new Font("Serif",Font.BOLD,24));
 g2.setColor(Color.blue);
 g2.setStroke(new BasicStroke(2.0f));
 x=new Line2D.Double(x1,y1,x2,y2);
 g2.draw(x);
 }

//MouseListener
public void mouseClicked(MouseEvent e)
 {}

 public void mousePressed(MouseEvent e)
 {
   x1=e.getX();y1=e.getY();}

  public void mouseReleased(MouseEvent e)
 { x2=e.getX();y2=e.getY();repaint();}

 public void mouseEntered(MouseEvent e)
 { }

 public void mouseExited(MouseEvent e)
 { }
//MouseMotionListener

 public void mouseDragged(MouseEvent e)
 {}
 public void mouseMoved(MouseEvent e)
 {}

}
```

```
class W12E4 {
public static void main(String args[])
{FrameGraphic.plot("Graphic window:mouseP",new mouseP());}}
```

EX5:

```
 import java.awt.*;
import java.awt.event.*;
import java.util.*;
import javax.swing.*;
import javax.swing.table.*;
import javax.swing.event.*;
import java.awt.geom.*;

public class  comboP extends JPanel implements ActionListener
{ JPanel inputPanel;
  JTextField jt;
  JComboBox<String> colorList;
  String colornames[]={"black","blue","cyan","dark gray","gray",
        "green","light grey","magenta","orange","pink","red","white","yellow"};
  Color colors[]={Color.black,Color.blue,Color.cyan,Color.darkGray,Color.gray,
                  Color.green,Color.lightGray,Color.magenta,Color.orange,Color.pink,
                  Color.red,Color.white,Color.yellow};
                  Color r1;
  public comboP()
  {
              colorList=new JComboBox<String>(colornames);
              jt=new JTextField("black");
    inputPanel=new JPanel();
    inputPanel.setLayout(new BorderLayout());
```

```
    r1=Color.black;
    inputPanel.setBackground(r1);
    setBackground(r1);
    inputPanel.add(new JScrollPane(colorList),BorderLayout.NORTH);
    inputPanel.add(jt,BorderLayout.CENTER);
    add(inputPanel);
    colorList.addActionListener(this);
  }

public void actionPerformed( ActionEvent e)
{
r1=colors[colorList.getSelectedIndex()];
jt.setText(colornames[colorList.getSelectedIndex()]);
inputPanel.setBackground(r1);
jt.setBackground(r1);
setBackground(r1);
repaint();
}
}
```

```
 class W12E5 {
public static void main(String args[])
{FrameGraphic.plot("Graphic window:comboP Combobox control",new comboP());}}
```

EX6:

```
 import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
import javax.swing.event.*;

public class SliderTest extends JFrame implements ChangeListener
{
    //
    public ovalP p;
    public JSlider cap;
    Color r=Color.lightGray;
    // pencereyi baslatma metodu
    public SliderTest()
    {
    super("JSlider Test");
    p=new ovalP(30,30,30);
    cap=new JSlider(SwingConstants.HORIZONTAL,0,200,10);
    cap.setMajorTickSpacing(20);
    cap.setPaintTicks(true);
    cap.setPaintLabels(true);
    cap.addChangeListener(this);
    add(p,BorderLayout.CENTER);
    add(cap,BorderLayout.SOUTH);
    }
    // girdi alanindaki olan olaylari dinleme metodu
    public void stateChanged(ChangeEvent e)
    {
     p.setOvalP(30, 30,cap.getValue());
     repaint();
    }

     //=====================================================
      public static void main(String[] args)
      {
      SliderTest f= new SliderTest();
      f.setDefaultCloseOperation( JFrame.EXIT_ON_CLOSE );
      f.setSize(350,200);
      f.setVisible(true);
      }
}
```

