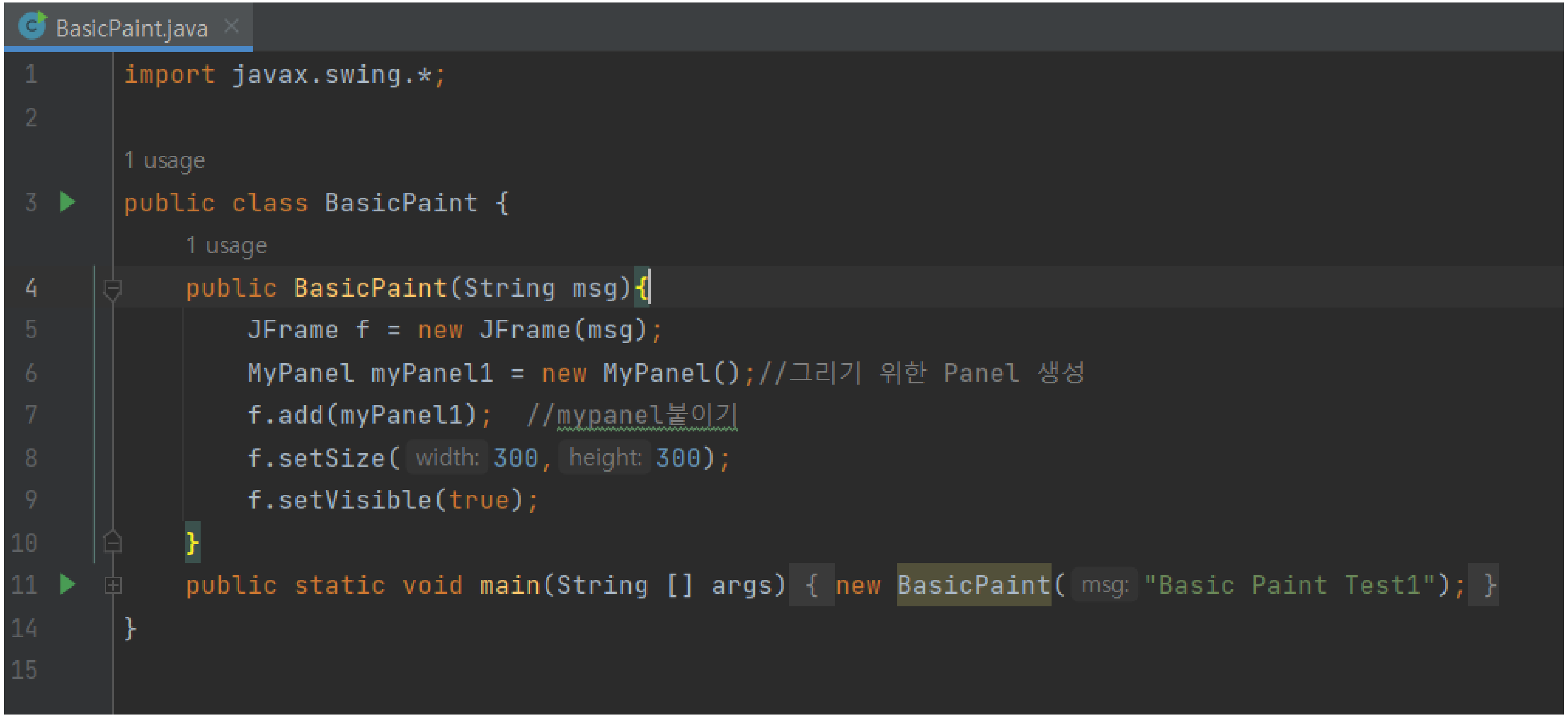
자바 그래픽
AWT – 기본적인 도형들을 쉽게 그릴 수 있다.
Java 2D – 커브를 그릴 수 있으며, 2차원 도형을 회전, 그라디언트 채우기 등 을 할 수 있다.

간단한 도형을 그리는 순서
Jframe 생성-> Jpanel 생성 -> 도형 그리기 (MyPanel) -> 좌표값 계산 -> 도형 그리기 함수 호출

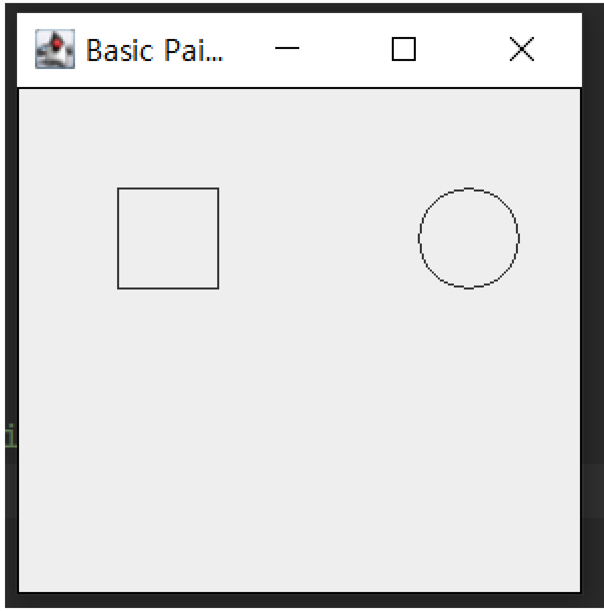
그래픽 좌표값은 x축의 값이 커질 수록 왼쪽에서 오른쪽, y축의 값이 커질 수록 위에서 아래로 증가한다.
X,Y축의 값을 시작으로 heigh(높이), width(너비)를 지정해준다.

6.1 Draw Basic Shape



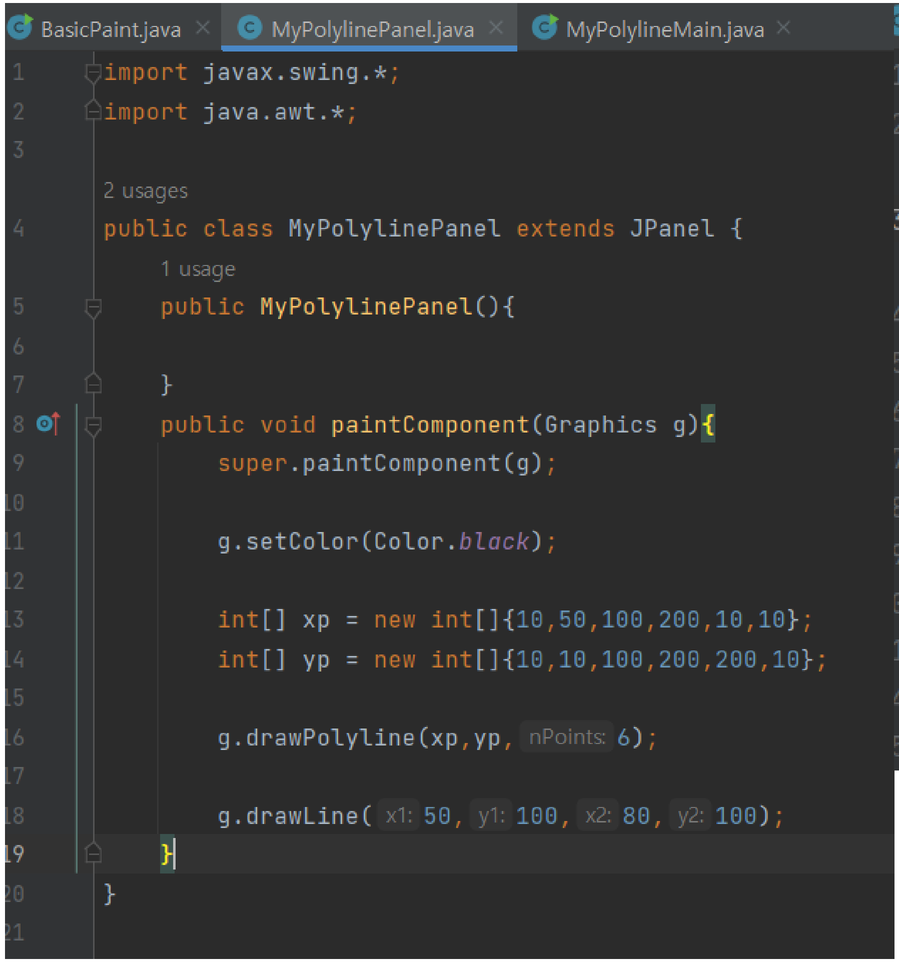
```
import javax.swing.*;

1 usage
public class BasicPaint {
    1 usage
    public BasicPaint(String msg){
        JFrame f = new JFrame(msg);
        MyPanel myPanel1 = new MyPanel();//그리기 위한 Panel 생성
        f.add(myPanel1);  //mypanel붙이기
        f.setSize( width: 300, height: 300);
        f.setVisible(true);
    }
    public static void main(String [] args) { new BasicPaint( msg: "Basic Paint Test1"); }
}
```

결과화면

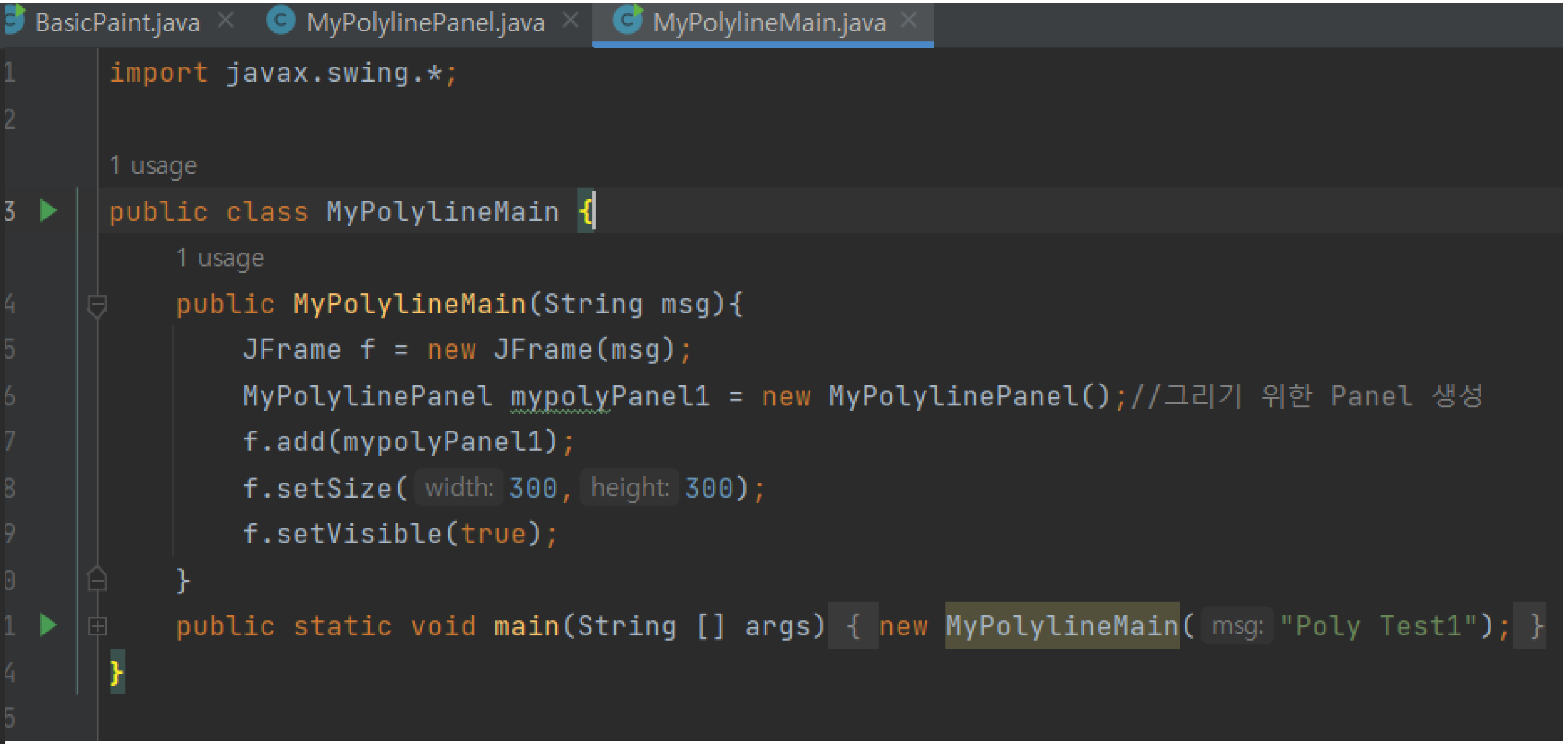


사각형 – drawrect
원 - drawoval

6.2 Line draw

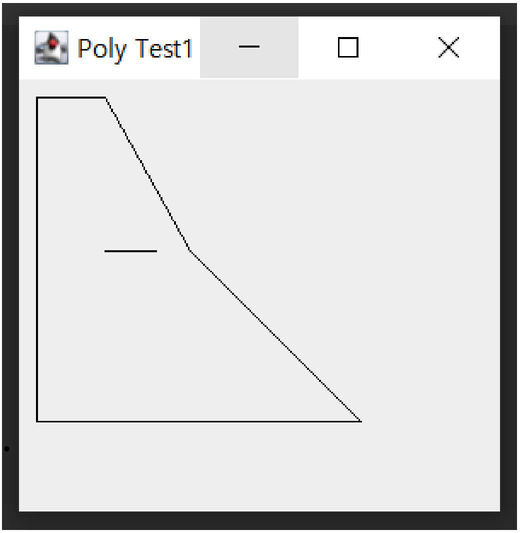


```java
import javax.swing.*;
import java.awt.*;

2 usages
public class MyPolylinePanel extends JPanel {
    1 usage
    public MyPolylinePanel(){

    }
    public void paintComponent(Graphics g){
        super.paintComponent(g);

        g.setColor(Color.black);

        int[] xp = new int[]{10,50,100,200,10,10};
        int[] yp = new int[]{10,10,100,200,200,10};

        g.drawPolyline(xp,yp, nPoints: 6);

        g.drawLine( x1: 50, y1: 100, x2: 80, y2: 100);
    }
}
```



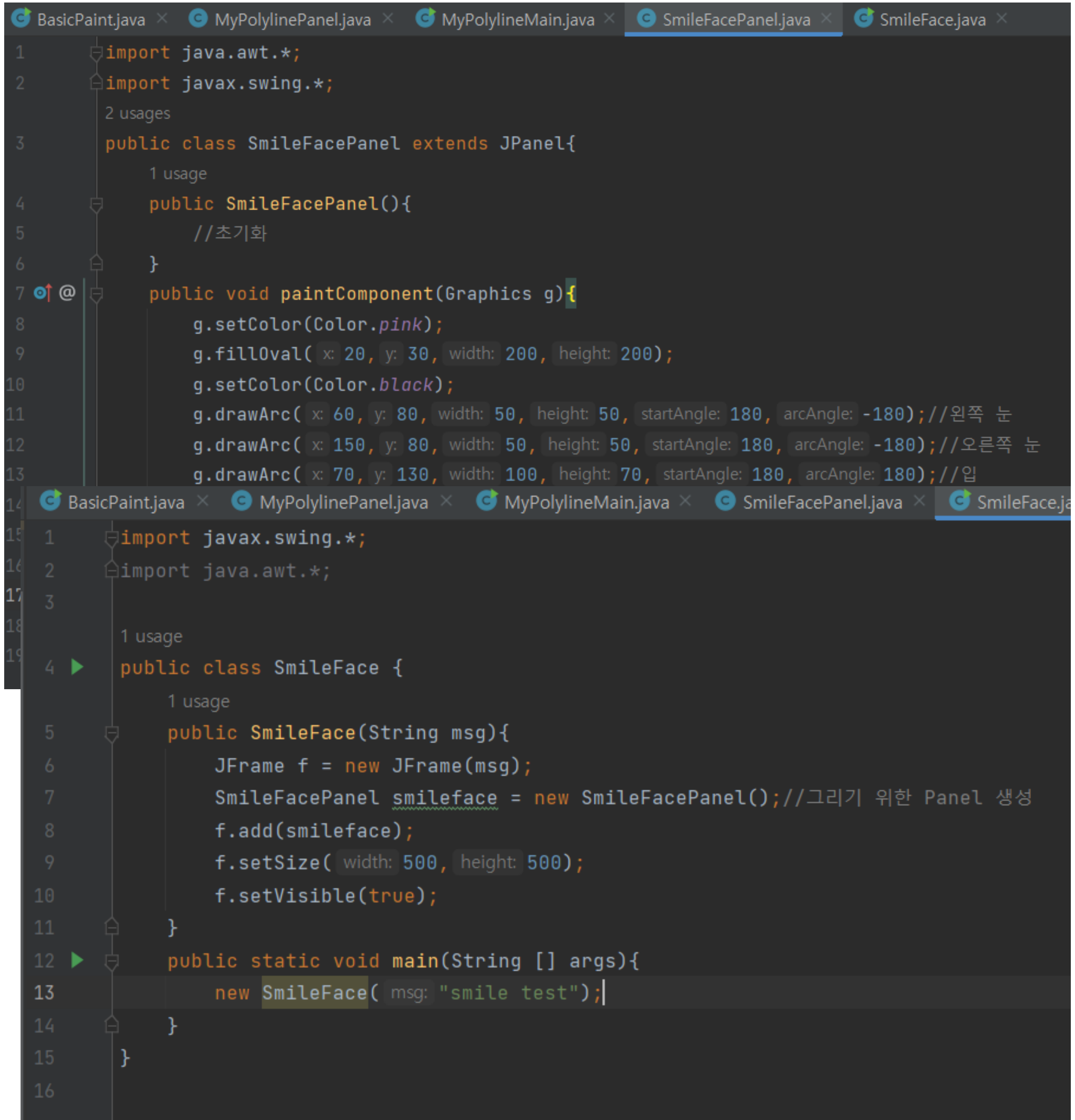
```java
import javax.swing.*;

1 usage
public class MyPolylineMain {
    1 usage
    public MyPolylineMain(String msg){
        JFrame f = new JFrame(msg);
        MyPolylinePanel mypolyPanel1 = new MyPolylinePanel();//그리기 위한 Panel 생성
        f.add(mypolyPanel1);
        f.setSize( width: 300, height: 300);
        f.setVisible(true);
    }
    public static void main(String [] args) { new MyPolylineMain( msg: "Poly Test1"); }
}
```

결과화면



직선 – drawline
Polyline을 이용하여 점선을 가지고 직선으로 연결된다.

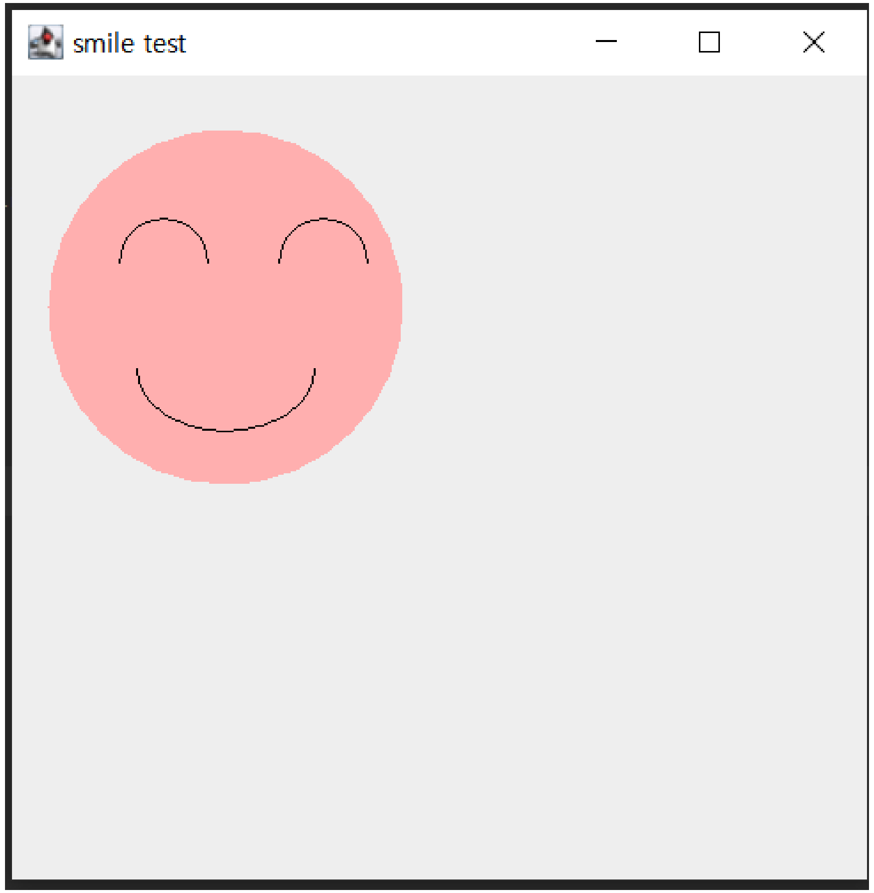
6.2 smile Face



```
import java.awt.*;
import javax.swing.*;
2 usages
public class SmileFacePanel extends JPanel{
    1 usage
    public SmileFacePanel(){
        //초기화
    }
    public void paintComponent(Graphics g){
        g.setColor(Color.pink);
        g.fillOval( x: 20, y: 30, width: 200, height: 200);
        g.setColor(Color.black);
        g.drawArc( x: 60, y: 80, width: 50, height: 50, startAngle: 180, arcAngle: -180);//왼쪽 눈
        g.drawArc( x: 150, y: 80, width: 50, height: 50, startAngle: 180, arcAngle: -180);//오른쪽 눈
        g.drawArc( x: 70, y: 130, width: 100, height: 70, startAngle: 180, arcAngle: 180);//입
```

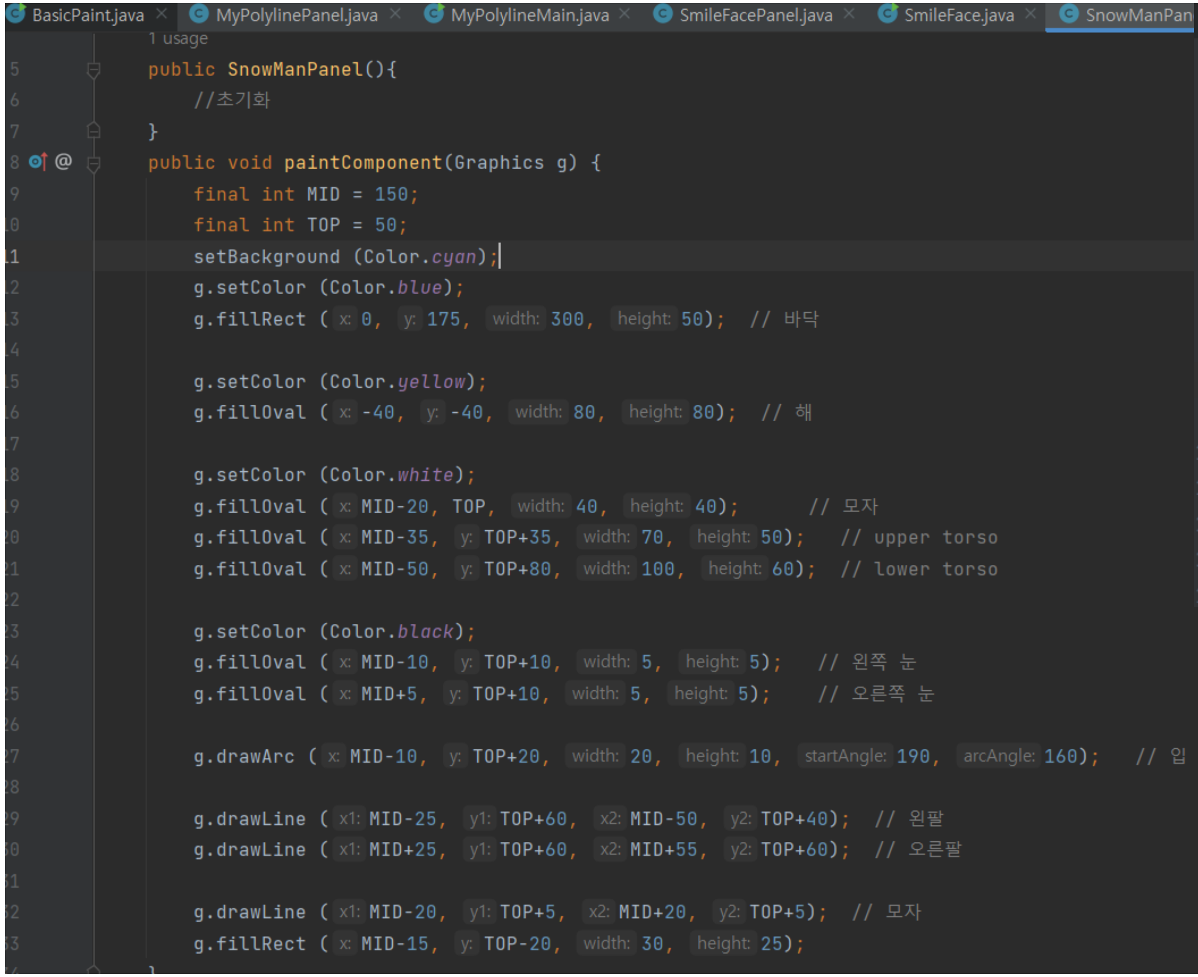
```
import javax.swing.*;
import java.awt.*;

1 usage
public class SmileFace {
    1 usage
    public SmileFace(String msg){
        JFrame f = new JFrame(msg);
        SmileFacePanel smileface = new SmileFacePanel();//그리기 위한 Panel 생성
        f.add(smileface);
        f.setSize( width: 500, height: 500);
        f.setVisible(true);
    }
    public static void main(String [] args){
        new SmileFace( msg: "smile test");
    }
}
```

결과화면

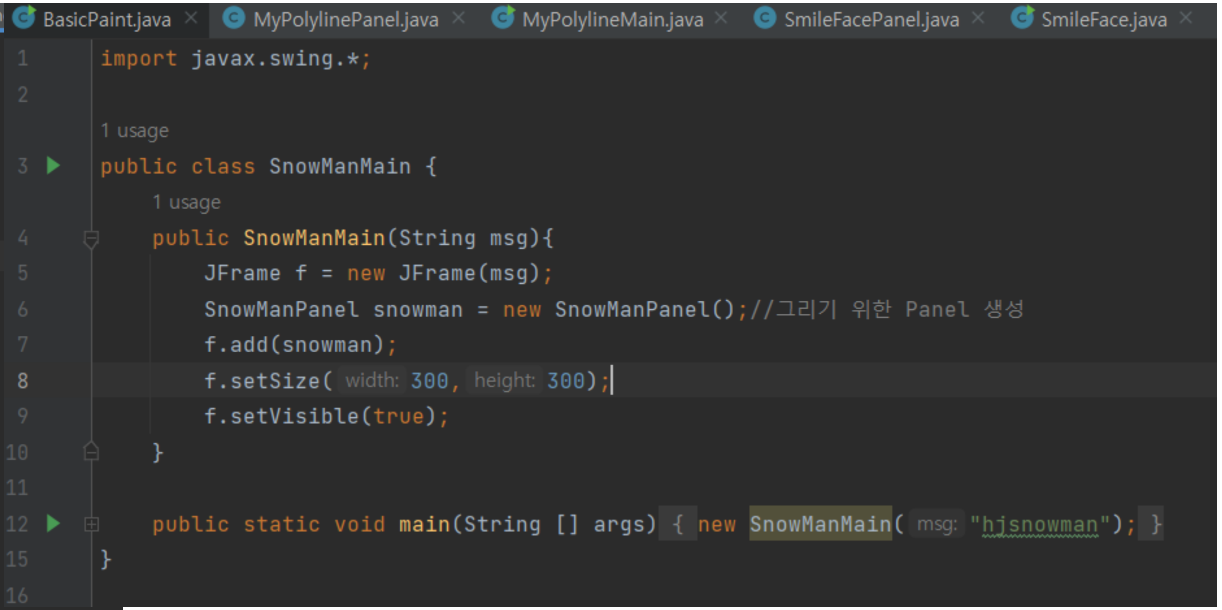


원 + 호를 사용하여 웃는 얼굴을 그렸다.
Drawarc를 사용해 arcangle의 각도 만큼의 호를 그린다.

H.W SnowMan

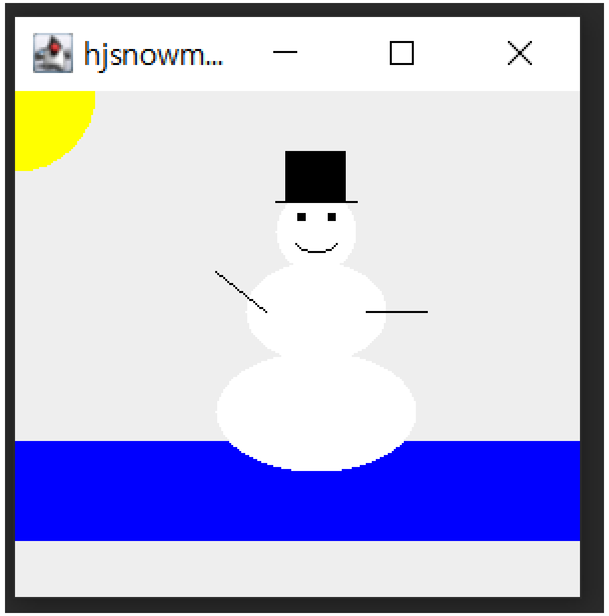


```
    1 usage
    public SnowManPanel(){
        //초기화
    }
    public void paintComponent(Graphics g) {
        final int MID = 150;
        final int TOP = 50;
        setBackground (Color.cyan);
        g.setColor (Color.blue);
        g.fillRect ( x: 0,  y: 175,  width: 300,  height: 50);  // 바닥

        g.setColor (Color.yellow);
        g.fillOval ( x: -40,  y: -40,  width: 80,  height: 80);  // 해

        g.setColor (Color.white);
        g.fillOval ( x: MID-20, TOP,  width: 40,  height: 40);      // 모자
        g.fillOval ( x: MID-35,  y: TOP+35,  width: 70,  height: 50);   // upper torso
        g.fillOval ( x: MID-50,  y: TOP+80,  width: 100,  height: 60);  // lower torso

        g.setColor (Color.black);
        g.fillOval ( x: MID-10,  y: TOP+10,  width: 5,  height: 5);   // 왼쪽 눈
        g.fillOval ( x: MID+5,  y: TOP+10,  width: 5,  height: 5);    // 오른쪽 눈

        g.drawArc ( x: MID-10,  y: TOP+20,  width: 20,  height: 10,  startAngle: 190,  arcAngle: 160);   // 입

        g.drawLine ( x1: MID-25,  y1: TOP+60,  x2: MID-50,  y2: TOP+40);  // 왼팔
        g.drawLine ( x1: MID+25,  y1: TOP+60,  x2: MID+55,  y2: TOP+60);  // 오른팔

        g.drawLine ( x1: MID-20,  y1: TOP+5,  x2: MID+20,  y2: TOP+5);  // 모자
        g.fillRect ( x: MID-15,  y: TOP-20,  width: 30,  height: 25);
    }
```

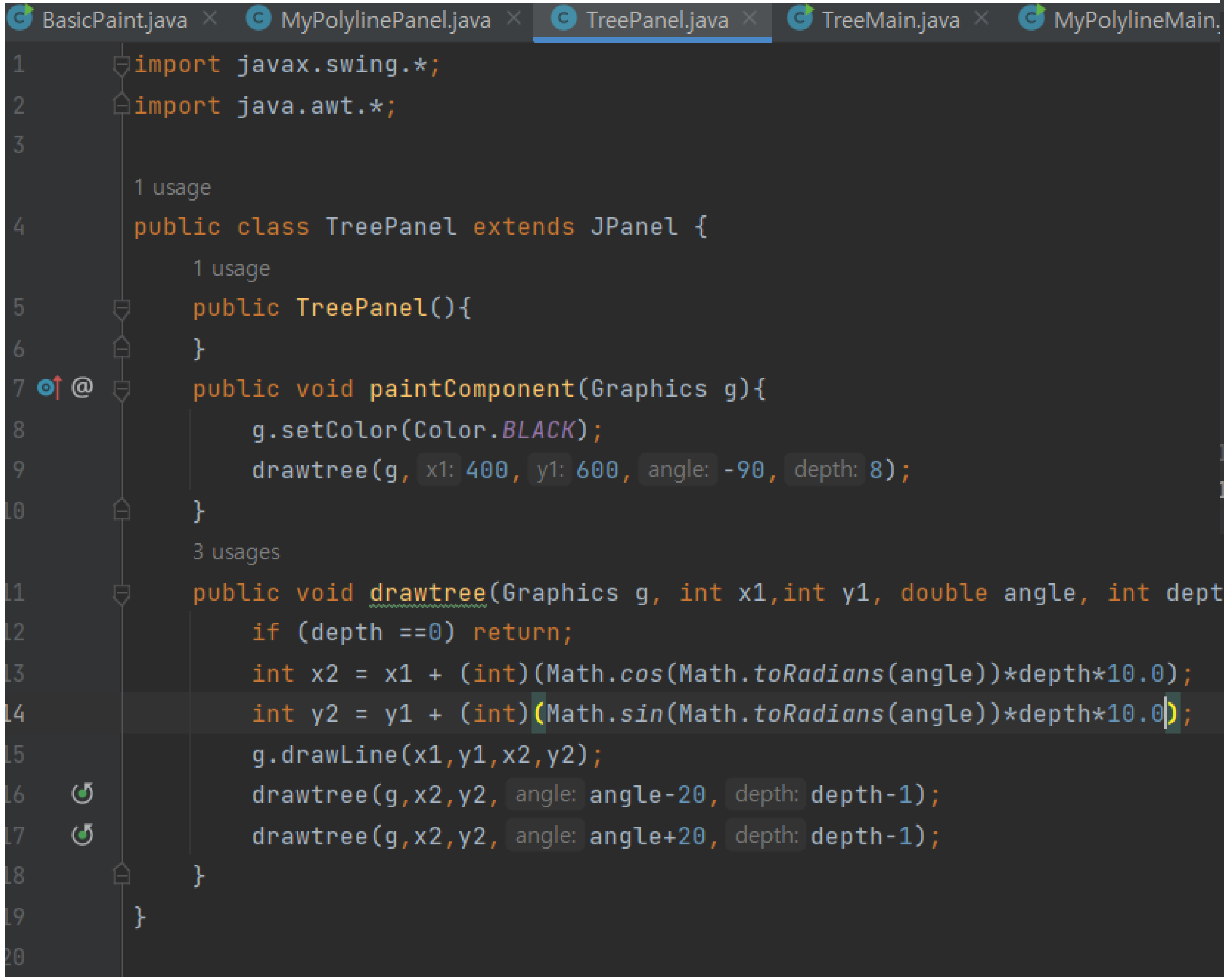


```
import javax.swing.*;

1 usage
public class SnowManMain {
    1 usage
    public SnowManMain(String msg){
        JFrame f = new JFrame(msg);
        SnowManPanel snowman = new SnowManPanel();//그리기 위한 Panel 생성
        f.add(snowman);
        f.setSize( width: 300,  height: 300);
        f.setVisible(true);
    }

    public static void main(String [] args) { new SnowManMain( msg: "hjsnowman"); }
}
```

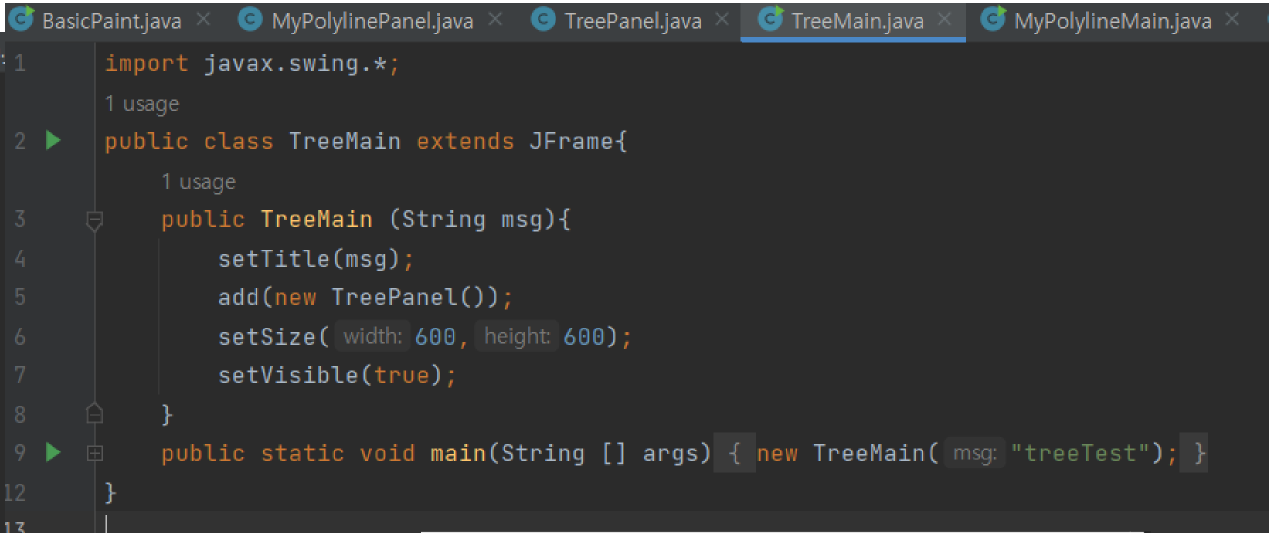
결과화면



6.2 Drawing Tree

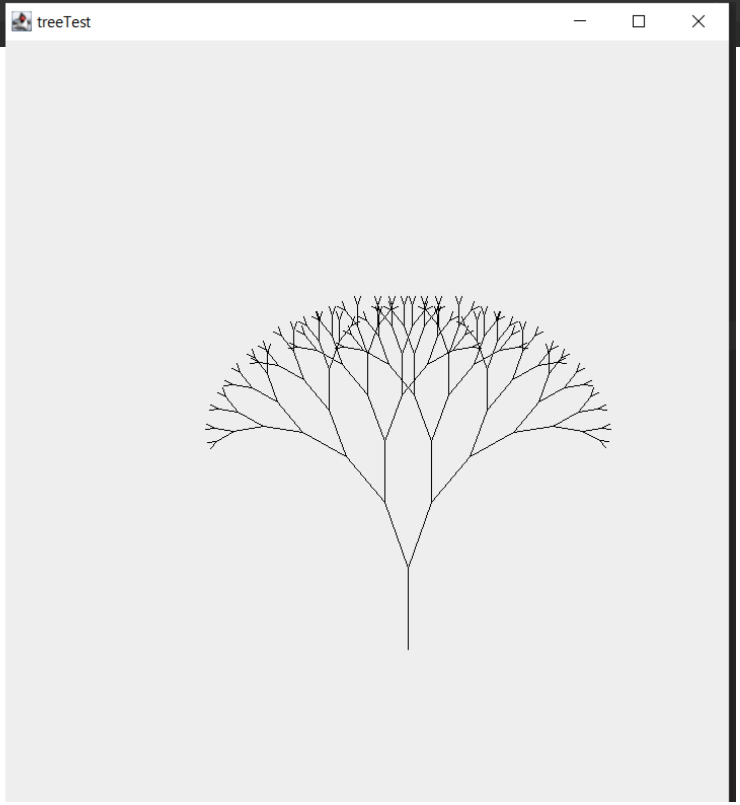


```java
import javax.swing.*;
import java.awt.*;

1 usage
public class TreePanel extends JPanel {
    1 usage
    public TreePanel(){
    }
    public void paintComponent(Graphics g){
        g.setColor(Color.BLACK);
        drawtree(g, x1: 400, y1: 600, angle: -90, depth: 8);
    }
    3 usages
    public void drawtree(Graphics g, int x1,int y1, double angle, int depth){
        if (depth ==0) return;
        int x2 = x1 + (int)(Math.cos(Math.toRadians(angle))*depth*10.0);
        int y2 = y1 + (int)(Math.sin(Math.toRadians(angle))*depth*10.0);
        g.drawLine(x1,y1,x2,y2);
        drawtree(g,x2,y2, angle: angle-20, depth: depth-1);
        drawtree(g,x2,y2, angle: angle+20, depth: depth-1);
    }
}
```



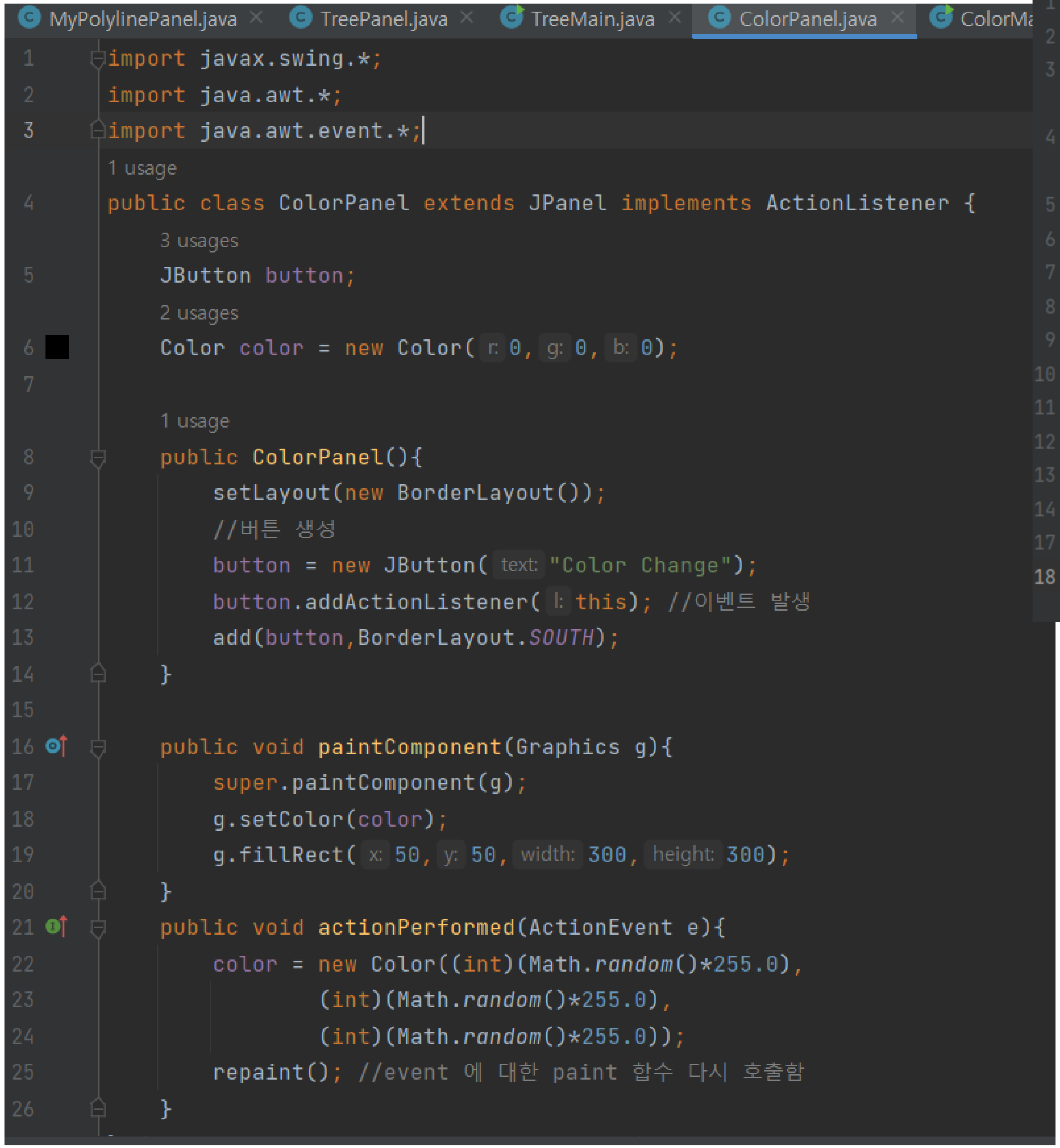
```java
import javax.swing.*;
1 usage
public class TreeMain extends JFrame{
    1 usage
    public TreeMain (String msg){
        setTitle(msg);
        add(new TreePanel());
        setSize( width: 600, height: 600);
        setVisible(true);
    }
    public static void main(String [] args) { new TreeMain( msg: "treeTest"); }
}
```

결과화면

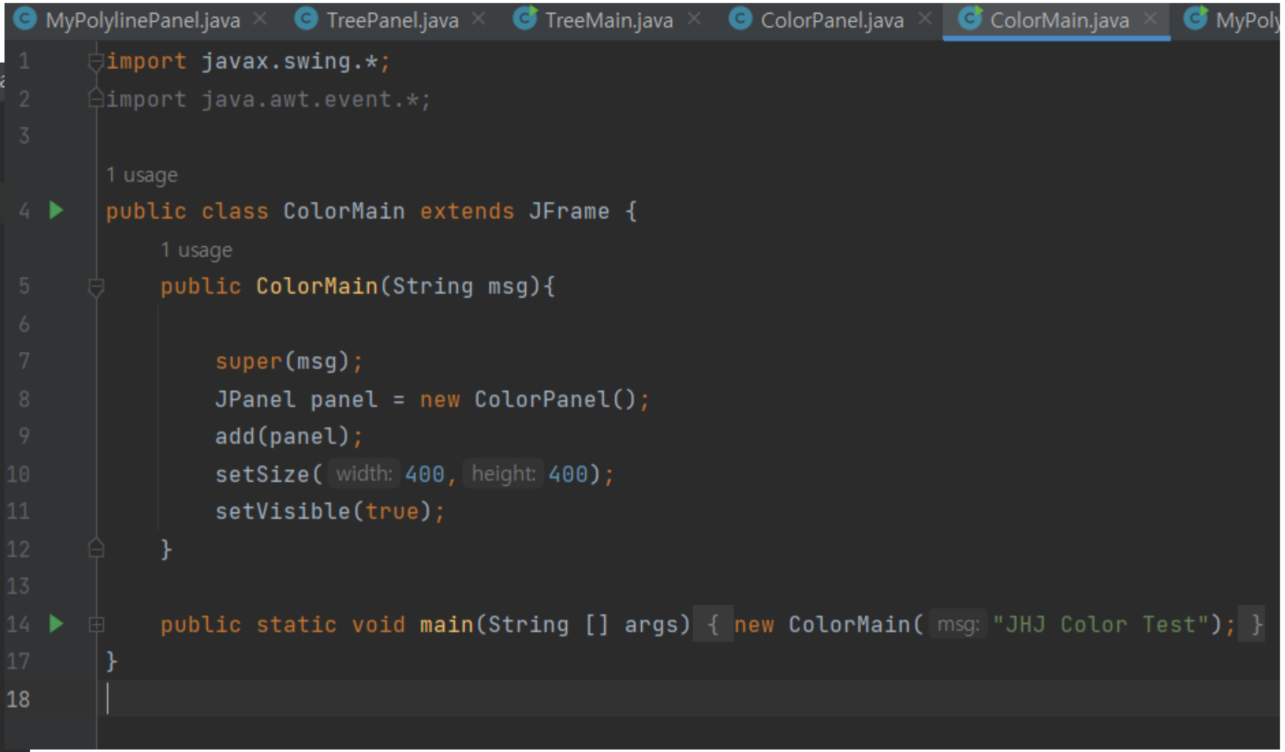


나무 줄기를 그린 후 줄기의 끝점에서 특정한 각도로 2가지 가지를 그린다.
동일한 과정을 반복하지만, 깊이를 지정하여 특정 깊이에 도달하면 멈춘다.

6.3 Color Lab1

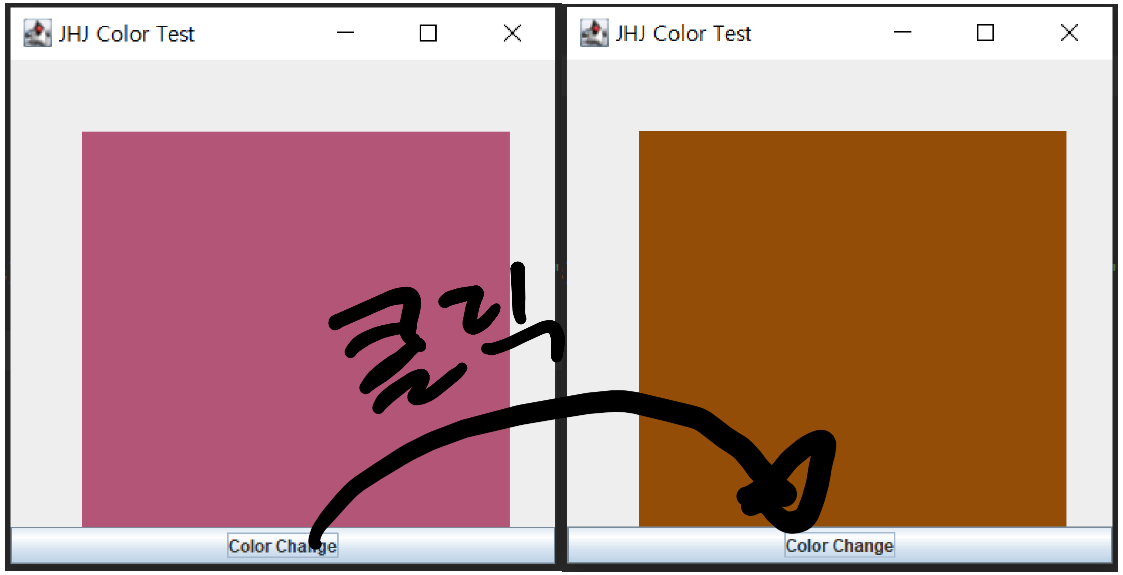


```java
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
1 usage
public class ColorPanel extends JPanel implements ActionListener {
    3 usages
    JButton button;
    2 usages
    Color color = new Color( r: 0, g: 0, b: 0);

    1 usage
    public ColorPanel(){
        setLayout(new BorderLayout());
        //버튼 생성
        button = new JButton( text: "Color Change");
        button.addActionListener( l: this); //이벤트 발생
        add(button,BorderLayout.SOUTH);
    }

    public void paintComponent(Graphics g){
        super.paintComponent(g);
        g.setColor(color);
        g.fillRect( x: 50, y: 50, width: 300, height: 300);
    }
    public void actionPerformed(ActionEvent e){
        color = new Color((int)(Math.random()*255.0),
                (int)(Math.random()*255.0),
                (int)(Math.random()*255.0));
        repaint(); //event 에 대한 paint 함수 다시 호출함
    }
```

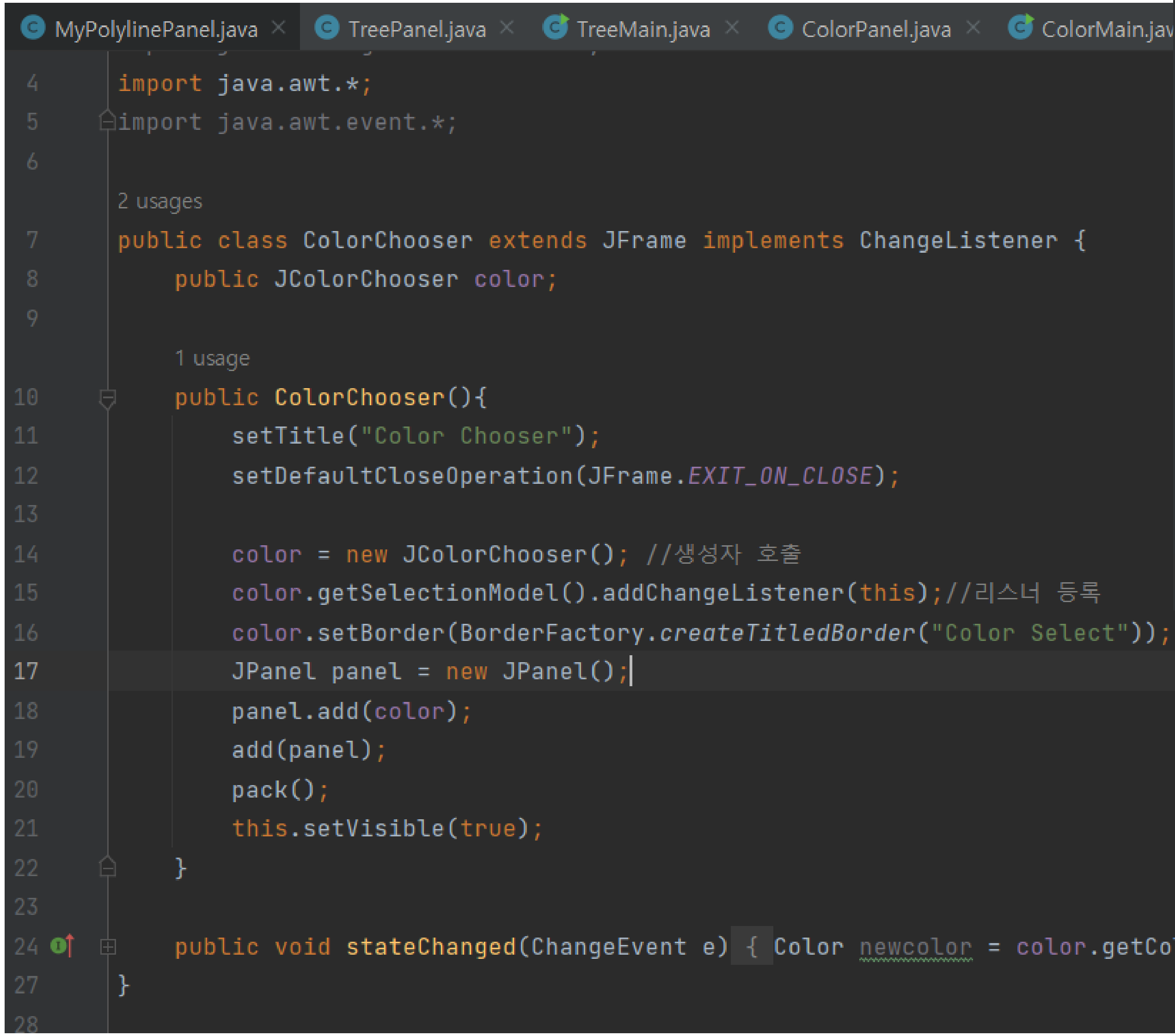


```java
import javax.swing.*;
import java.awt.event.*;

1 usage
public class ColorMain extends JFrame {
    1 usage
    public ColorMain(String msg){

        super(msg);
        JPanel panel = new ColorPanel();
        add(panel);
        setSize( width: 400, height: 400);
        setVisible(true);
    }

    public static void main(String [] args) { new ColorMain( msg: "JHJ Color Test"); }
}

```

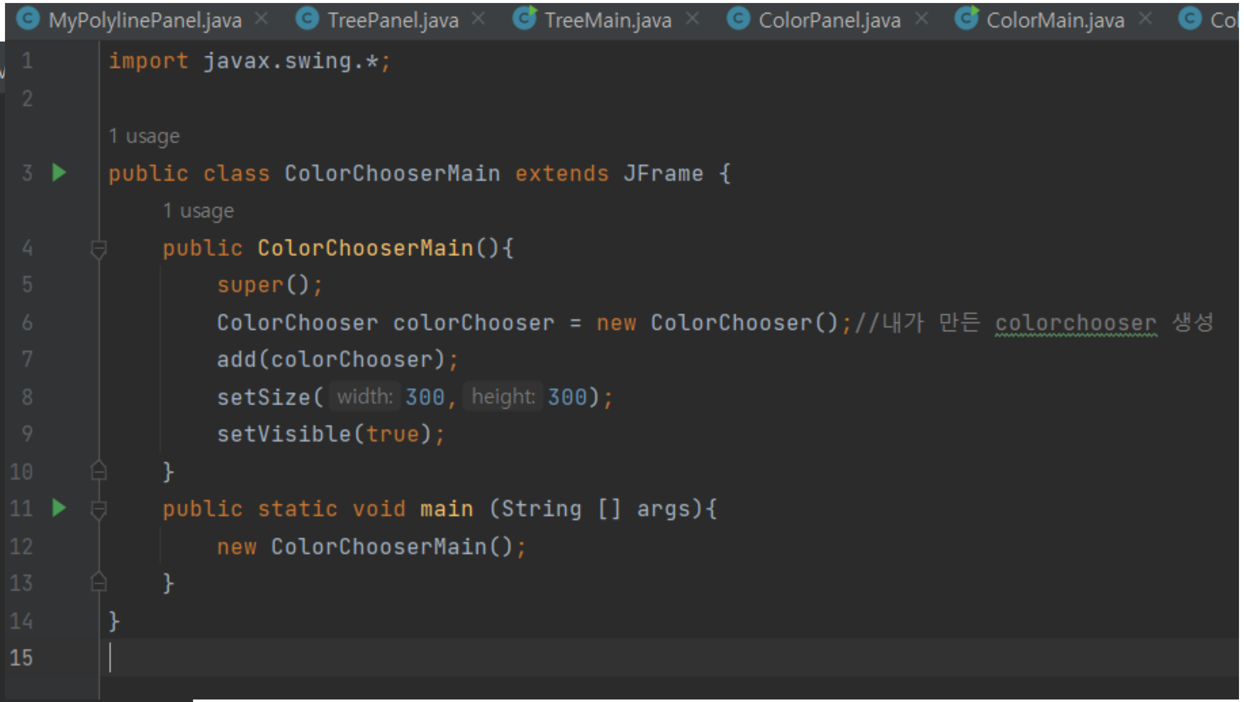
결과화면



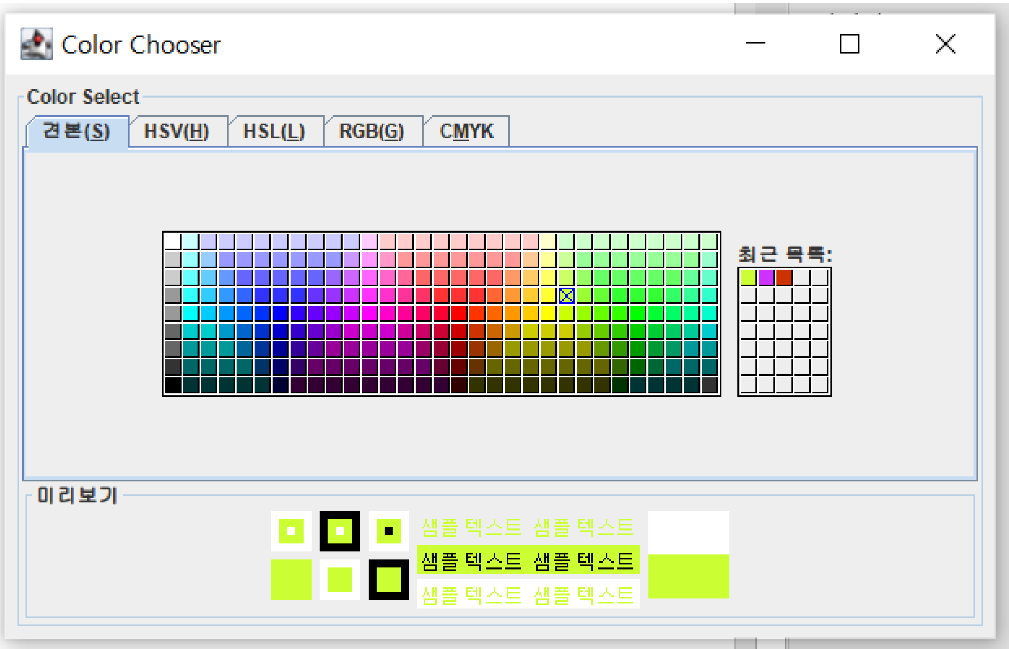
6.3 Color Lab2 Color setting



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

2 usages
public class ColorChooser extends JFrame implements ChangeListener {
    public JColorChooser color;

    1 usage
    public ColorChooser(){
        setTitle("Color Chooser");
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);

        color = new JColorChooser(); //생성자 호출
        color.getSelectionModel().addChangeListener(this);//리스너 등록
        color.setBorder(BorderFactory.createTitledBorder("Color Select"));
        JPanel panel = new JPanel();
        panel.add(color);
        add(panel);
        pack();
        this.setVisible(true);
    }

    public void stateChanged(ChangeEvent e) { Color newcolor = color.getColor(); }
}
```

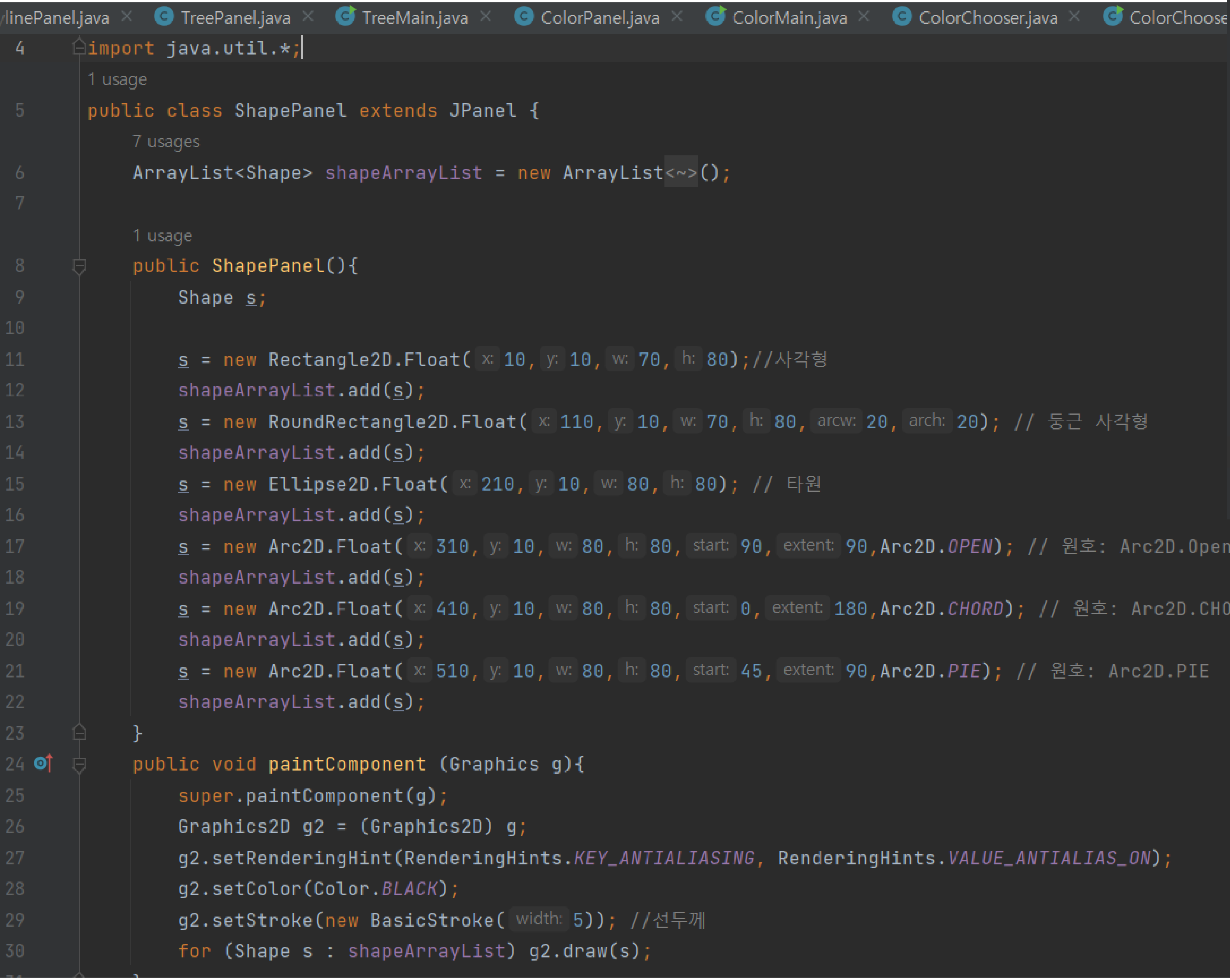


```
import javax.swing.*;

1 usage
public class ColorChooserMain extends JFrame {
    1 usage
    public ColorChooserMain(){
        super();
        ColorChooser colorChooser = new ColorChooser();//내가 만든 colorchooser 생성
        add(colorChooser);
        setSize( width: 300, height: 300);
        setVisible(true);
    }
    public static void main (String [] args){
        new ColorChooserMain();
    }
}
```

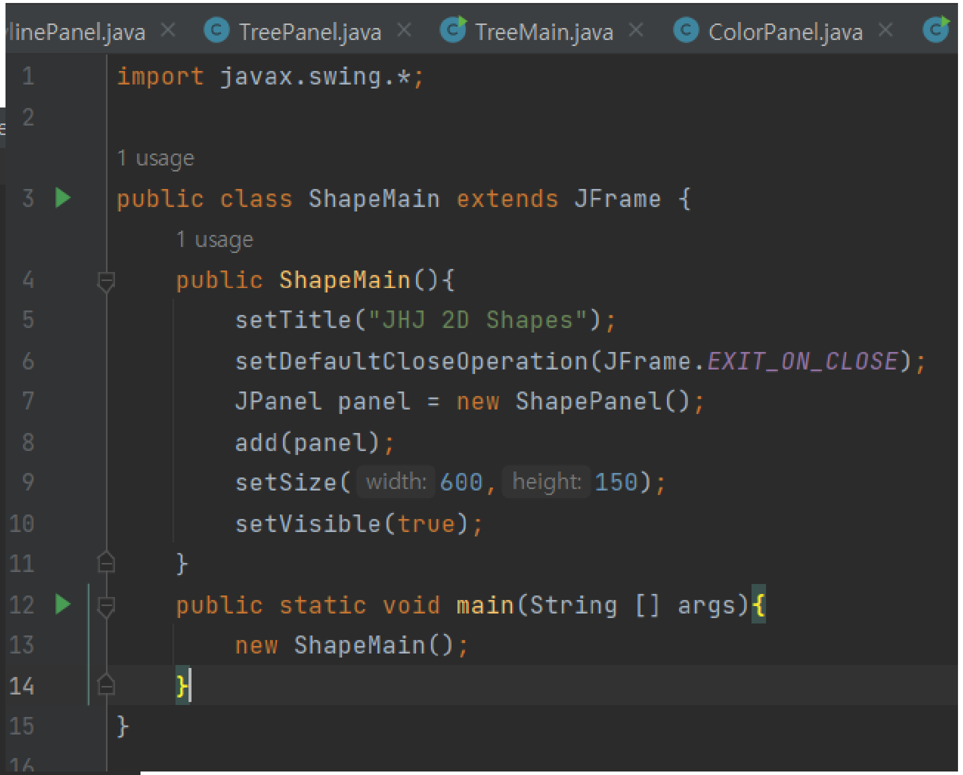


결과화면

6.4 Java 2D Lab1

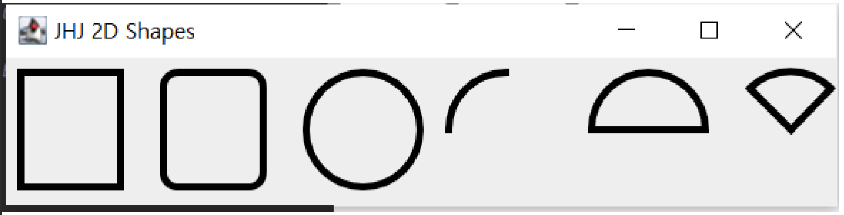


```java
import java.util.*;
1 usage
public class ShapePanel extends JPanel {
    7 usages
    ArrayList<Shape> shapeArrayList = new ArrayList<~>();

    1 usage
    public ShapePanel(){
        Shape s;

        s = new Rectangle2D.Float( x: 10, y: 10, w: 70, h: 80);//사각형
        shapeArrayList.add(s);
        s = new RoundRectangle2D.Float( x: 110, y: 10, w: 70, h: 80, arcw: 20, arch: 20); // 둥근 사각형
        shapeArrayList.add(s);
        s = new Ellipse2D.Float( x: 210, y: 10, w: 80, h: 80); // 타원
        shapeArrayList.add(s);
        s = new Arc2D.Float( x: 310, y: 10, w: 80, h: 80, start: 90, extent: 90,Arc2D.OPEN); // 원호: Arc2D.Open
        shapeArrayList.add(s);
        s = new Arc2D.Float( x: 410, y: 10, w: 80, h: 80, start: 0, extent: 180,Arc2D.CHORD); // 원호: Arc2D.CHORD
        shapeArrayList.add(s);
        s = new Arc2D.Float( x: 510, y: 10, w: 80, h: 80, start: 45, extent: 90,Arc2D.PIE); // 원호: Arc2D.PIE
        shapeArrayList.add(s);
    }
    public void paintComponent (Graphics g){
        super.paintComponent(g);
        Graphics2D g2 = (Graphics2D) g;
        g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING, RenderingHints.VALUE_ANTIALIAS_ON);
        g2.setColor(Color.BLACK);
        g2.setStroke(new BasicStroke( width: 5)); //선두께
        for (Shape s : shapeArrayList) g2.draw(s);
```

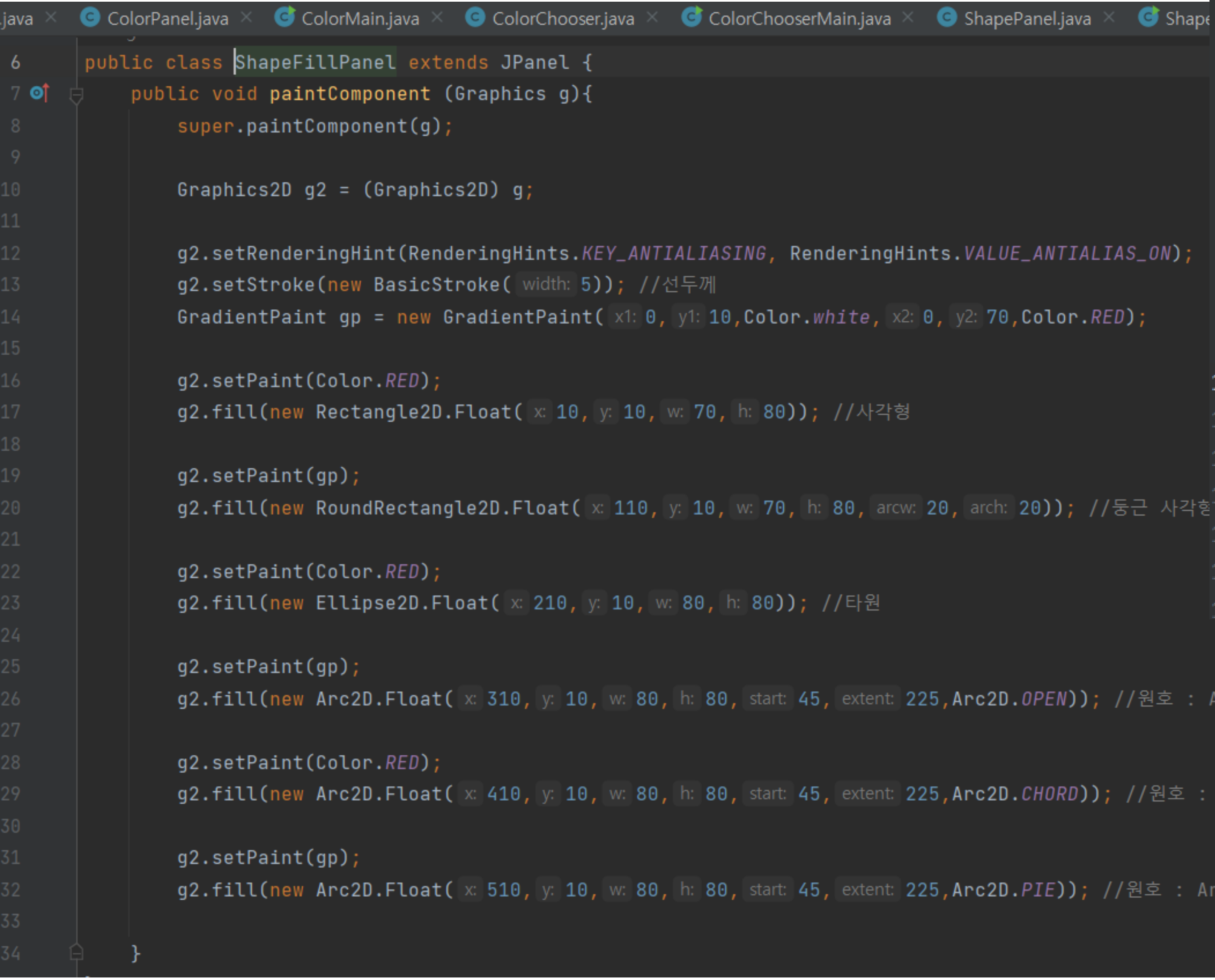


```java
import javax.swing.*;

1 usage
public class ShapeMain extends JFrame {
    1 usage
    public ShapeMain(){
        setTitle("JHJ 2D Shapes");
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        JPanel panel = new ShapePanel();
        add(panel);
        setSize( width: 600, height: 150);
        setVisible(true);
    }
    public static void main(String [] args){
        new ShapeMain();
    }
}
```

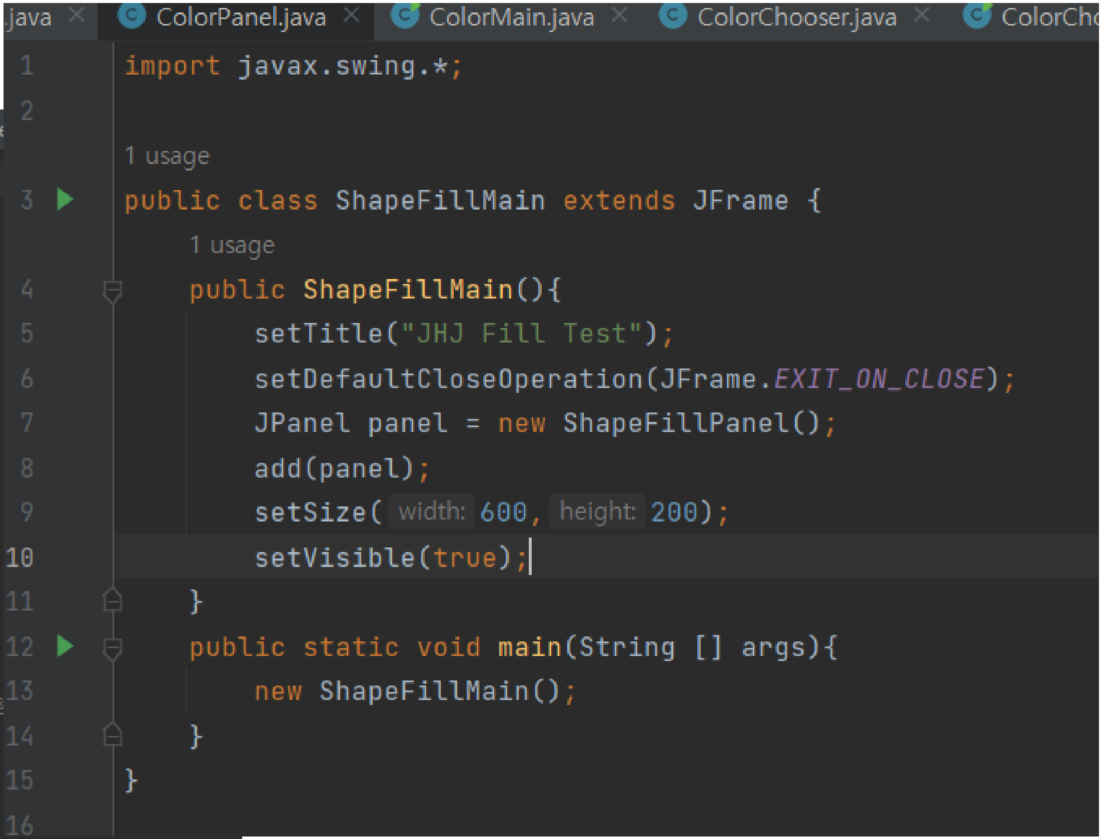
결과화면



6.4 Java 2D Lab2

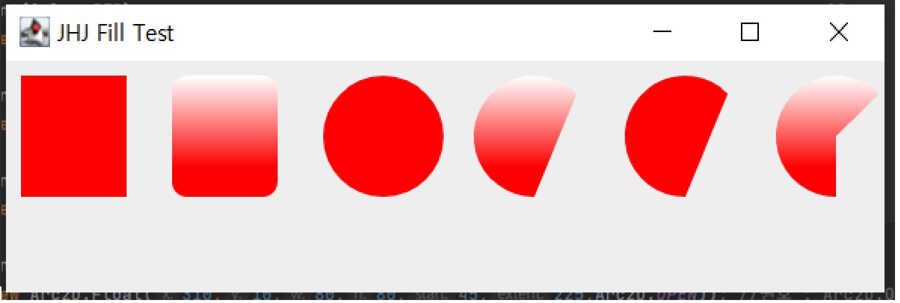


```java
public class ShapeFillPanel extends JPanel {
    public void paintComponent (Graphics g){
        super.paintComponent(g);

        Graphics2D g2 = (Graphics2D) g;

        g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING, RenderingHints.VALUE_ANTIALIAS_ON);
        g2.setStroke(new BasicStroke( width: 5)); //선두께
        GradientPaint gp = new GradientPaint( x1: 0, y1: 10,Color.white, x2: 0, y2: 70,Color.RED);

        g2.setPaint(Color.RED);
        g2.fill(new Rectangle2D.Float( x: 10, y: 10, w: 70, h: 80)); //사각형

        g2.setPaint(gp);
        g2.fill(new RoundRectangle2D.Float( x: 110, y: 10, w: 70, h: 80, arcw: 20, arch: 20)); //둥근 사각형

        g2.setPaint(Color.RED);
        g2.fill(new Ellipse2D.Float( x: 210, y: 10, w: 80, h: 80)); //타원

        g2.setPaint(gp);
        g2.fill(new Arc2D.Float( x: 310, y: 10, w: 80, h: 80, start: 45, extent: 225,Arc2D.OPEN)); //원호 : Arc2D.Open

        g2.setPaint(Color.RED);
        g2.fill(new Arc2D.Float( x: 410, y: 10, w: 80, h: 80, start: 45, extent: 225,Arc2D.CHORD)); //원호 : Arc2D.CHORD

        g2.setPaint(gp);
        g2.fill(new Arc2D.Float( x: 510, y: 10, w: 80, h: 80, start: 45, extent: 225,Arc2D.PIE)); //원호 : Arc2D.PIE

    }
```



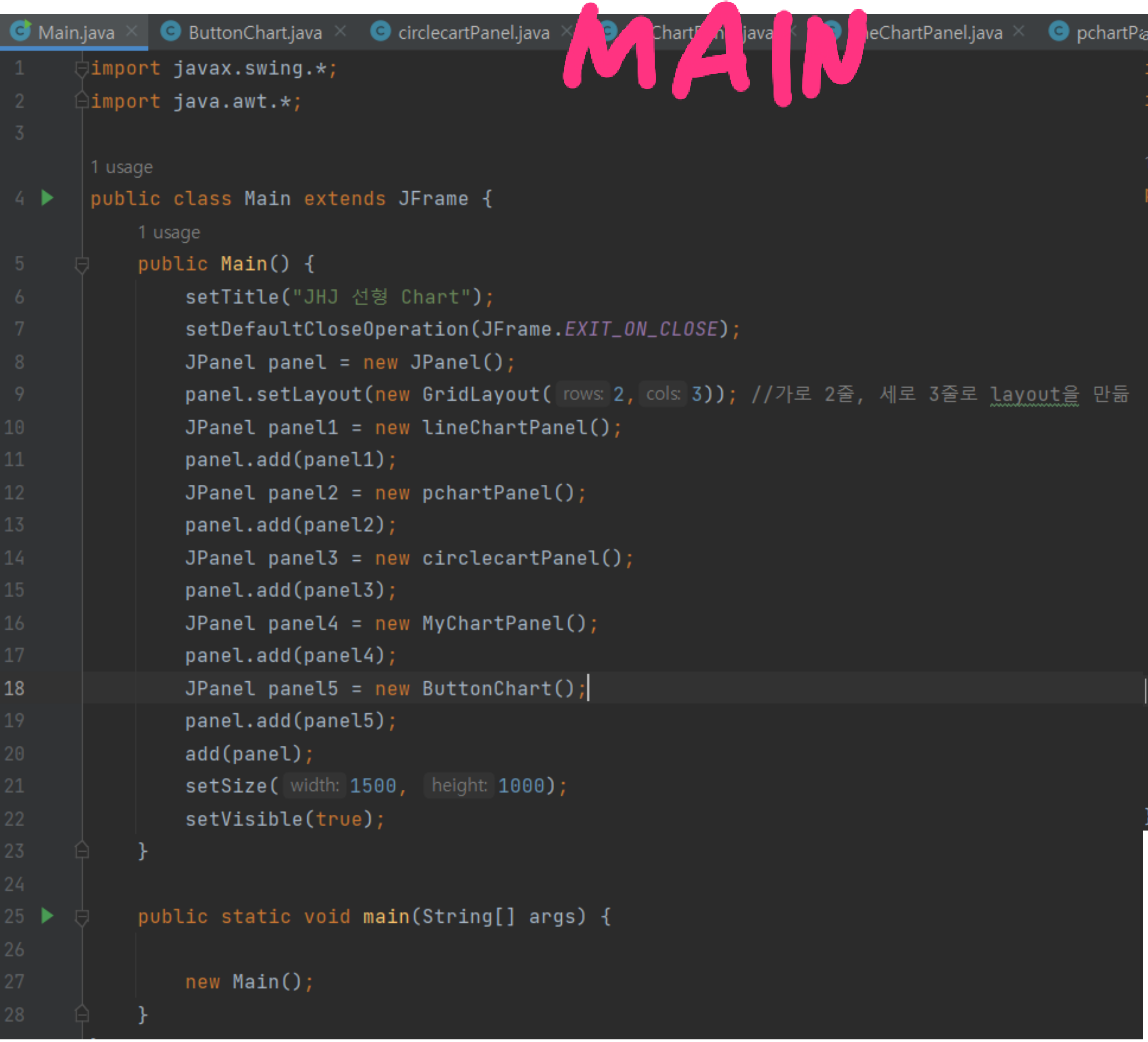
```java
import javax.swing.*;

1 usage
public class ShapeFillMain extends JFrame {
    1 usage
    public ShapeFillMain(){
        setTitle("JHJ Fill Test");
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        JPanel panel = new ShapeFillPanel();
        add(panel);
        setSize( width: 600, height: 200);
        setVisible(true);
    }
    public static void main(String [] args){
        new ShapeFillMain();
    }
}
```

결과화면



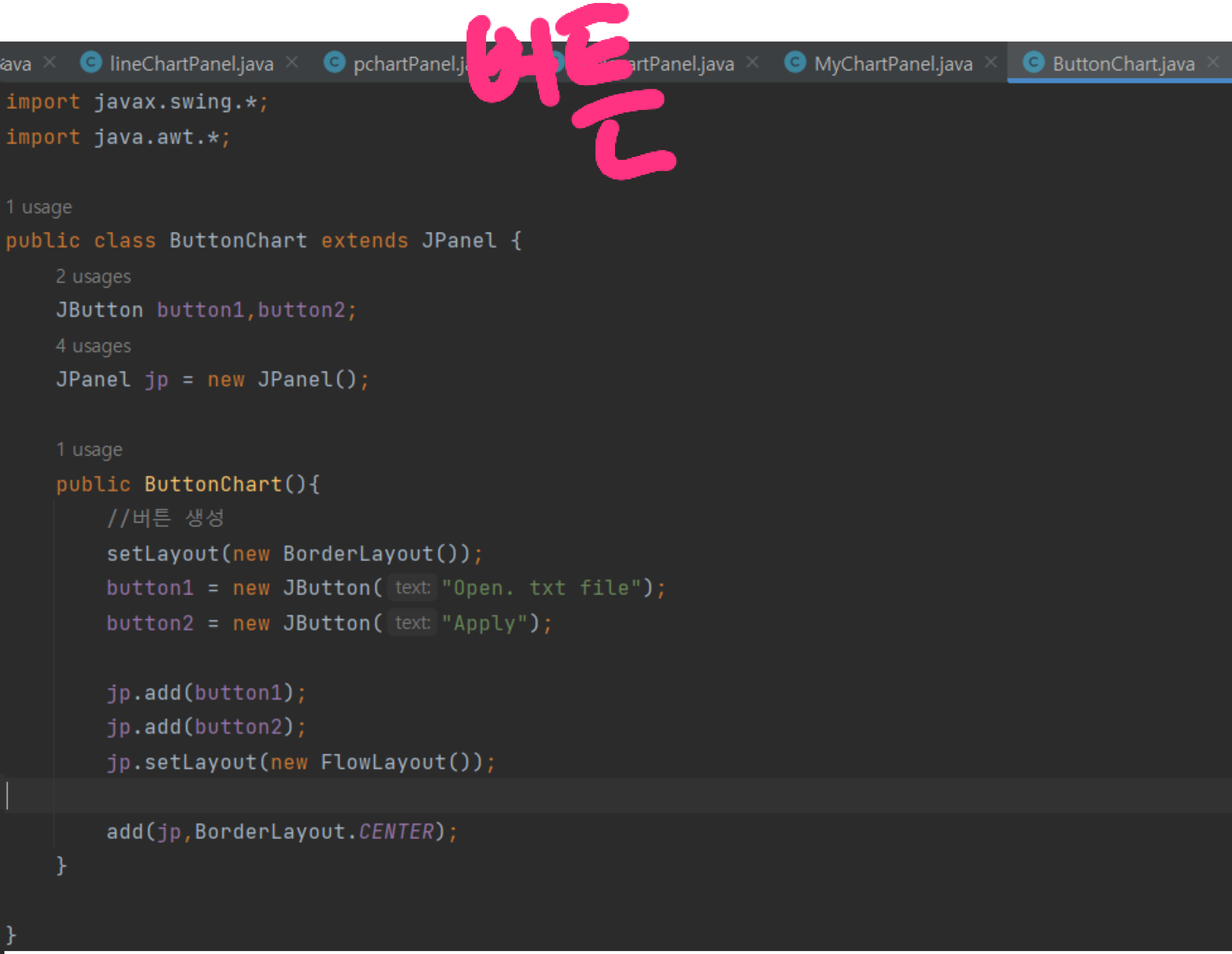
HW 나만의 차트 그리기

MAIN



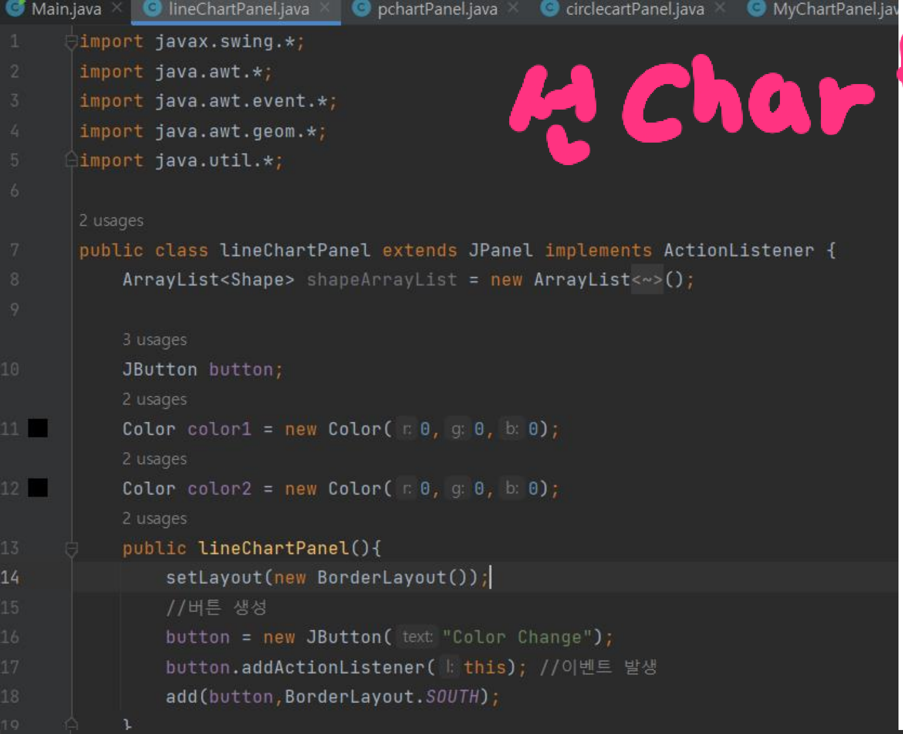
```
import javax.swing.*;
import java.awt.*;

1 usage
public class Main extends JFrame {
    1 usage
    public Main() {
        setTitle("JHJ 선형 Chart");
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        JPanel panel = new JPanel();
        panel.setLayout(new GridLayout( rows: 2, cols: 3)); //가로 2줄, 세로 3줄로 layout을 만듦
        JPanel panel1 = new lineChartPanel();
        panel.add(panel1);
        JPanel panel2 = new pchartPanel();
        panel.add(panel2);
        JPanel panel3 = new circlecartPanel();
        panel.add(panel3);
        JPanel panel4 = new MyChartPanel();
        panel.add(panel4);
        JPanel panel5 = new ButtonChart();
        panel.add(panel5);
        add(panel);
        setSize( width: 1500,  height: 1000);
        setVisible(true);
    }

    public static void main(String[] args) {

        new Main();
    }
```

버튼

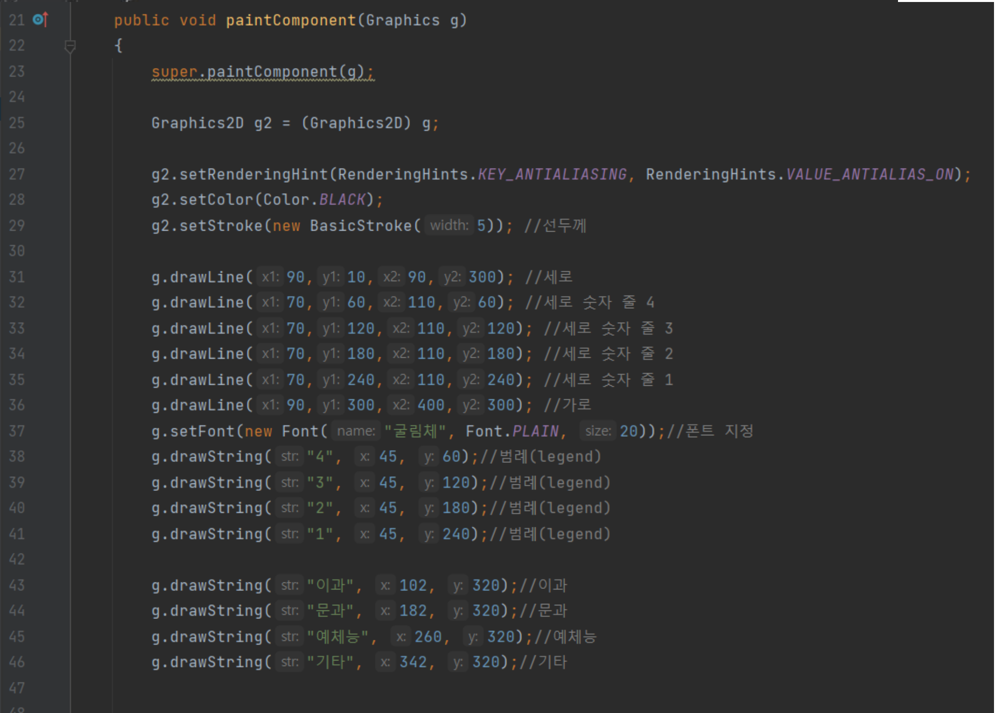


```
import javax.swing.*;
import java.awt.*;

1 usage
public class ButtonChart extends JPanel {
    2 usages
    JButton button1,button2;
    4 usages
    JPanel jp = new JPanel();

    1 usage
    public ButtonChart(){
        //버튼 생성
        setLayout(new BorderLayout());
        button1 = new JButton( text: "Open. txt file");
        button2 = new JButton( text: "Apply");

        jp.add(button1);
        jp.add(button2);
        jp.setLayout(new FlowLayout());

        add(jp,BorderLayout.CENTER);
    }

}
```

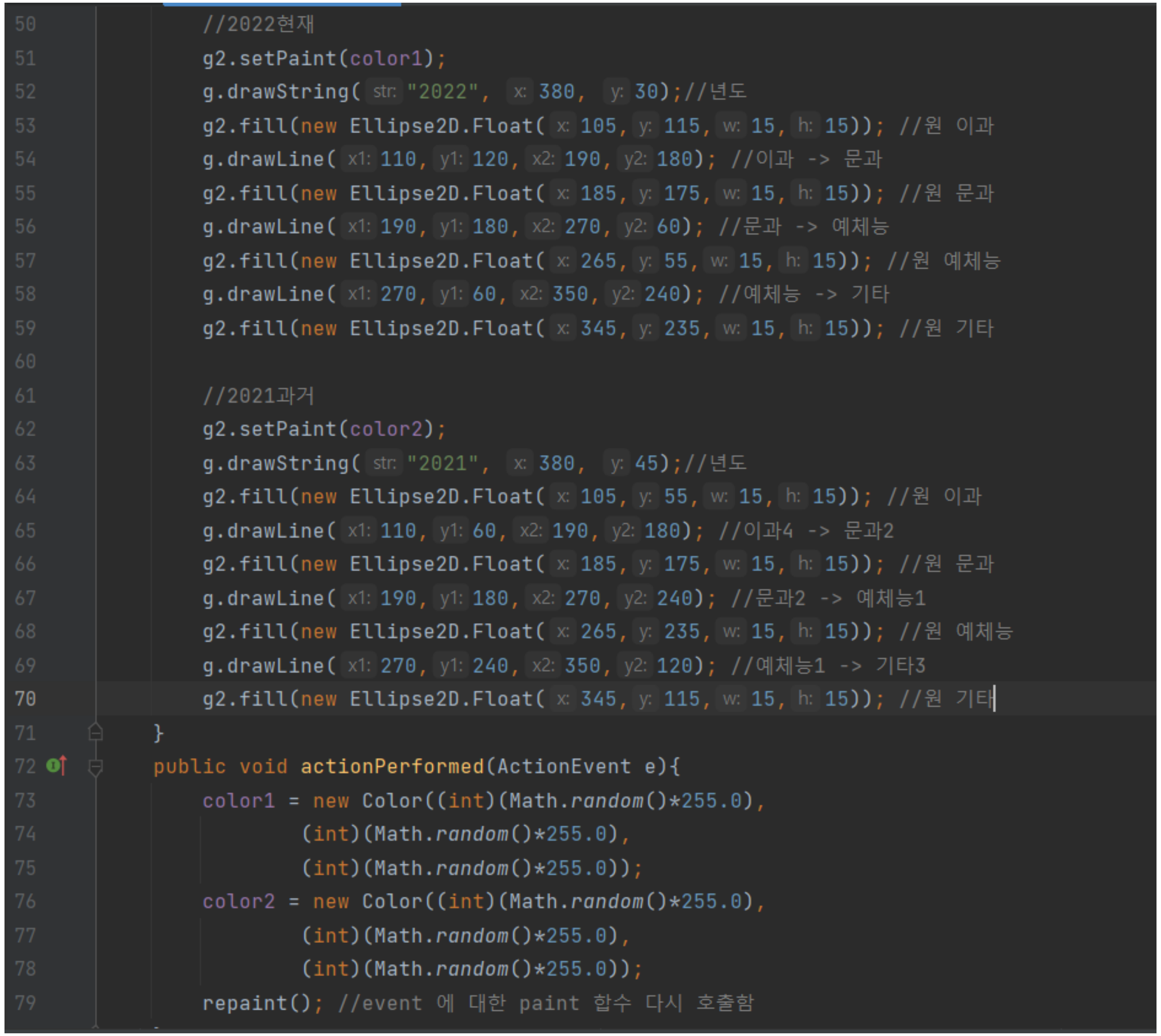
선 Chart



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

2 usages
public class lineChartPanel extends JPanel implements ActionListener {
    ArrayList<Shape> shapeArrayList = new ArrayList<~>();

    3 usages
    JButton button;
    2 usages
    Color color1 = new Color( r: 0, g: 0, b: 0);
    2 usages
    Color color2 = new Color( r: 0, g: 0, b: 0);
    2 usages
    public lineChartPanel(){
        setLayout(new BorderLayout());
        //버튼 생성
        button = new JButton( text: "Color Change");
        button.addActionListener( l: this); //이벤트 발생
        add(button,BorderLayout.SOUTH);
    }
```

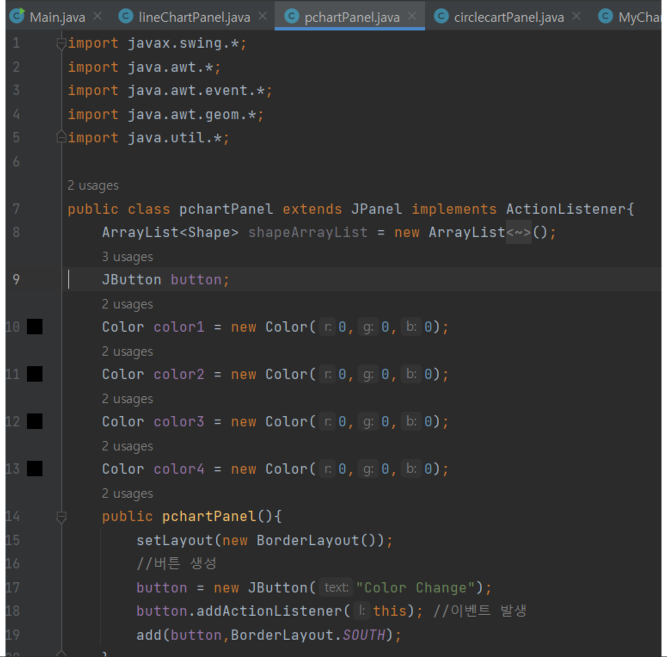


```java
    public void paintComponent(Graphics g)
    {
        super.paintComponent(g);

        Graphics2D g2 = (Graphics2D) g;

        g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING, RenderingHints.VALUE_ANTIALIAS_ON);
        g2.setColor(Color.BLACK);
        g2.setStroke(new BasicStroke( width: 5)); //선두께

        g.drawLine( x1: 90, y1: 10, x2: 90, y2: 300); //세로
        g.drawLine( x1: 70, y1: 60, x2: 110, y2: 60); //세로 숫자 줄 4
        g.drawLine( x1: 70, y1: 120, x2: 110, y2: 120); //세로 숫자 줄 3
        g.drawLine( x1: 70, y1: 180, x2: 110, y2: 180); //세로 숫자 줄 2
        g.drawLine( x1: 70, y1: 240, x2: 110, y2: 240); //세로 숫자 줄 1
        g.drawLine( x1: 90, y1: 300, x2: 400, y2: 300); //가로
        g.setFont(new Font( name: "굴림체", Font.PLAIN, size: 20));//폰트 지정
        g.drawString( str: "4", x: 45, y: 60);//범례(legend)
        g.drawString( str: "3", x: 45, y: 120);//범례(legend)
        g.drawString( str: "2", x: 45, y: 180);//범례(legend)
        g.drawString( str: "1", x: 45, y: 240);//범례(legend)

        g.drawString( str: "이과", x: 102, y: 320);//이과
        g.drawString( str: "문과", x: 182, y: 320);//문과
        g.drawString( str: "예체능", x: 260, y: 320);//예체능
        g.drawString( str: "기타", x: 342, y: 320);//기타

```



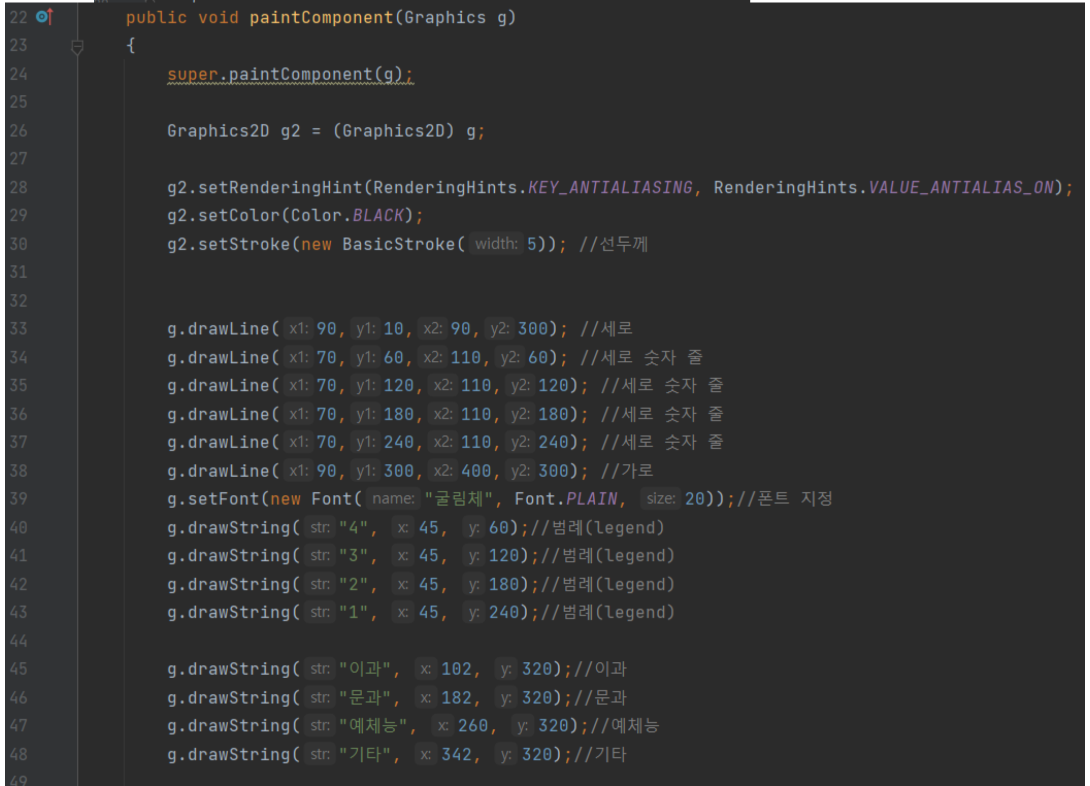
```java
        //2022현재
        g2.setPaint(color1);
        g.drawString( str: "2022", x: 380, y: 30);//년도
        g2.fill(new Ellipse2D.Float( x: 105, y: 115, w: 15, h: 15)); //원 이과
        g.drawLine( x1: 110, y1: 120, x2: 190, y2: 180); //이과 -> 문과
        g2.fill(new Ellipse2D.Float( x: 185, y: 175, w: 15, h: 15)); //원 문과
        g.drawLine( x1: 190, y1: 180, x2: 270, y2: 60); //문과 -> 예체능
        g2.fill(new Ellipse2D.Float( x: 265, y: 55, w: 15, h: 15)); //원 예체능
        g.drawLine( x1: 270, y1: 60, x2: 350, y2: 240); //예체능 -> 기타
        g2.fill(new Ellipse2D.Float( x: 345, y: 235, w: 15, h: 15)); //원 기타

        //2021과거
        g2.setPaint(color2);
        g.drawString( str: "2021", x: 380, y: 45);//년도
        g2.fill(new Ellipse2D.Float( x: 105, y: 55, w: 15, h: 15)); //원 이과
        g.drawLine( x1: 110, y1: 60, x2: 190, y2: 180); //이과4 -> 문과2
        g2.fill(new Ellipse2D.Float( x: 185, y: 175, w: 15, h: 15)); //원 문과
        g.drawLine( x1: 190, y1: 180, x2: 270, y2: 240); //문과2 -> 예체능1
        g2.fill(new Ellipse2D.Float( x: 265, y: 235, w: 15, h: 15)); //원 예체능
        g.drawLine( x1: 270, y1: 240, x2: 350, y2: 120); //예체능1 -> 기타3
        g2.fill(new Ellipse2D.Float( x: 345, y: 115, w: 15, h: 15)); //원 기타
    }
    public void actionPerformed(ActionEvent e){
        color1 = new Color((int)(Math.random()*255.0),
                (int)(Math.random()*255.0),
                (int)(Math.random()*255.0));
        color2 = new Color((int)(Math.random()*255.0),
                (int)(Math.random()*255.0),
                (int)(Math.random()*255.0));
        repaint(); //event 에 대한 paint 함수 다시 호출함
```

막대

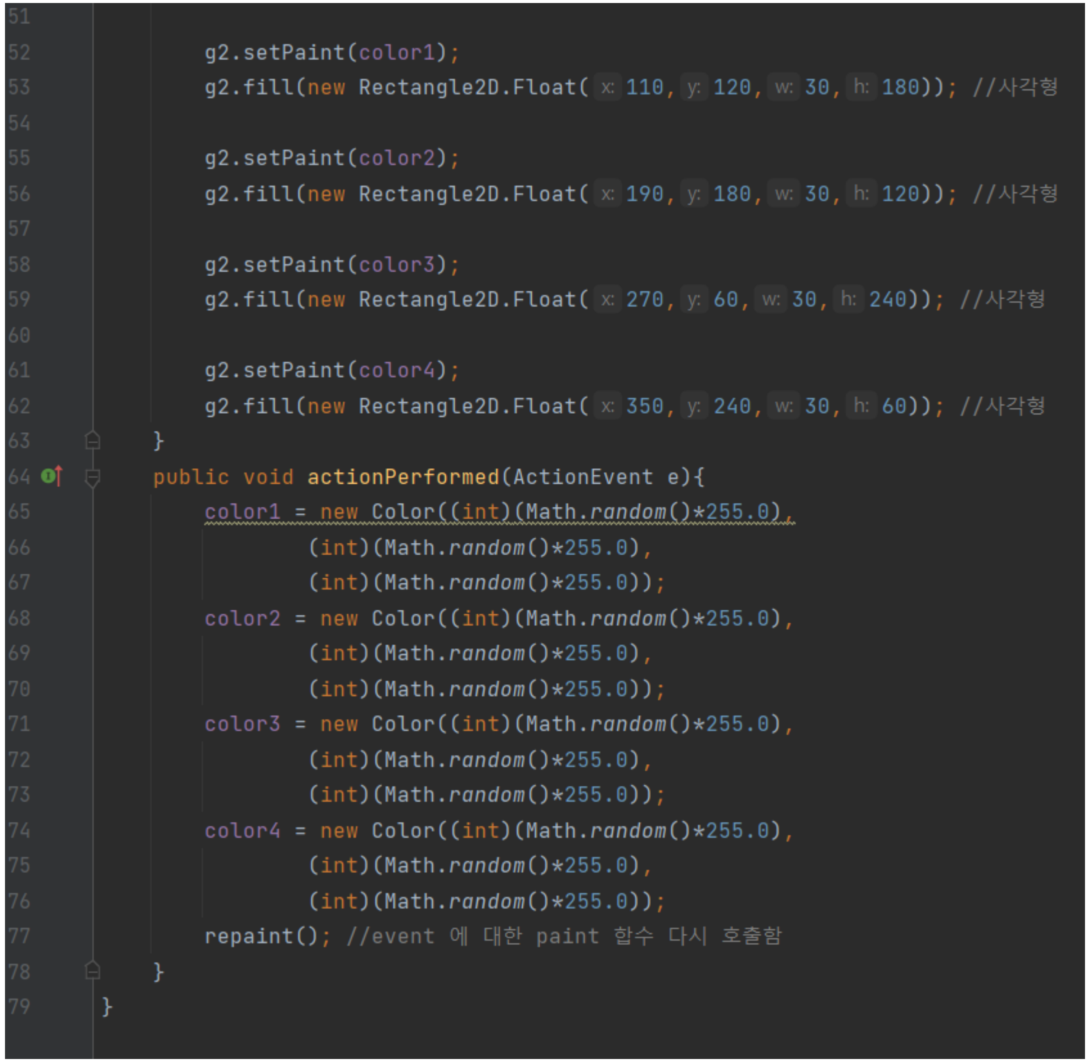


Main.java × lineChartPanel.java × pchartPanel.java × circlecartPanel.java × MyChar

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

2 usages
public class pchartPanel extends JPanel implements ActionListener{
    ArrayList<Shape> shapeArrayList = new ArrayList<~>();
    3 usages
    JButton button;
    2 usages
    Color color1 = new Color( r: 0, g: 0, b: 0);
    2 usages
    Color color2 = new Color( r: 0, g: 0, b: 0);
    2 usages
    Color color3 = new Color( r: 0, g: 0, b: 0);
    2 usages
    Color color4 = new Color( r: 0, g: 0, b: 0);
    2 usages
    public pchartPanel(){
        setLayout(new BorderLayout());
        //버튼 생성
        button = new JButton( text: "Color Change");
        button.addActionListener( l: this); //이벤트 발생
        add(button,BorderLayout.SOUTH);
```

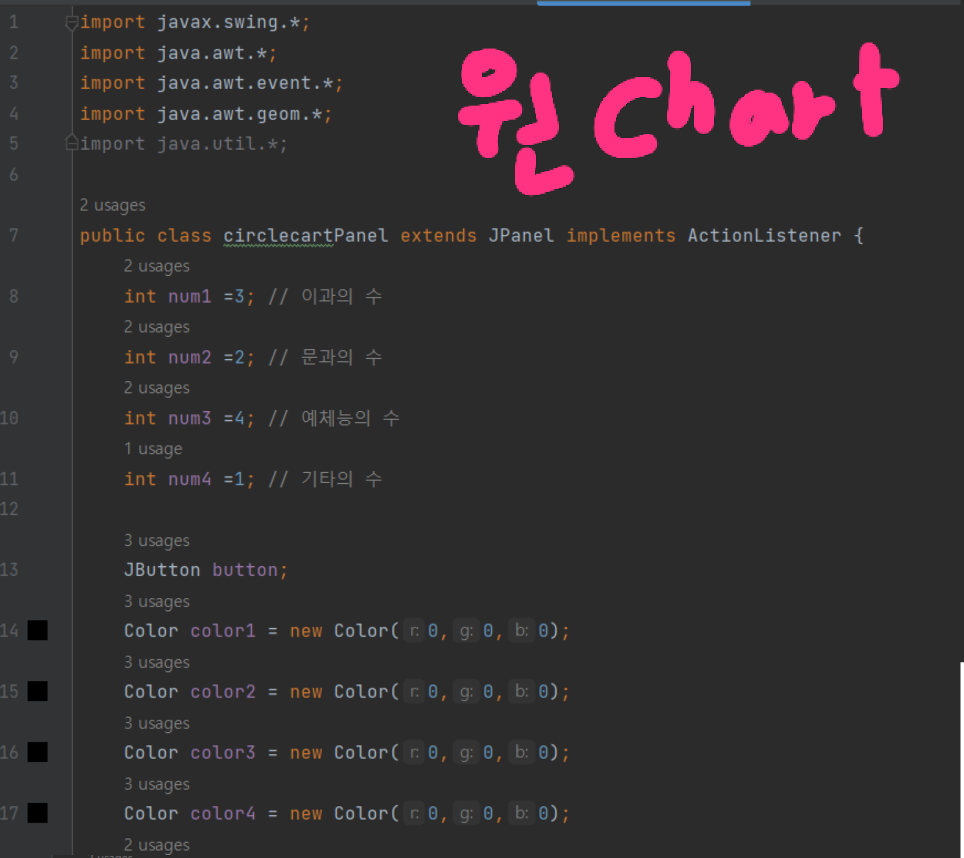


```java
    public void paintComponent(Graphics g)
    {
        super.paintComponent(g);

        Graphics2D g2 = (Graphics2D) g;

        g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING, RenderingHints.VALUE_ANTIALIAS_ON);
        g2.setColor(Color.BLACK);
        g2.setStroke(new BasicStroke( width: 5)); //선두께


        g.drawLine( x1: 90, y1: 10, x2: 90, y2: 300); //세로
        g.drawLine( x1: 70, y1: 60, x2: 110, y2: 60); //세로 숫자 줄
        g.drawLine( x1: 70, y1: 120, x2: 110, y2: 120); //세로 숫자 줄
        g.drawLine( x1: 70, y1: 180, x2: 110, y2: 180); //세로 숫자 줄
        g.drawLine( x1: 70, y1: 240, x2: 110, y2: 240); //세로 숫자 줄
        g.drawLine( x1: 90, y1: 300, x2: 400, y2: 300); //가로
        g.setFont(new Font( name: "굴림체", Font.PLAIN,  size: 20));//폰트 지정
        g.drawString( str: "4",  x: 45,  y: 60);//범례(legend)
        g.drawString( str: "3",  x: 45,  y: 120);//범례(legend)
        g.drawString( str: "2",  x: 45,  y: 180);//범례(legend)
        g.drawString( str: "1",  x: 45,  y: 240);//범례(legend)

        g.drawString( str: "이과",  x: 102,  y: 320);//이과
        g.drawString( str: "문과",  x: 182,  y: 320);//문과
        g.drawString( str: "예체능",  x: 260,  y: 320);//예체능
        g.drawString( str: "기타",  x: 342,  y: 320);//기타
```

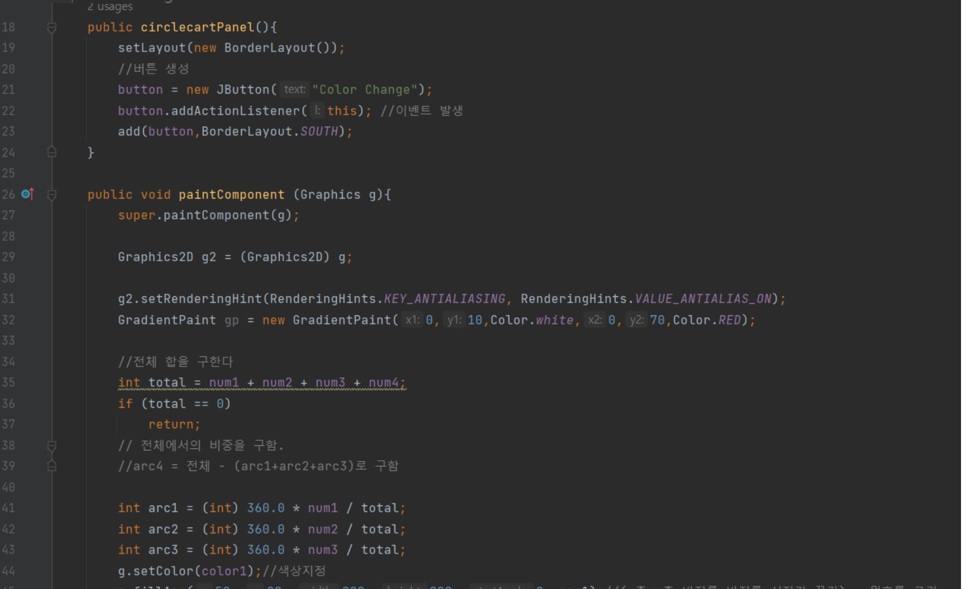


```java

            g2.setPaint(color1);
            g2.fill(new Rectangle2D.Float( x: 110, y: 120, w: 30, h: 180)); //사각형

            g2.setPaint(color2);
            g2.fill(new Rectangle2D.Float( x: 190, y: 180, w: 30, h: 120)); //사각형

            g2.setPaint(color3);
            g2.fill(new Rectangle2D.Float( x: 270, y: 60, w: 30, h: 240)); //사각형

            g2.setPaint(color4);
            g2.fill(new Rectangle2D.Float( x: 350, y: 240, w: 30, h: 60)); //사각형
        }
        public void actionPerformed(ActionEvent e){
            color1 = new Color((int)(Math.random()*255.0),
                    (int)(Math.random()*255.0),
                    (int)(Math.random()*255.0));
            color2 = new Color((int)(Math.random()*255.0),
                    (int)(Math.random()*255.0),
                    (int)(Math.random()*255.0));
            color3 = new Color((int)(Math.random()*255.0),
                    (int)(Math.random()*255.0),
                    (int)(Math.random()*255.0));
            color4 = new Color((int)(Math.random()*255.0),
                    (int)(Math.random()*255.0),
                    (int)(Math.random()*255.0));
            repaint(); //event 에 대한 paint 함수 다시 호출함
        }
    }
```

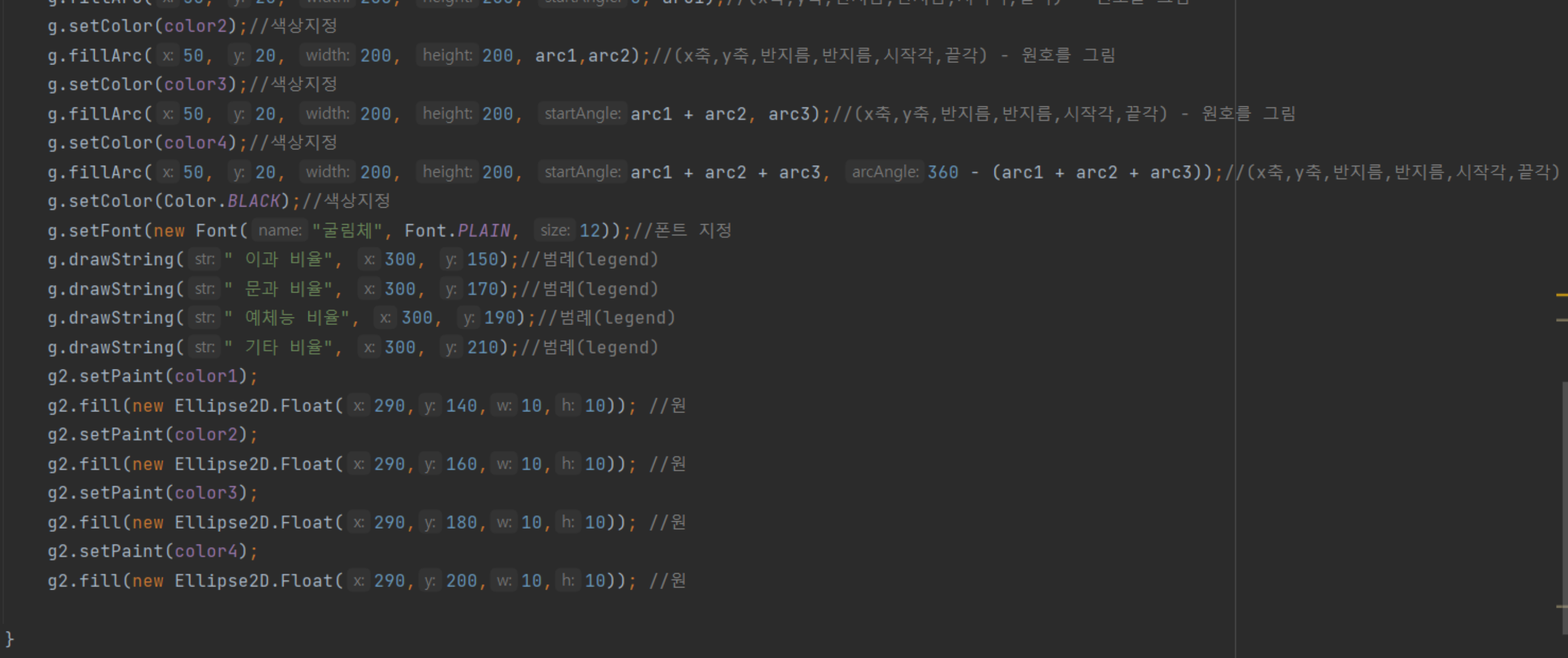
원 Chart



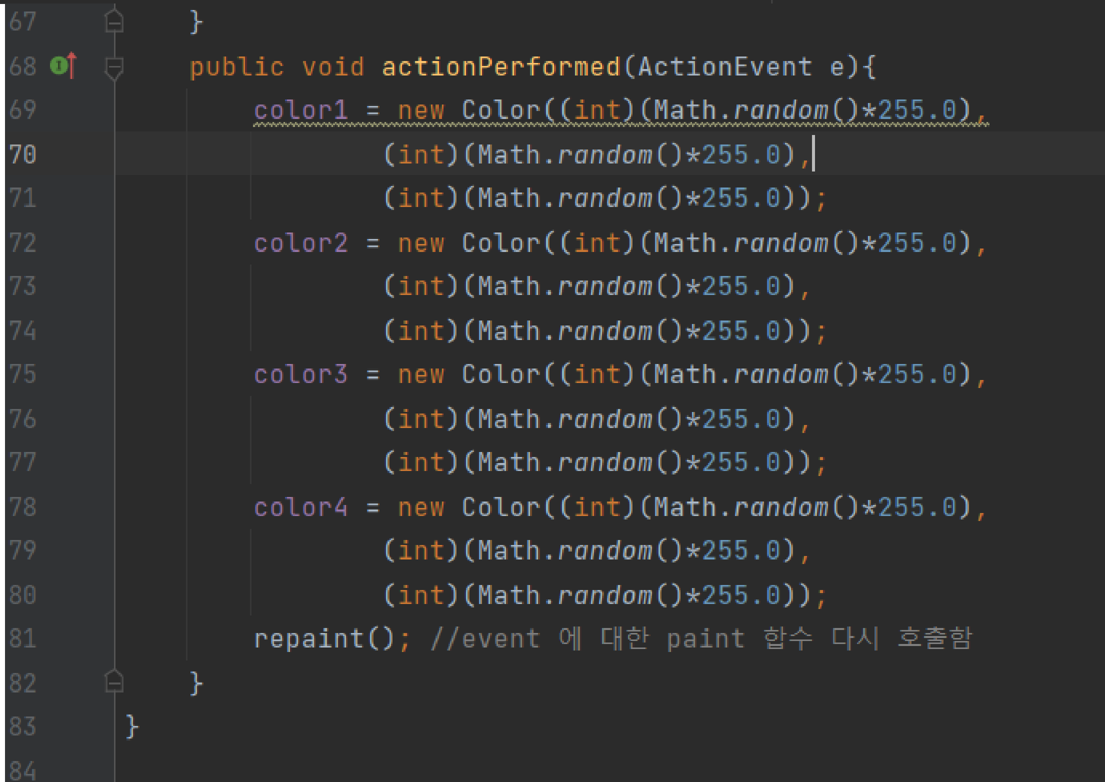
```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
import java.awt.geom.*;
import java.util.*;

2 usages
public class circlecartPanel extends JPanel implements ActionListener {
    2 usages
    int num1 =3; // 이과의 수
    2 usages
    int num2 =2; // 문과의 수
    2 usages
    int num3 =4; // 예체능의 수
    1 usage
    int num4 =1; // 기타의 수

    3 usages
    JButton button;
    3 usages
    Color color1 = new Color( r: 0, g: 0, b: 0);
    3 usages
    Color color2 = new Color( r: 0, g: 0, b: 0);
    3 usages
    Color color3 = new Color( r: 0, g: 0, b: 0);
    3 usages
    Color color4 = new Color( r: 0, g: 0, b: 0);
    2 usages
```



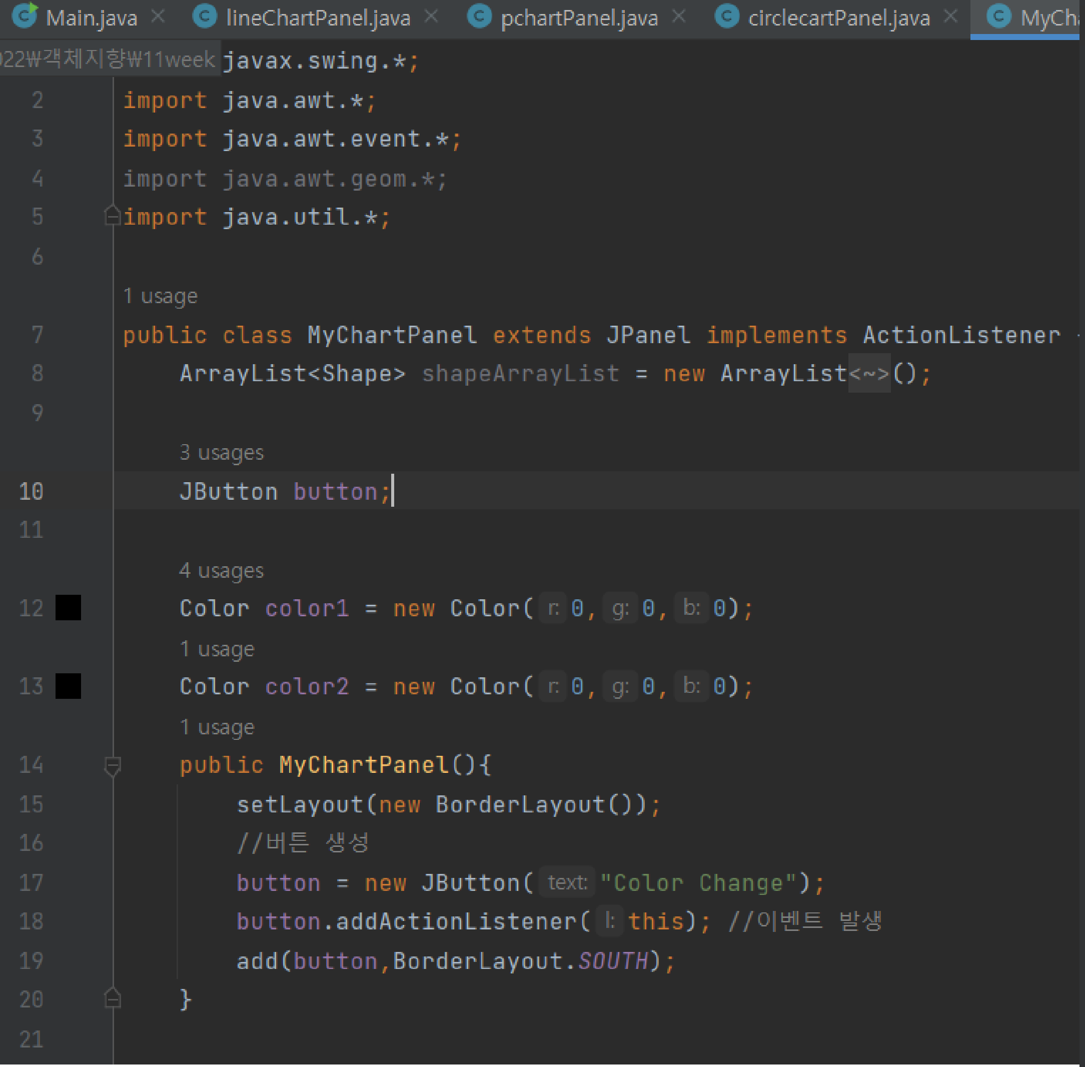
```
2 usages
public circlecartPanel(){
    setLayout(new BorderLayout());
    //버튼 생성
    button = new JButton( text: "Color Change");
    button.addActionListener( l: this); //이벤트 발생
    add(button,BorderLayout.SOUTH);
}

public void paintComponent (Graphics g){
    super.paintComponent(g);

    Graphics2D g2 = (Graphics2D) g;

    g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING, RenderingHints.VALUE_ANTIALIAS_ON);
    GradientPaint gp = new GradientPaint( x1: 0, y1: 10,Color.white, x2: 0, y2: 70,Color.RED);

    //전체 합을 구한다
    int total = num1 + num2 + num3 + num4;
    if (total == 0)
        return;
    // 전체에서의 비중을 구함.
    //arc4 = 전체 - (arc1+arc2+arc3)로 구함

    int arc1 = (int) 360.0 * num1 / total;
    int arc2 = (int) 360.0 * num2 / total;
    int arc3 = (int) 360.0 * num3 / total;
    g.setColor(color1);//색상지정
```



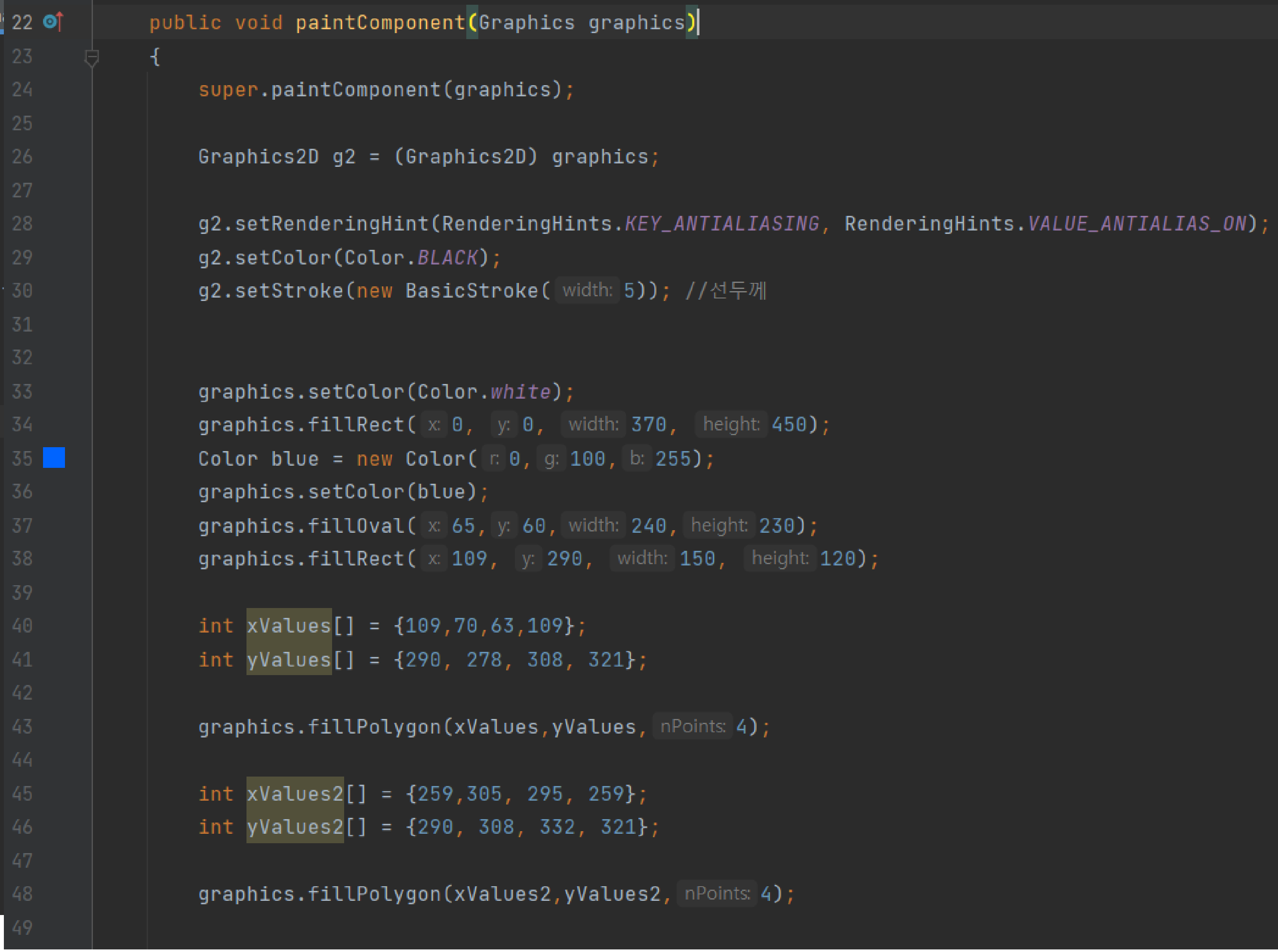
```
    g.setColor(color2);//색상지정
    g.fillArc( x: 50, y: 20, width: 200, height: 200, arc1,arc2);//(x축,y축,반지름,반지름,시작각,끝각) - 원호를 그림
    g.setColor(color3);//색상지정
    g.fillArc( x: 50, y: 20, width: 200, height: 200, startAngle: arc1 + arc2, arc3);//(x축,y축,반지름,반지름,시작각,끝각) - 원호를 그림
    g.setColor(color4);//색상지정
    g.fillArc( x: 50, y: 20, width: 200, height: 200, startAngle: arc1 + arc2 + arc3, arcAngle: 360 - (arc1 + arc2 + arc3));//(x축,y축,반지름,반지름,시작각,끝각)
    g.setColor(Color.BLACK);//색상지정
    g.setFont(new Font( name: "굴림체", Font.PLAIN, size: 12));//폰트 지정
    g.drawString( str: " 이과 비율", x: 300, y: 150);//범례(legend)
    g.drawString( str: " 문과 비율", x: 300, y: 170);//범례(legend)
    g.drawString( str: " 예체능 비율", x: 300, y: 190);//범례(legend)
    g.drawString( str: " 기타 비율", x: 300, y: 210);//범례(legend)
    g2.setPaint(color1);
    g2.fill(new Ellipse2D.Float( x: 290, y: 140, w: 10, h: 10)); //원
    g2.setPaint(color2);
    g2.fill(new Ellipse2D.Float( x: 290, y: 160, w: 10, h: 10)); //원
    g2.setPaint(color3);
    g2.fill(new Ellipse2D.Float( x: 290, y: 180, w: 10, h: 10)); //원
    g2.setPaint(color4);
    g2.fill(new Ellipse2D.Float( x: 290, y: 200, w: 10, h: 10)); //원

}
```



```
    }
    public void actionPerformed(ActionEvent e){
        color1 = new Color((int)(Math.random()*255.0),
                (int)(Math.random()*255.0),
                (int)(Math.random()*255.0));
        color2 = new Color((int)(Math.random()*255.0),
                (int)(Math.random()*255.0),
                (int)(Math.random()*255.0));
        color3 = new Color((int)(Math.random()*255.0),
                (int)(Math.random()*255.0),
                (int)(Math.random()*255.0));
        color4 = new Color((int)(Math.random()*255.0),
                (int)(Math.random()*255.0),
                (int)(Math.random()*255.0));
        repaint(); //event 에 대한 paint 함수 다시 호출함
    }
}
```

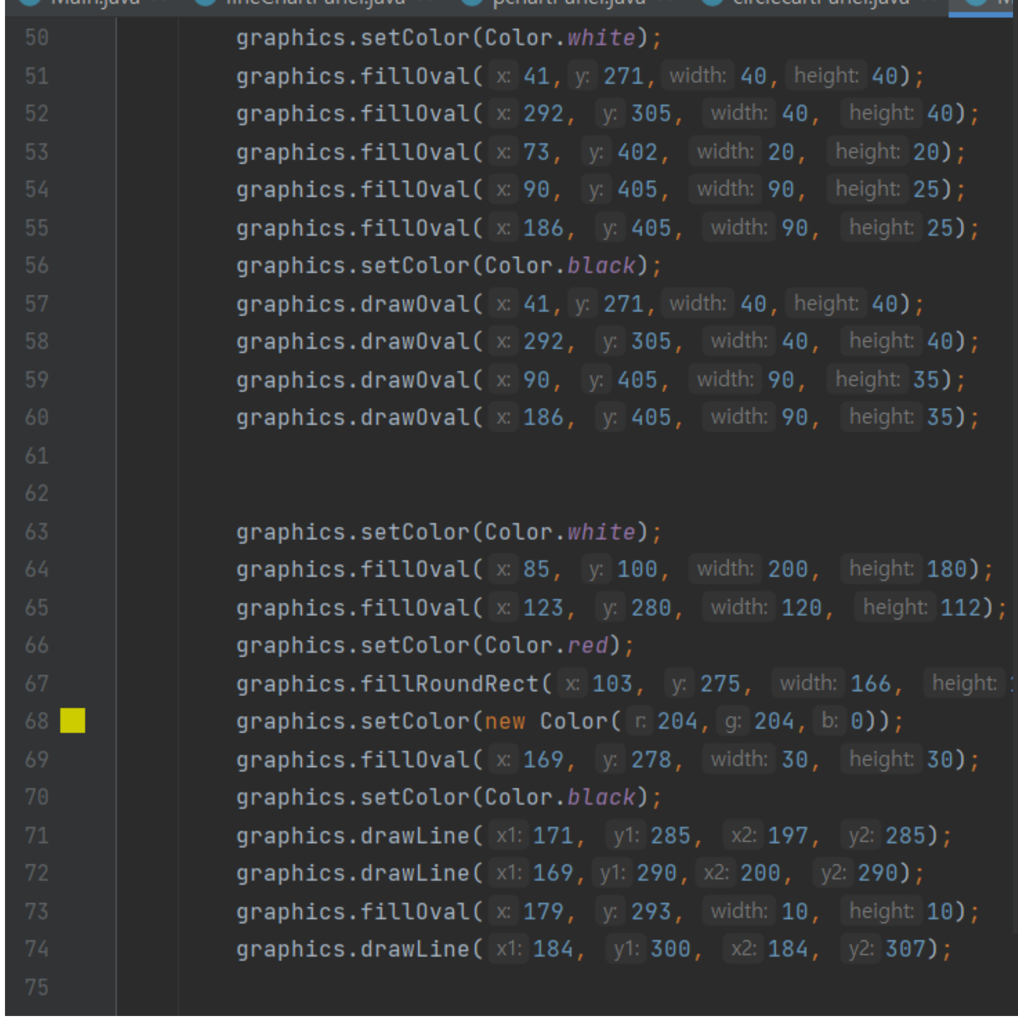


```java
javax.swing.*;
import java.awt.*;
import java.awt.event.*;
import java.awt.geom.*;
import java.util.*;

1 usage
public class MyChartPanel extends JPanel implements ActionListener
    ArrayList<Shape> shapeArrayList = new ArrayList<~>();

    3 usages
    JButton button;

    4 usages
    Color color1 = new Color( r: 0, g: 0, b: 0);
    1 usage
    Color color2 = new Color( r: 0, g: 0, b: 0);
    1 usage
    public MyChartPanel(){
        setLayout(new BorderLayout());
        //버튼 생성
        button = new JButton( text: "Color Change");
        button.addActionListener( l: this); //이벤트 발생
        add(button,BorderLayout.SOUTH);
    }
```

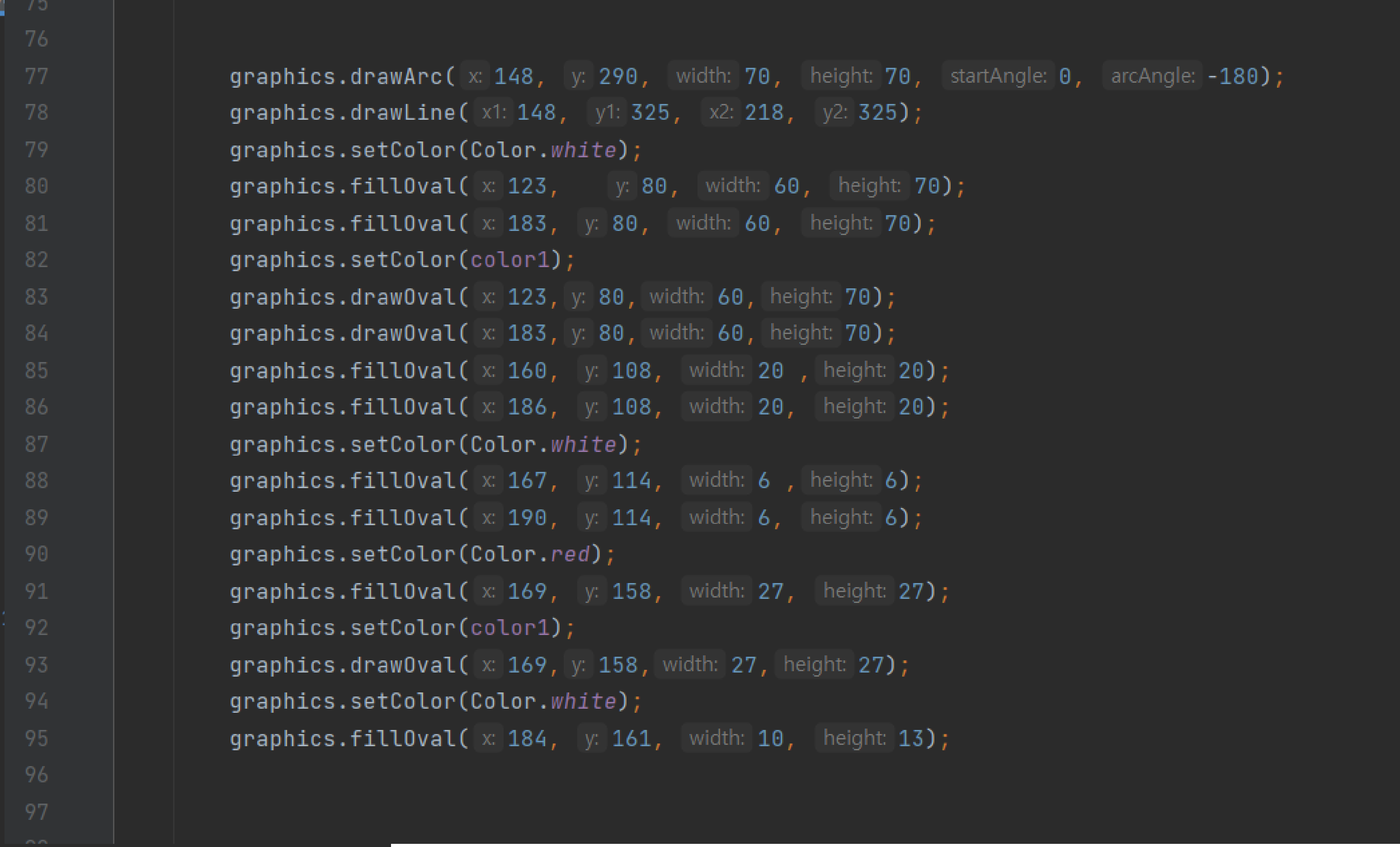


```java
    public void paintComponent(Graphics graphics)
    {
        super.paintComponent(graphics);

        Graphics2D g2 = (Graphics2D) graphics;

        g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING, RenderingHints.VALUE_ANTIALIAS_ON);
        g2.setColor(Color.BLACK);
        g2.setStroke(new BasicStroke( width: 5)); //선두께


        graphics.setColor(Color.white);
        graphics.fillRect( x: 0,  y: 0,  width: 370,  height: 450);
        Color blue = new Color( r: 0, g: 100, b: 255);
        graphics.setColor(blue);
        graphics.fillOval( x: 65, y: 60, width: 240, height: 230);
        graphics.fillRect( x: 109,  y: 290,  width: 150,  height: 120);

        int xValues[] = {109,70,63,109};
        int yValues[] = {290, 278, 308, 321};

        graphics.fillPolygon(xValues,yValues, nPoints: 4);

        int xValues2[] = {259,305, 295, 259};
        int yValues2[] = {290, 308, 332, 321};

        graphics.fillPolygon(xValues2,yValues2, nPoints: 4);
```

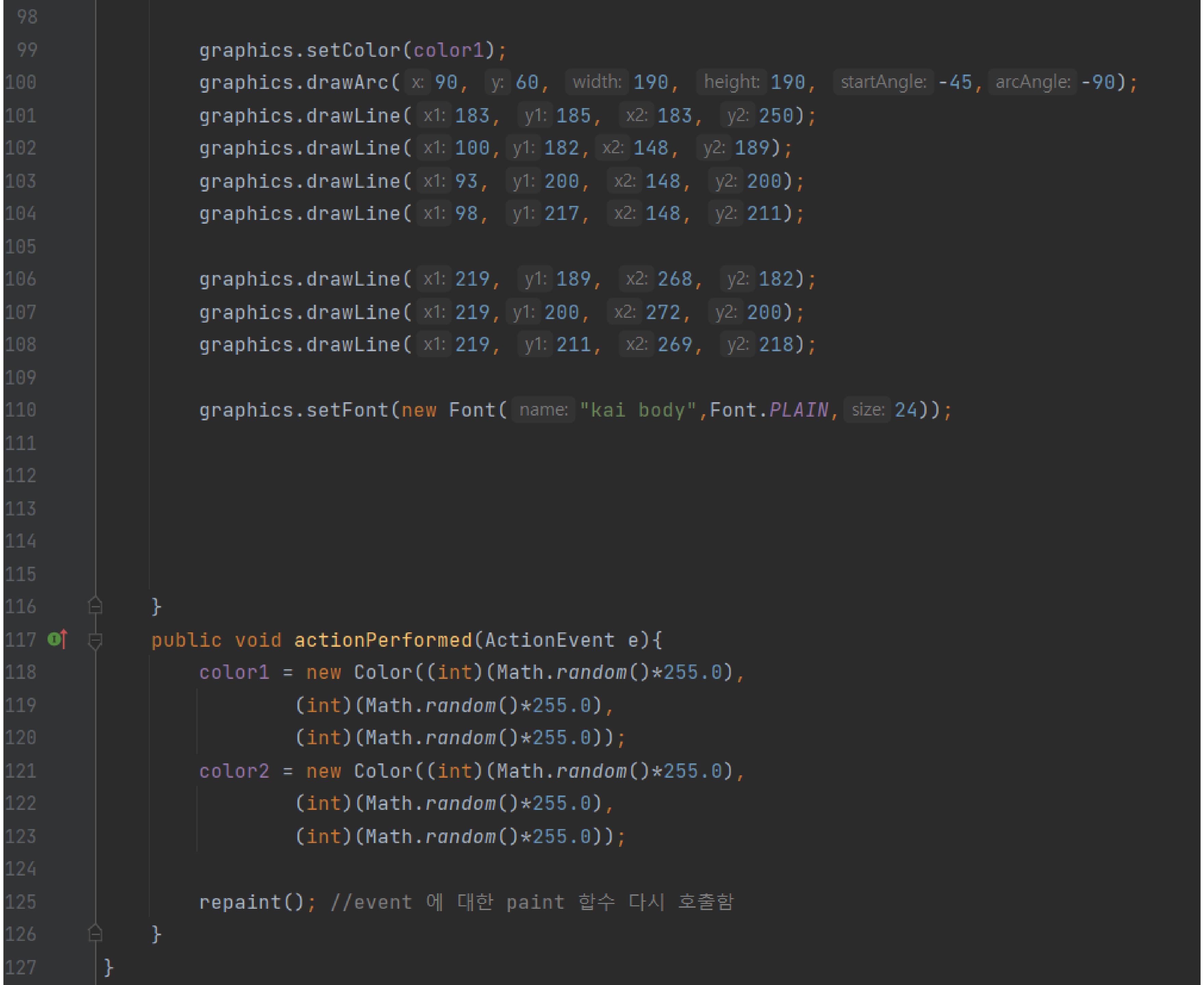
나만의 Chart



```
        graphics.setColor(Color.white);
        graphics.fillOval( x: 41, y: 271, width: 40, height: 40);
        graphics.fillOval( x: 292, y: 305, width: 40, height: 40);
        graphics.fillOval( x: 73, y: 402, width: 20, height: 20);
        graphics.fillOval( x: 90, y: 405, width: 90, height: 25);
        graphics.fillOval( x: 186, y: 405, width: 90, height: 25);
        graphics.setColor(Color.black);
        graphics.drawOval( x: 41, y: 271, width: 40, height: 40);
        graphics.drawOval( x: 292, y: 305, width: 40, height: 40);
        graphics.drawOval( x: 90, y: 405, width: 90, height: 35);
        graphics.drawOval( x: 186, y: 405, width: 90, height: 35);


        graphics.setColor(Color.white);
        graphics.fillOval( x: 85, y: 100, width: 200, height: 180);
        graphics.fillOval( x: 123, y: 280, width: 120, height: 112);
        graphics.setColor(Color.red);
        graphics.fillRoundRect( x: 103, y: 275, width: 166, height: 
        graphics.setColor(new Color( r: 204, g: 204, b: 0));
        graphics.fillOval( x: 169, y: 278, width: 30, height: 30);
        graphics.setColor(Color.black);
        graphics.drawLine( x1: 171, y1: 285, x2: 197, y2: 285);
        graphics.drawLine( x1: 169, y1: 290, x2: 200, y2: 290);
        graphics.fillOval( x: 179, y: 293, width: 10, height: 10);
        graphics.drawLine( x1: 184, y1: 300, x2: 184, y2: 307);

```

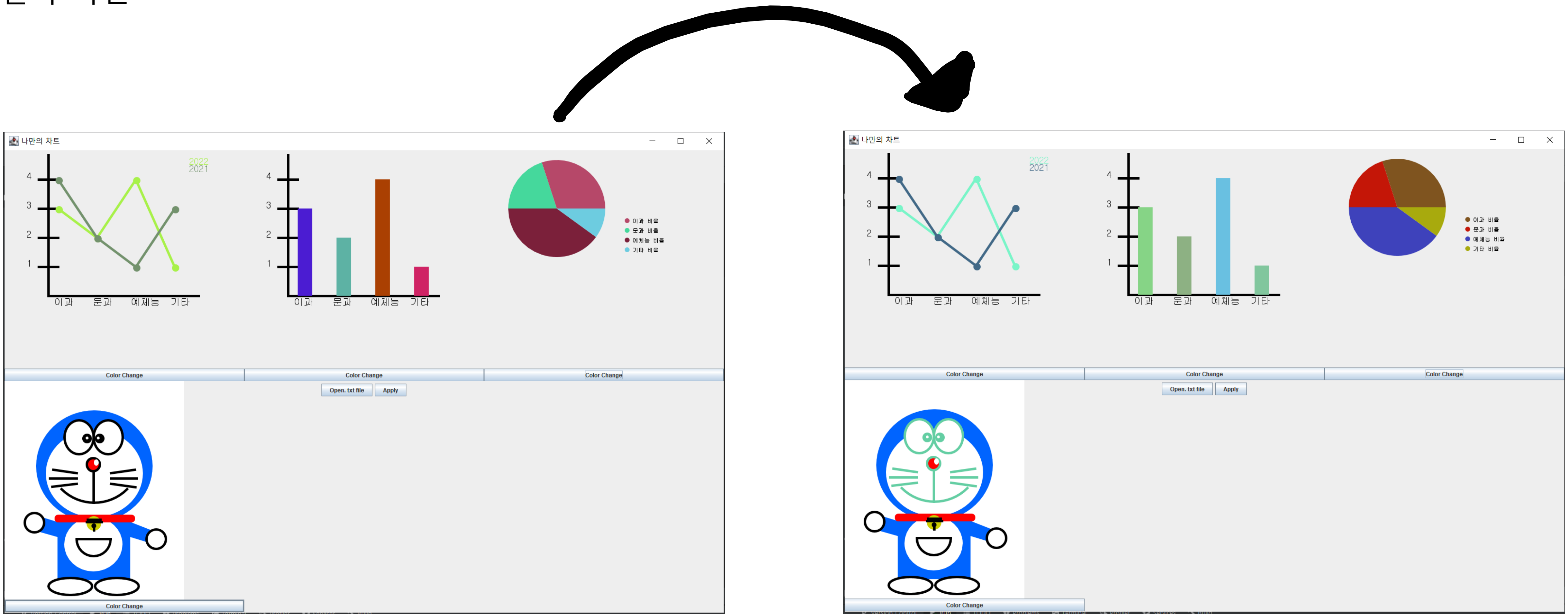


```

        graphics.drawArc( x: 148, y: 290, width: 70, height: 70, startAngle: 0, arcAngle: -180);
        graphics.drawLine( x1: 148, y1: 325, x2: 218, y2: 325);
        graphics.setColor(Color.white);
        graphics.fillOval( x: 123,     y: 80, width: 60, height: 70);
        graphics.fillOval( x: 183, y: 80, width: 60, height: 70);
        graphics.setColor(color1);
        graphics.drawOval( x: 123, y: 80, width: 60, height: 70);
        graphics.drawOval( x: 183, y: 80, width: 60, height: 70);
        graphics.fillOval( x: 160, y: 108, width: 20 , height: 20);
        graphics.fillOval( x: 186, y: 108, width: 20, height: 20);
        graphics.setColor(Color.white);
        graphics.fillOval( x: 167, y: 114, width: 6 , height: 6);
        graphics.fillOval( x: 190, y: 114, width: 6, height: 6);
        graphics.setColor(Color.red);
        graphics.fillOval( x: 169, y: 158, width: 27, height: 27);
        graphics.setColor(color1);
        graphics.drawOval( x: 169, y: 158, width: 27, height: 27);
        graphics.setColor(Color.white);
        graphics.fillOval( x: 184, y: 161, width: 10, height: 13);


```



```
        graphics.setColor(color1);
        graphics.drawArc( x: 90,  y: 60,  width: 190,  height: 190,  startAngle: -45, arcAngle: -90);
        graphics.drawLine( x1: 183,  y1: 185,  x2: 183,  y2: 250);
        graphics.drawLine( x1: 100, y1: 182, x2: 148,  y2: 189);
        graphics.drawLine( x1: 93,  y1: 200,  x2: 148,  y2: 200);
        graphics.drawLine( x1: 98,  y1: 217,  x2: 148,  y2: 211);

        graphics.drawLine( x1: 219,  y1: 189,  x2: 268,  y2: 182);
        graphics.drawLine( x1: 219, y1: 200,  x2: 272,  y2: 200);
        graphics.drawLine( x1: 219,  y1: 211,  x2: 269,  y2: 218);

        graphics.setFont(new Font( name: "kai body",Font.PLAIN, size: 24));






    }
    public void actionPerformed(ActionEvent e){
        color1 = new Color((int)(Math.random()*255.0),
                (int)(Math.random()*255.0),
                (int)(Math.random()*255.0));
        color2 = new Color((int)(Math.random()*255.0),
                (int)(Math.random()*255.0),
                (int)(Math.random()*255.0));

        repaint(); //event 에 대한 paint 함수 다시 호출함
    }
}
```

결과 화면


나만의 차트
2022
2021
4
3
2
1
이과
문과
예체능
기타
이과 비율
문과 비율
예체능 비율
기타 비율
Color Change
Color Change
Color Change
Open. txt file
Apply
Color Change
나만의 차트
2022
2021
4
3
2
1
이과
문과
예체능
기타
이과 비율
문과 비율
예체능 비율
기타 비율
Color Change
Color Change
Color Change
Open. txt file
Apply
Color Change