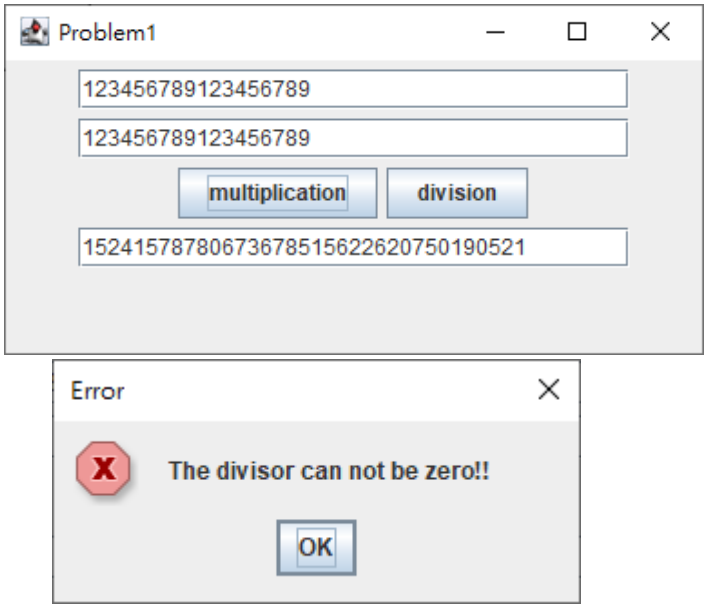
1. Big Integer

This problem extends from HW3 Problem 5. Write a Java application program that contains three text fields and two buttons labeled "multiplication", "division" with following requirements.

1) Two text fields get two BigInteger numbers from the user. One text field displays the result.
2) If the divisor is zero, then show an error message by using JOptionPane.
3) Please put main program and other programs in different files.

Sample Output



2. Uppercase and Lowercase

This problem extends from HW3 Problem3. Write a Java application program that contains a text field and three buttons labeled "uppercase", "lowercase", "swapcase" with following requirements.

1) uppercase: Convert all characters to uppercase.
2) lowercase: Convert all characters to lowercase.
3) swapcase: Swap uppercase and lowercase.
4) Please put main program and other programs in different files.

Hint:

Class: java.lang.Character

static boolean isLetter(char ch)

static boolean isLowerCase(char ch)

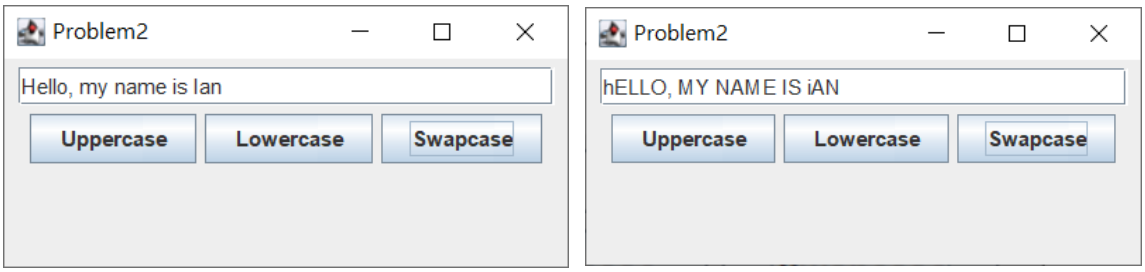
static boolean isUpperCase(char ch)

static boolean toLowerCase(char ch)

static boolean toUpperCase(char ch)

Ex: Character.isLetter('a') returns True.

Sample Output



3. Circle

Write a JFrame-JPanel program that let user input seven parameters in one JTextField. The seven parameters are the size of JPanel (), five kinds of colors, and an angle in order.

