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Lab Number: 10

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Lab 10 Report, JAVA

Objectives:

The objective of this lab was to understand the design principles of GUI and understand action events classes and methods. The outcome of this lab was to generate a calculator that had usable buttons and can perform math. After receiving input from the user, the calculator will calculate for the given answer.

Program:

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

import javax.swing.*;

import java.awt.*;

import java.lang.Math;

class calculator extends JFrame implements ActionListener {

        // create a frame

        static JFrame f;


        // create a textfield

        static JTextField l;


        // store operator and operands

        String s0, s1, s2;


        // default constructor

        calculator()

        {

                s0 = s1 = s2 = "";
```

```
    }

    // main function
    public static void main(String args[])
    {
        // create a frame
        f = new JFrame("calculator");

        // create a object of class
        calculator c = new calculator();

        // create a textfield
        l = new JTextField(32);

        // set the textfield to non editable
        l.setEditable(false);

        // create number buttons and some operators
        JButton b0, b1, b2, b3, b4, b5, b6, b7, b8, b9, ba, bs, bd, bm, be, beq, beq1, bSin,
bCos, bTan, bLn, bSqr, bPow, bSqu;

        // create number buttons
        b0 = new JButton("0");
        b1 = new JButton("1");
        b2 = new JButton("2");
        b3 = new JButton("3");
        b4 = new JButton("4");
```

```
            b5 = new JButton("5");
            b6 = new JButton("6");
            b7 = new JButton("7");
            b8 = new JButton("8");
            b9 = new JButton("9");

            // equals button
            beq1 = new JButton("=");

            // create operator buttons
            ba = new JButton("+");
            bs = new JButton("-");
            bd = new JButton("/");
            bm = new JButton("*");
            beq = new JButton("C");

            // create . button
            be = new JButton(".");

//create trig buttons
bCos = new JButton("cos");
bSin = new JButton("sin");
bTan = new JButton("tan");

//create exponent buttons
bSqr = new JButton("sqrt");
bSqu = new JButton("x^2");
```

```
bPow = new JButton("x^y");
bLn = new JButton("ln");

//set button sizes
b0.setPreferredSize(new Dimension(90, 50));
b1.setPreferredSize(new Dimension(90, 50));
b2.setPreferredSize(new Dimension(90, 50));
b3.setPreferredSize(new Dimension(90, 50));
b4.setPreferredSize(new Dimension(90, 50));
b5.setPreferredSize(new Dimension(90, 50));
b6.setPreferredSize(new Dimension(90, 50));
b7.setPreferredSize(new Dimension(90, 50));
b8.setPreferredSize(new Dimension(90, 50));
b9.setPreferredSize(new Dimension(90, 50));
ba.setPreferredSize(new Dimension(90, 50));
bs.setPreferredSize(new Dimension(90, 50));
bm.setPreferredSize(new Dimension(90, 50));
bd.setPreferredSize(new Dimension(90, 50));
beq1.setPreferredSize(new Dimension(90, 50));
be.setPreferredSize(new Dimension(90, 50));
bSin.setPreferredSize(new Dimension(90, 50));
bCos.setPreferredSize(new Dimension(90, 50));
bTan.setPreferredSize(new Dimension(90, 50));
bLn.setPreferredSize(new Dimension(90, 50));
bSqr.setPreferredSize(new Dimension(90, 50));
bSqu.setPreferredSize(new Dimension(90, 50));
bPow.setPreferredSize(new Dimension(90, 50));
```

```
beq.setPreferredSize(new Dimension(90, 50));

        // create a panel
        JPanel p = new JPanel();

        // add action listeners
        bm.addActionListener(c);
        bd.addActionListener(c);
        bs.addActionListener(c);
        ba.addActionListener(c);
        b9.addActionListener(c);
        b8.addActionListener(c);
        b7.addActionListener(c);
        b6.addActionListener(c);
        b5.addActionListener(c);
        b4.addActionListener(c);
        b3.addActionListener(c);
        b2.addActionListener(c);
        b1.addActionListener(c);
        b0.addActionListener(c);
        be.addActionListener(c);
        beq.addActionListener(c);
        beq1.addActionListener(c);
bSin.addActionListener(c);
bCos.addActionListener(c);
bTan.addActionListener(c);
bLn.addActionListener(c);
```

```
bSqr.addActionListener(c);
bSqu.addActionListener(c);
bPow.addActionListener(c);

        // add elements to panel
p.add(l);
        p.add(b7);
p.add(b8);
p.add(b9);
p.add(bd);
p.add(b4);
p.add(b5);
p.add(b6);
p.add(bm);
p.add(b1);
p.add(b2);
p.add(b3);
p.add(bs);
p.add(b0);
p.add(be);
p.add(beq1);
p.add(ba);
p.add(bSin);
p.add(bCos);
p.add(bTan);
p.add(bLn);
p.add(beq);
```

```
p.add(bSqr);
p.add(bPow);
p.add(bSqu);

        // add panel to frame
        f.add(p);

f.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        f.setSize(400, 400);
        f.setVisible(true);
    }
    public void actionPerformed(ActionEvent e)
    {
        String s = e.getActionCommand();

        // if the value is a number
        if ((s.charAt(0) >= '0' && s.charAt(0) <= '9') || s.charAt(0) == '.') {
            // if operand is present then add to second no
            if (!s1.equals(""))
                s2 = s2 + s;
            else
                s0 = s0 + s;