```
import javax.swing.*;
import java.awt.*;
```

```
import java.awt.geom.*;

public class ovalP extends JPanel
{
int xi,yi,radius;

public ovalP(int xi1, int yi1,int radius1)
{
xi=xi1;
yi=yi1;
radius=(radius1 >= 0 ? radius1:10);
}

public void setOvalP(int xi1, int yi1,int radius1)
{
xi=xi1;
yi=yi1;
radius=(radius1 >= 0 ? radius1:10);
repaint();
}

public void paint(Graphics g)
{
 //super.paintComponent(g);
 g.setColor(Color.BLUE);
 Graphics2D g2=(Graphics2D)g;
 g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING,
 RenderingHints.VALUE_ANTIALIAS_ON);
 Ellipse2D elips1=new Ellipse2D.Double(xi,yi,radius,radius);
 g2.draw(elips1);
}
}
```

EX7

```
import java.io.*;
import java.util.*;
import javax.swing.*;
 import javax.swing.table.*;
 import java.awt.*;
    public class JTableP extends JPanel
    {
                private static final long serialVersionUID = 43567894L;
                public void kur(Object a[][],String heading[])
                {
                int n=a.length;
                int m=a[0].length;
                JTable jt=new JTable(a,heading);
                jt.setPreferredScrollableViewportSize(new Dimension(500,80));
                jt.setFillsViewportHeight(true);
    add(new JScrollPane(jt));
    }
    public void kur(Object a[][])
                { int n=a[0].length;
                  String heading[]=new String[n];
                  char b='\u0041';
      for(int i=0;i<n;i++)
      {heading[i]=""+b;b++;}
      kur(a,heading);
    }
    public JTableP(Object a[][],String heading[])
    {kur(a,heading);}
                public JTableP(Object a[][])
                { kur(a);}
                public JTableP(double b[][])
                { Object a[][]=doubletoDouble(b);
                  kur(a);
                }
                public JTableP(double b[][],String heading[])
                { Object a[][]=doubletoDouble(b);
                  kur(a,heading);
                }
                public JTableP(int b[][])
```

```
            { Object a[][]=inttoInteger(b);
              kur(a);
            }
            public JTableP(int b[][],String heading[])
            { Object a[][]=inttoInteger(b);
              kur(a,heading);
            }
            public static void print(Object a[][],String heading[],String bb)
{
            JTableP pp=new JTableP(a,heading);
JFrame frame=new JFrame(bb);
frame.setDefaultCloseOperation( JFrame.EXIT_ON_CLOSE );
frame.getContentPane().add(pp);
frame.pack();
frame.setVisible(true);
            }
            public static void print(Object a[][],String bb)
            {
              int n=a[0].length;
              String heading[]=new String[n];
              char b='\u0041';
 for(int i=0;i<n;i++)
 {heading[i]=""+b;b++;}
 JTableP pp=new JTableP(a,heading);
              JFrame frame=new JFrame(bb);
 frame.setDefaultCloseOperation( JFrame.EXIT_ON_CLOSE );
 frame.getContentPane().add(pp);
 frame.pack();
 frame.setVisible(true);
            }
            public static void print(Object a[][])
            {               int n=a[0].length;
              String heading[]=new String[n];
              char b='\u0041';
 for(int i=0;i<n;i++)
 {heading[i]=""+b;b++;}
 JTableP pp=new JTableP(a,heading);
              JFrame frame=new JFrame("JTable");
 frame.setDefaultCloseOperation( JFrame.EXIT_ON_CLOSE );
 frame.getContentPane().add(pp);
 frame.pack();
 frame.setVisible(true);
            }
            public static void print(double a[][],String heading[],String bb)
            {print(doubletoDouble(a),heading,bb);}
            public static void print(double a[][],String bb)
            {print(doubletoDouble(a),bb);}
            public static void print(double a[][])
            {print(doubletoDouble(a));}
            public static void print(int a[][],String heading[],String bb)
            {print(inttoInteger(a),heading,bb);}
            public static void print(int a[][],String bb)
            {print(inttoInteger(a),bb);}
            public static void print(int a[][])
            {print(inttoInteger(a));}
            public static Double[][] doubletoDouble(double xi[][])
{ int n=xi.length;
int m=xi[0].length;
Double X[][]=new Double[n][m];
for(int j=0;j<m;j++)
  {for(int i=0;i<n;i++)
  {X[i][j]=new Double(xi[i][j]);}
  }
return X;
}
public static Integer[][] inttoInteger(int xi[][])
{ int n=xi.length;
int m=xi[0].length;
Integer X[][]=new Integer[n][m];
for(int j=0;j<m;j++)
  {for(int i=0;i<n;i++)
  {X[i][j]=new Integer(xi[i][j]);}
  }
return X;
}
```