1) Please define the following method:
   ```
   public void drawCircle(Graphics g, double x, double y, double radius)
   ```
   This function will draw one circle in the JPanel with three requirements:
   a) The center of the circle is at the center of JPanel
   b) The radius of the circle is one quarter of the size of JPanel.
   c) The color of the circle is the first kind of colors.
2) Please define following method:
   ```
   public void drawMark(Graphics g, double x, double y, double radius)
   ```
   This function will mark four points: the rightmost point, the top point, the leftmost point, the bottom point of the circle. The color of marks are the last four kinds of colors in the above order.
3) Rotate four marks by angle.

4) You can directly re-input different values in the JTextField to change the figure without re-executing the program.
5) Please put main program and other programs in different files, i.e., you have three files: P3_Test.java, P3_JFrame.java, P3_JPanel.java.
   a) P3_Test.java

```
public class P3_Test{
      public static void main(String args[]){
            P3_JFrame f = new P3_JFrame();

            // your code
      }
}
```

   b) P3_JFrame.java

```
public class P3_JFrame extends JFrame implements ActionListener{
      // You should add JTextField and P3_JPanel to JFrame
      // Don't add JTextField to P3_JPanel
}
```

   c) P3_JPanel.java

```
class P3_JPanel extends JPanel {

      // draw circle
    public void drawCircle(Graphics g, double x, double y, double
radius){
            //your code
    }

      // draw mark
      public void drawMark(Graphics g, double x, double y, double
radius){
            // your code
      }
}
```

Note:

1) Color for the circle and the mark: black / red / blue / green / yellow / white / pink / orange
2) Angle: 0~360
3) To make JPanel having the Dimensions MxN, set the preferred size of JPanel and use JFrame.pack() to fit the components as per component's preferred size.

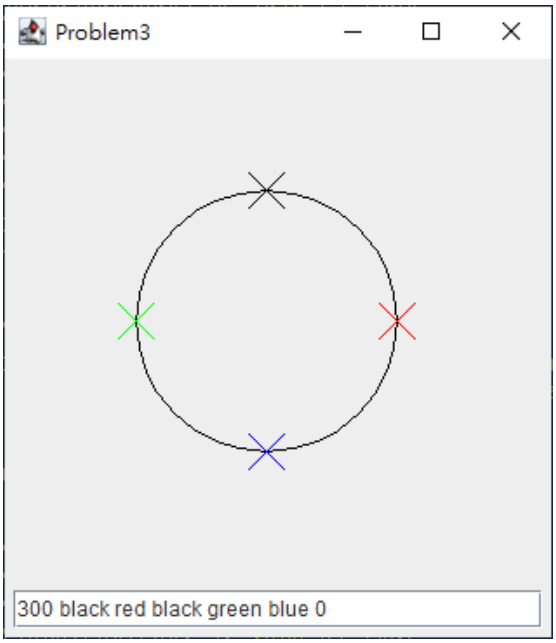
```
// Class: java.awt.Dimension,
// panel is object of JPanel
// frame is object of JFrame
panel.setPreferredSize(new Dimension(M, N));
frame.pack();
```

4) You can use this.repaint(); to call paintComponent() repainting the panel.

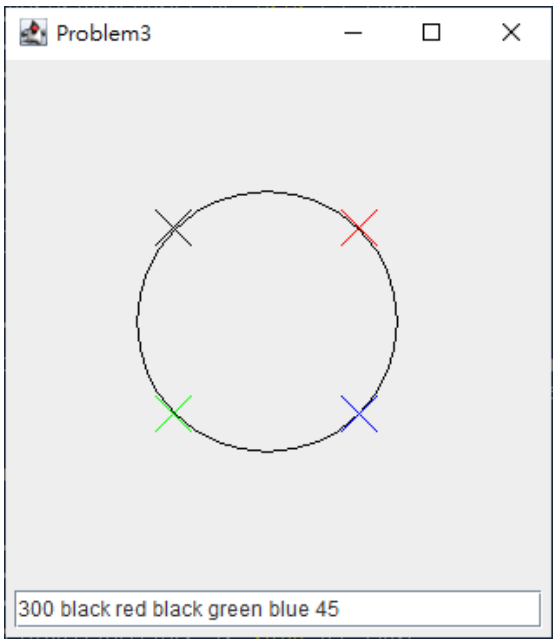
Sample Input and Output

seven parameters: size, color1, color2, color3, color4, color5, angle

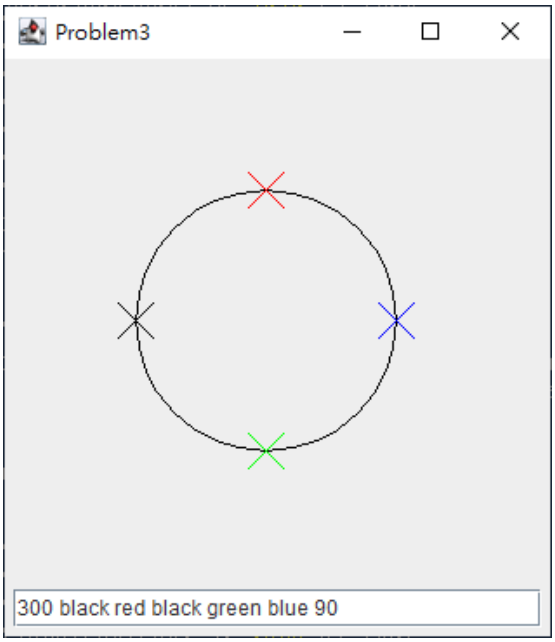
300 black red black green blue 0



300 black red black green blue 45



300 black red black green blue 90



4. Draw Circle

Please modify your code in problem 3 that let user input eight parameters to draw a lot of circles. The eight parameters are the size of JPanel (), five kinds of colors, an angle , an order in order. Please define following method:

```
public void drawCircle(Graphics g, double x, double y, double radius, Color c, int order)
```

This function will draw circles. The new parameter, Color c, represents the color of the circle, and, order, represents the layer of circles.

1) order = 1 : The circle is the same as Problem 3 except for marking the four points. The color is the first kind of colors user inputs.
2) order > 1 : You need to draw another four circles with following requirements:
   a) The center of each circle is at one of four marks of the circle in last layer.
   b) The radius of each circle is one quarter of the size of the circle in last layer.
   c) The color of each circle is the last four kinds of colors in the following order: the rightmost circle, the top circle, the leftmost circle, the bottom circle.

Please put main program and other programs in different files, i.e., you have three files: P4_Test.java, P4_JFrame.java, P4_JPanel.java.

c) P4_Test.java

```
public class P4_Test{
	public static void main(String args[]){
		P4_JFrame f = new P4_JFrame();

		// your code
	}
}
```

d) P4_JFrame.java

```
public class P4_JFrame extends JFrame implements ActionListener{
	// You should add JTextField and P4_JPanel to JFrame
	// Don't add JTextField to P4_JPanel
}
```

d) P4_JPanel.java

```
class P4_JPanel extends JPanel {

	// draw circle
    public void drawCircle(Graphics g, double x, double y, double
radius, Color c, int order){
		// your code
    }
}
```

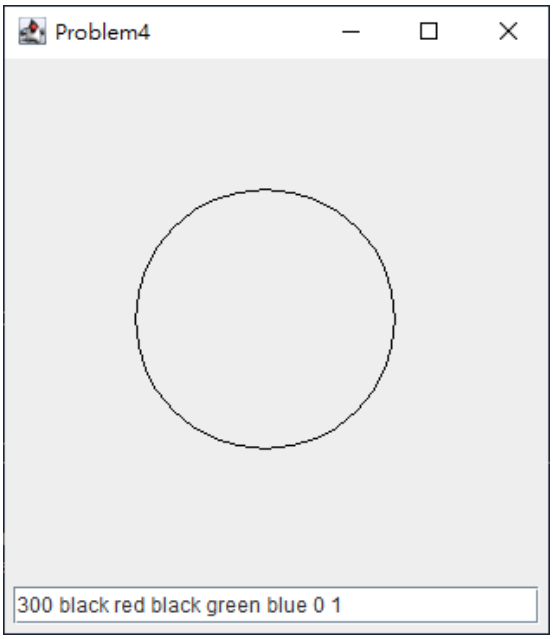
Note:

1) You should use recursive function to draw circles.
2) Since you don't need to mark the four points, please remove the function `drawMark`, which you define in Problem 3.

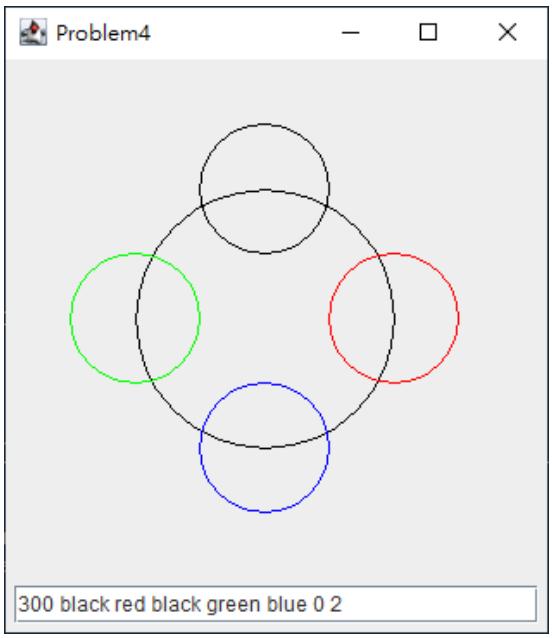
Sample Input and Output

Eight parameters: size, color1, color2, color3, color4, color5, angle, order

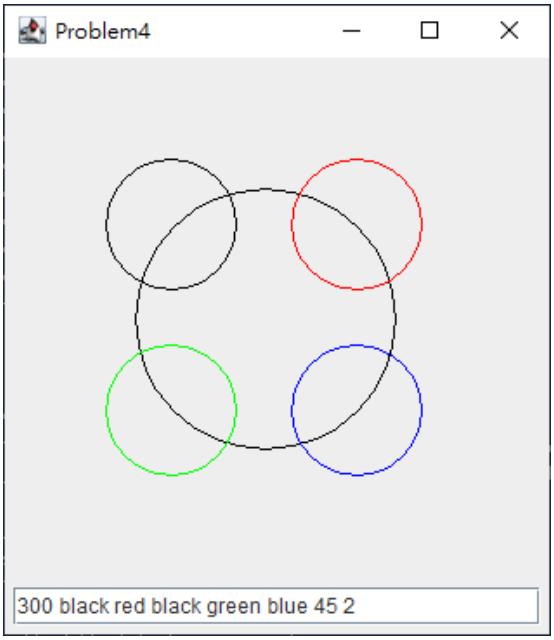
300 black red black green blue 0 1



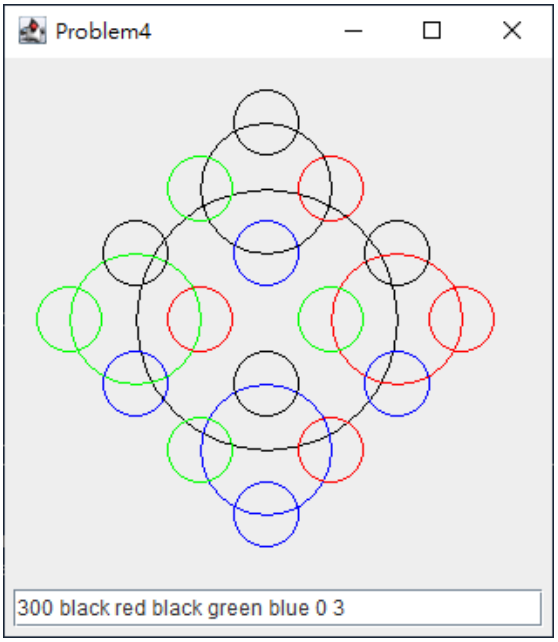
300 black red black green blue 0 2



300 black red black green blue 45 2



300 black red black green blue 0 3



300 black red black green blue 30 3