            // set the value of text
            l.setText(s0 + s1 + s2);
        }
//if the value is clear
```

```
            else if (s.charAt(0) == 'C') {
                    // clear the one letter
                    s0 = s1 = s2 = "";

                    // set the value of text
                    l.setText(s0 + s1 + s2);
            }

//equal sign
            else if (s.charAt(0) == '=') {

                    double te;

                    // store the value in 1st
                    if (s1.equals("+"))
                            te = (Double.parseDouble(s0) + Double.parseDouble(s2));
                    else if (s1.equals("-"))
                            te = (Double.parseDouble(s0) - Double.parseDouble(s2));
                    else if (s1.equals("/"))
                            te = (Double.parseDouble(s0) / Double.parseDouble(s2));
  else if (s1.equals("x^y"))
    te = Math.pow(Double.parseDouble(s0),Double.parseDouble(s2));
                    else
                            te = (Double.parseDouble(s0) * Double.parseDouble(s2));

                    // set the value of text
                    String text = Double.toString(te);
```

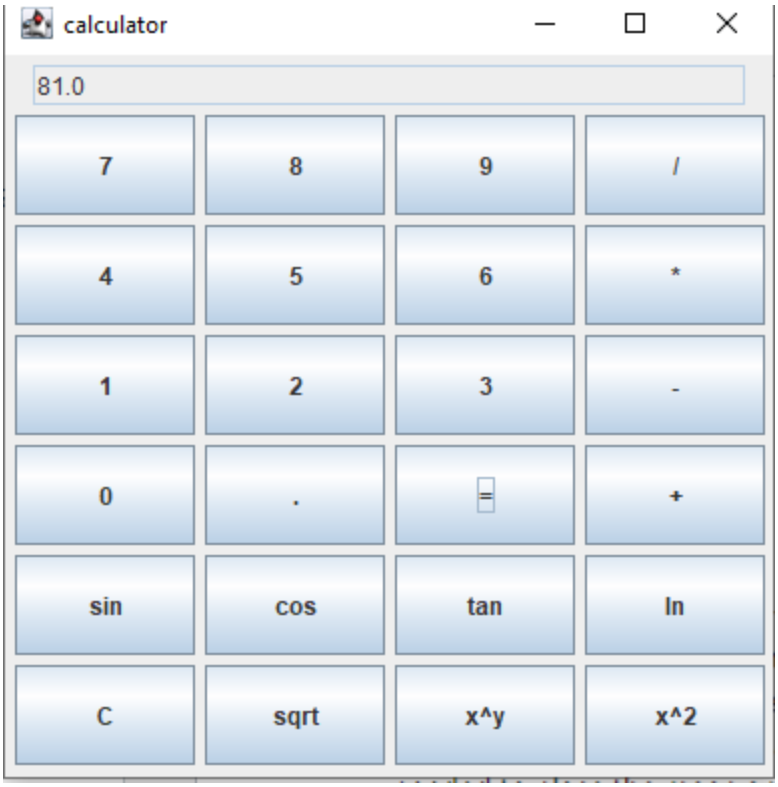
```
                    l.setText(text);


                    // convert it to string
                    s0 = Double.toString(te);


                    s1 = s2 = "";
                }
        //sin
        else if(s.charAt(0) == 's' && s.charAt(1) == 'i' && s.charAt(2) == 'n'){ //check if sin is selected
            double res = Math.sin(Double.parseDouble(s0)); //calculate
                    String te = Double.toString(res); //convert result to string
            l.setText(te); //display
                    s0 = te; //set s0 to the result
                    s1 = s2 = ""; //clear other fields
        }
                //cos
        else if(s.charAt(0) == 'c' && s.charAt(1) == 'o' && s.charAt(2) == 's'){ //check if cos is
selected
            double res = Math.cos(Double.parseDouble(s0)); //calculate
                    String te = Double.toString(res); //convert result to string
            l.setText(te); //display
                    s0 = te; //set s0 to the result
                    s1 = s2 = ""; //clear other fields
        }
                //natural log
        else if(s.charAt(0) == 'l' && s.charAt(1) == 'n'){ //check if ln is selected
            double res = Math.log(Double.parseDouble(s0)); //calculate
```

```
                    String te = Double.toString(res); //convert result to string
        l.setText(te); //display
                    s0 = te; //set s0 to the result
                    s1 = s2 = ""; //clear other fields
    }
            //tan
    else if(s.charAt(0) == 't' && s.charAt(1) == 'a' && s.charAt(2) == 'n'){ //check if tan is selected
        double res = Math.tan(Double.parseDouble(s0)); //calculate
                    String te = Double.toString(res); //convert result to string
        l.setText(te); //display
                    s0 = te; //set s0 to the result
                    s1 = s2 = ""; //clear other fields
    }
            //square root
    else if(s.charAt(0) == 's' && s.charAt(1) == 'q' && s.charAt(2) == 'r' && s.charAt(3) == 't'){ //check if sqrt is selected
        double res = Math.sqrt(Double.parseDouble(s0)); //calculate
                    String te = Double.toString(res); //convert result to string
        l.setText(te); //display
                    s0 = te; //set s0 to the result
                    s1 = s2 = ""; //clear other fields
    }
            //square
    else if(s.charAt(0) == 'x' && s.charAt(1) == '^' && s.charAt(2) == '2'){ //check if square is selected
        double res = Math.pow(Double.parseDouble(s0),2); //calculate
                    String te = