LAB 0410 Java

1. Pascal Triangle

Write a command line program (or JTextField-JButton program) that creates a two-dimensional matrix representing the Pascal triangle.

Input the size from the user, which is a integer between 1~15.

Output the triangle, all integers with 6 characters wide, right padded.

* Use Enhanced for statement for the array process.

Sample Input

9

Sample Output

```
                                                           1
                                                     1     1
                                               1     2     1
                                         1     3     3     1
                                   1     4     6     4     1
                             1     5    10    10     5     1
                       1     6    15    20    15     6     1
                 1     7    21    35    35    21     7     1
           1     8    28    56    70    56    28     8     1
     1     9    36    84   126   126    84    36     9     1
```

2. Turtle Graphics

Write a command line program (or JTextField-JButton program) for Turtle Graphics. The turtle holds a pen, and draws as it moves. Use a 10x10 array for the map. It starts at position (5, 5) and faces upward. Read commands and control the turtle:

“left”	Turn left 90 degrees
“right”	Turn right 90 degrees
“move 5”	Move forward 5 steps
“quit”	Quit

Print “<” or “>” or “^” or “v” for the turtle. (left/right/up/down)

Print “.” for empty box, “#” for filled box.

Print a space “ ” between columns.

* Use Enhanced for statement for the array process.

Sample Input & Output

```
start
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . ^ . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
move 3
. . . . . . . . . .
. . . . . . . . . .
. . . . . ^ . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
left
. . . . . . . . . .
. . . . . . . . . .
. . . . . < . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
move 4
. . . . . . . . . .
. . . . . . . . . .
. < # # # # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
```

```
right
. . . . . . . . . .
. . . . . . . . . .
. ^ # # # # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
move 2
. ^ . . . . . . . .
. # . . . . . . . .
. # # # # # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
right
. > . . . . . . . .
. # . . . . . . . .
. # # # # # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
move 3
. # # # > . . . . .
. # . . . . . . . .
. # # # # # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
```

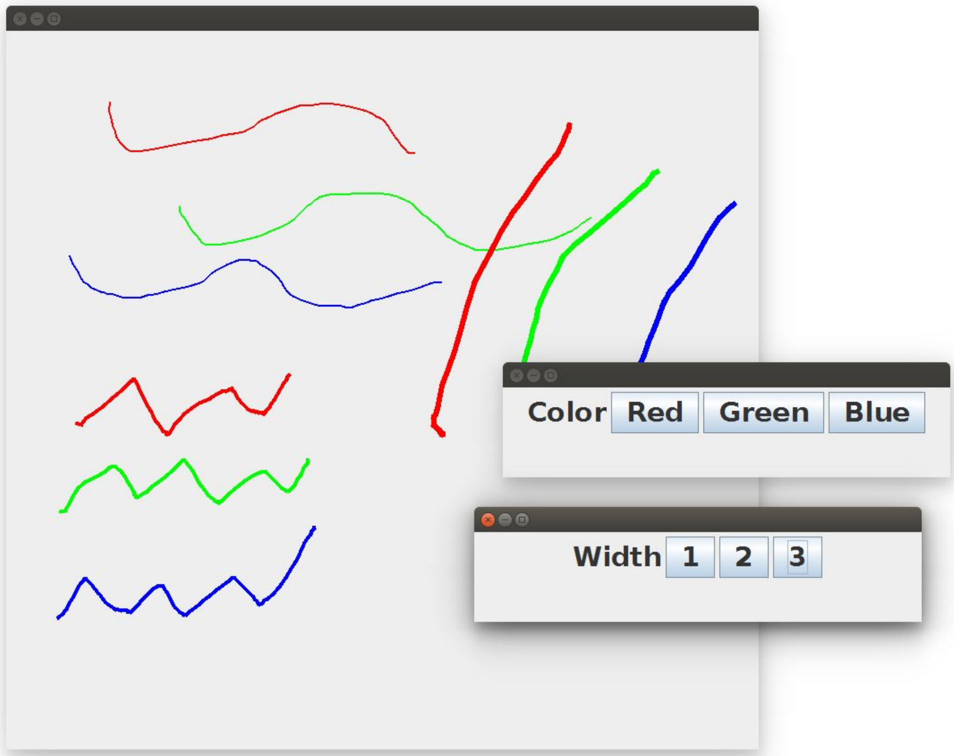
```
right
. # # # v . . . . .
. # . . . . . . . .
. # # # # # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . # . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
. . . . . . . . . .
move 7
. # # # # . . . . .
. # . . # . . . . .
. # # # # # . . . .
. . . . # # . . . .
. . . . # # . . . .
. . . . # # . . . .
. . . . # . . . . .
. . . . v . . . . .
. . . . . . . . . .
. . . . . . . . . .
left
. # # # # . . . . .
. # . . # . . . . .
. # # # # # . . . .
. . . . # # . . . .
. . . . # # . . . .
. . . . # # . . . .
. . . . # . . . . .
. . . . > . . . . .
. . . . . . . . . .
. . . . . . . . . .
move 3
. # # # # . . . . .
. # . . # . . . . .
. # # # # # . . . .
. . . . # # . . . .
. . . . # # . . . .
. . . . # # . . . .
. . . . # . . . . .
. . . . # # # > . .
. . . . . . . . . .
. . . . . . . . . .
```

3. Painting

Write a JFrame-JPanel program for painting. Drag the mouse left-button to paint on the panel. Create 3 JFrames:

- JFrame-1 contains a JPanel for painting. (size = 800x800)
- JFrame-2 contains a JLabel "Color" and 3 JButtons "Red", "Green", "Blue" to set color. (font-size = 30)
- JFrame-3 contains a JLabel "Width" and 3 JButtons "1", "2", "3" to set line-width. (font-size = 30)

Sample Output



Note

** Code given at the end of file **

MouseListener & MouseMotionListener functions

```
public void mousePressed(MouseEvent event) { … }
public void mouseReleased(MouseEvent event) { … }
public void mouseDragged(MouseEvent event) { … }
public void mouseClicked(MouseEvent event) { … }
public void mouseEntered(MouseEvent event) { … }
public void mouseExited(MouseEvent event) { … }
public void mouseMoved(MouseEvent event) { … }
```

Check mouse left-button/right-button

```
if (SwingUtilities.isLeftMouseButton(event)) …
if (SwingUtilities.isRightMouseButton(event)) …
```

Get mouse (x,y)

```
x = event.getX();
y = event.getY();
```

Set color and line-width

```
Graphics g = getGraphics();
Graphics2D g2 = (Graphics2D)g;
g2.setColor(color);
g2.setStroke(new BasicStroke(width));
g2.draw…
```

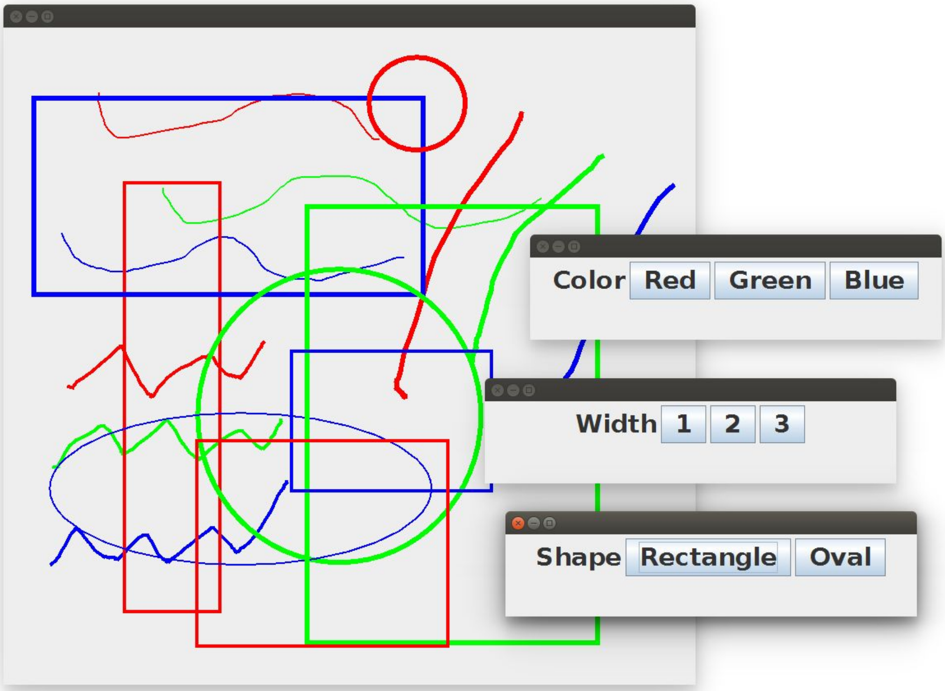
4. Painting (continued)

Please modify your code in problem 3, when you right-click on 2 points, draw a rectangle or oval surrounded by the 2 points.

Create a new JFrame:

- JFrame-4 contains a JLabel “Shape” and 2 JButtons “Rectangle”, “Oval” to set shape. (font-size = 30)

Sample Output



Code for Problem 3 & 4

Main.java

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

public class Main {
       public static void main(String[] args) {

             MyPanel panel = new MyPanel();

             JFrame frame1 = new JFrame();
             JFrame frame2 = new JFrame();
             // ...

             JButton button1 = new JButton("Red");
             JButton button2 = new JButton("Green");
             // ...

             JLabel label1 = new JLabel("Color");
             // ...

             button1.setFont(new Font("Arial",Font.BOLD,30));
             button2.setFont(new Font("Arial",Font.BOLD,30));
             label1.setFont(new Font("Arial",Font.BOLD,30));
             // ...

             button1.addActionListener((e)->{ panel.setColor(Color.RED); });
             button2.addActionListener((e)->{ panel.setColor(Color.GREEN); });
             // ...

             frame2.setLayout(new FlowLayout());
             // ...

             frame1.add(panel);
             frame2.add(label1);
             frame2.add(button1);
             frame2.add(button2);
             // ...

             frame1.pack();
             frame2.pack();
             // ...

             frame1.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
             frame2.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
             // ...
```

```
                frame1.setSize(800, 800);
                frame2.setSize(500, 100);
                // ...

                frame1.setVisible(true);
                frame2.setVisible(true);
                // ...
        }
}
```

MyPanel.java

```
// MyPanel.java
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
import java.util.*;

public class MyPanel extends JPanel
        implements MouseListener, MouseMotionListener {

        Color color;
        // ...

        public MyPanel() {
                addMouseListener(this);
                addMouseMotionListener(this);
                // ...
        }

        public void mousePressed(MouseEvent event) {
                System.out.println("mousePressed");
                // ...
        }

        public void mouseReleased(MouseEvent event) {
                System.out.println("mouseReleased");
                // ...
        }

        public void mouseDragged(MouseEvent event) {
                System.out.println("mouseDragged");
                // ...
        }

        public void mouseClicked(MouseEvent event) {
                System.out.println("mouseClicked");
                // ...
        }

        public void mouseEntered(MouseEvent event) {
                System.out.println("mouseEntered");
```

```
            // ...
      }

      public void mouseExited(MouseEvent event) {
            System.out.println("mouseExited");
            // ...
      }

      public void mouseMoved(MouseEvent event) {
            System.out.println("mouseMoved");
            // ...
      }

      public void setColor(Color c) {
            System.out.println("setColor");
            // ...
      }

}
```