```
        public static void main(String arg[])
        {double a[][]={{1.1,2.2,3.3,4.4},{4,4,5.5,6.6,7,7},{7,7,8.8,9.9,10.1},{10.1,11.2,12.3,13.4}};
        print(a,"JTable example");}
}
```

```
          import java.io.*;
          import java.util.*;
          import javax.swing.*;
  import javax.swing.table.*;
  import java.awt.*;
public class JTabletest
{
        public static void main(String arg[])
        {
        double a[][]={{1,2,3},{4,5,6},{7,8,9}};
        String s[]={"c1","c2","c3"};
        String s1="JTable example";
        JTableP pp=new JTableP(a,s);
        FrameGraphic.plot(s1,pp);
}}
```

HOMEWORK EXERCISES

Homework exercises will be done at home and will bring to next Thursday class printed no late exercises will be excepted. Each code should include student name id#, code plus results should be given. Homeworks will be accepted in written format plus a computer copy in pdf format will be sent to computer_programming@turhancoban.com adress your file name should be "group"+"week#"+studentname+studentid#.pdf

A W1_turhan_coban_0101333.pdf

B W3_ali_veli_02335646.pdf

W12HW1 :

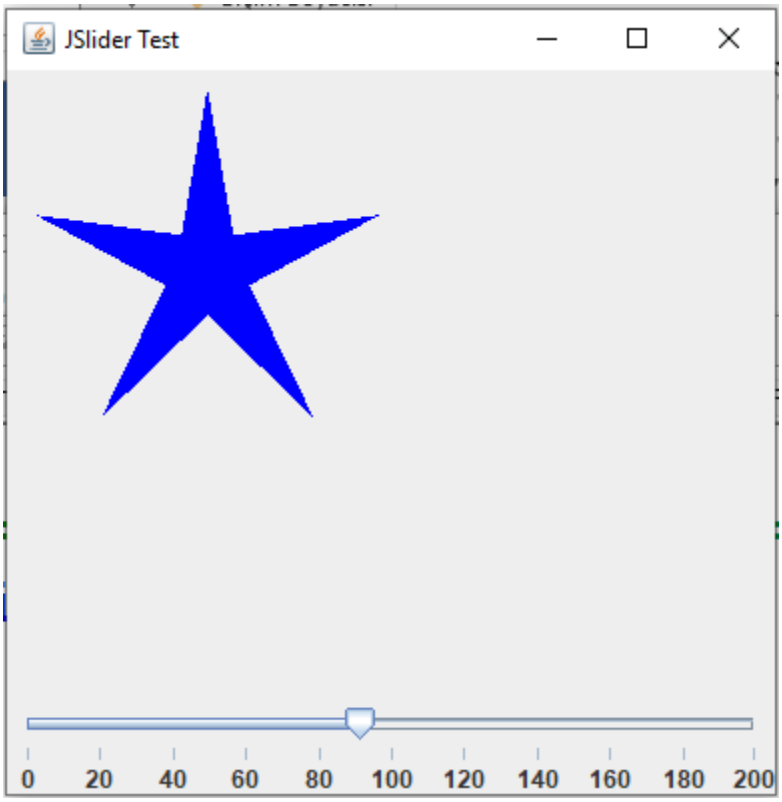
```
  public class polar
{//polar coordinate system
public double R,teta;
public polar()
{R=0;teta=0;}
public polar(double Ri,double tetai)
{R=Ri;teta=tetai;}
public polar(polar y)
{R=y.R();teta=y.teta();}
public void inputR(double Ri)
{R=Ri;}
public void inputTeta(double tetai)
{teta=tetai;}
public void inputPolar(double Ri,double tetai)
{R=Ri;teta=tetai;}
public void inputCartesian(double xi,double xj)
{R=Math.sqrt(xi*xi+xj*xj);teta=Math.atan2(xj,xi);}
public double R()
{return R;}
public double teta()
{return teta;}
public double xi()
{return R*Math.cos(teta);}
public double xj()
{return R*Math.sin(teta);}
public void add(polar y)
{kartesienGir((xi()+y.xi()),(xj()+y.xj()));}
public void substract(polar y)
{kartesienGir((xi()-y.xi()),(xj()-y.xj()));}
public polar read_polar()
{return this;}
public boolean equals(polar v)
{boolean b=((R==v.R())&&(teta==v.teta()));return b;}
public boolean greater_than(polar v)
{return (this.R>v.R());}
public boolean smaller_than(polar v)
{return (this.R<v.R());}
```

```
public String toString()
{return ""+R+"*exp("+teta+"i) ";}
}
```

```
 import javax.swing.table.*;
import java.awt.*;
import java.awt.event.*;
import javax.swing.event.*;
import java.awt.geom.*;

public class  star2P extends JPanel
{ public int x1,y1,x2,y2;
  public int starRadius;
  public Color c;
  public int side;
  public boolean first;
  GeneralPath x;
 public star2P(Color c1,int n)
 {super();
  side=n;
  c=c1;
  starRadius=100;
  x1=100;y1=100;x2=x1;y2=y1+starRadius;
  first=true;
 }
 public void setColor(Color c1)
 {c=c1;}
 public void setside(int n)
 {side=n;}
  public void setR(int Ri)
 {starRadius=Ri;y2=y1+starRadius;}
 public void setCizgi(int x1i,int y1i,int x2i,int y2i)
 {x1=x1i;y1=y1i;x2=x2i;y2=y2i;}
 public GeneralPath star(int x,int y, int n,int starRadius,double aci)
 {// bu yıldız cizime teta=pi/2+aci radyandan baslar
   GeneralPath star1=new GeneralPath();
   double teta=2.0*Math.PI/n;
   double R=starRadius;
   double r=starRadius*0.25;
   polar P1=new polar();
   polar P2=new polar();
   polar P3=new polar();
   for(int i=0;i<n;i++)
   { double teta1=teta*i+Math.PI/2.0+aci;
     double teta2=teta/2+teta1;
     P1.inputPolar(R,teta1);
     P2.inputPolar(r,teta2);
     if(i==0) star1.moveTo((x+(int)P1.xi()),(y-(int)P1.xj()));
     else     star1.lineTo((x+(int)P1.xi()),(y-(int)P1.xj()));
     star1.lineTo((x+(int)P2.xi()),(y-(int)P2.xj()));
     double teta3=teta*(i+1)+Math.PI/2.0+aci;
     P3.inputPolar(R,teta3);
     star1.lineTo((x+(int)P3.xi()),(y-(int)P3.xj()));
   }
   star1.closePath();
   return star1;
  }
 public void paintComponent(Graphics g)
 {super.paintComponent(g);
 Graphics2D g2=(Graphics2D)g;
 g2.setFont(new Font("Serif",Font.BOLD,24));
 g2.setColor(c);
 g2.setStroke(new BasicStroke(2.0f));
 starRadius=(int)Math.sqrt((x2-x1)*(x2-x1)+(y2-y1)*(y2-y1));
 x=star(x1,y1,side,starRadius,0);
 g2.fill(x);
 }
}
```

Star2P is given above. Create SliderTest1 similar to SliderTest so that you adjust size of a star by using a slider.



W12HW2 : Following program is given

```
//interface
interface if_x
{public double func(double x);
default double dfunc(double x)
{  double h=0.00001;
  return (-func(x+2.0*h)+8.0*func(x+h)-8.0*func(x-h)+func(x-2.0*h))/(12.0*h);
}
default double integral(double a,double b)
{
//integral f(x)dx
 double r[]={-0.973906528517171,-0.865063366688984,-0.679409568299024,-0.433395394129247,-0.148874338981631,
 0.148874338981631,0.433395394129247,0.679409568299024,0.865063366688984,0.973906528517171};
 double c[]={0.066671344308684,0.149451349150580,0.219086362515982,0.269266719309996,0.295524224714752,
 0.295524224714752,0.269266719309996,0.219086362515982,0.149451349150580,0.066671344308684};
double z=0,x,y;
double k1=(b-a)/2.0;
double k2=(b+a)/2.0;
for(int i=0;i<r.length;i++)
{
x=k2+k1*r[i];
y=func(x);
z+=k1*c[i]*y;
}
return z;
}
}
```

```
import java.util.*;
import java.io.*;
import java.awt.*;
class W12HW1a {
public static void main(String args[])
{double x1=IO.Dinput("x=");
 if_x f=(x)->x*x-2;
 double y=f.func(x1);
 double dy=f.dfunc(x1);
 double a=IO.Dinput("integral limit a=");
 double b=IO.Dinput("integral limit b=");
 double inty=f.integral(a,b);
 String s="Function : f(x)=x*x-2\n";
```

```
 s+="x = "+x1+"\n";
 s+="y=f(x)="+y+"\n";
 s+="dy/dx=f'(x)="+dy+"\n";
 s+="integral("+a+","+b+") = "+inty;
 IO.print(s);
}
}
```

By using GUI with JLabel, JTextField and JTextArea convert this program to a Graphic user interface (GUI) form

Çözüm:

```
 import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;


public class integralP extends JPanel implements ActionListener
{ private static final long serialVersionUID = 83572592L;
                JTextField jt1,jt2,jt3;
  JLabel jl1,jl2,jl3;
  JPanel p1;
  double a,b,integral;
  if_x f;
  public integralP(if_x f1)
  {f=f1;
  a=0;
  b=1;
  integral=0;
  p1=new JPanel();
   p1.setLayout(new GridLayout(3,2));
   setLayout(new BorderLayout());
   jl1=new JLabel("a=");
   jl2=new JLabel("b=");
   jl3=new JLabel("integral=");
   jt1=new JTextField("                    ");
   jt2=new JTextField("                    ");
   jt3=new JTextField("                    ");
   p1.add(jl1);
   p1.add(jt1);
   p1.add(jl2);
   p1.add(jt2);
   p1.add(jl3);
   p1.add(jt3);
   add(p1,BorderLayout.NORTH);
   jt1.addActionListener(this);
   jt2.addActionListener(this);
  }
  public void actionPerformed( ActionEvent e)
  {   if(e.getSource()==jt1)
     {a=Double.parseDouble(jt1.getText());
     jt1.setText(""+a);}
     else if(e.getSource()==jt2)
     {b=Double.parseDouble(jt2.getText());
     jt2.setText(""+b);
     integral=f.integral(a,b);
     jt3.setText(""+integral);
     }
  repaint();
  }
}
```

```
 import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;
public class FrameGraphics extends JFrame
{  private static final long serialVersionUID = 98579857L;
  JPanel d;
   public FrameGraphics(String a,JPanel di)
   {    super(a);
       d=di;
       add(d);
```

```
   }
   public static void plot(String a,JPanel di)
   {
       FrameGraphics f = new FrameGraphics(a,di);
       f.setDefaultCloseOperation( JFrame.EXIT_ON_CLOSE );
       f.setSize(500,300);
       f.setVisible(true);
   }
}
```

```
import java.util.*;
import java.io.*;
import java.awt.*;
class W12HW2b {
public static void main(String args[])
{ if_x f=(x)->x*x-2;
  FrameGraphics.plot("integral",new integralP(f));
}
}
```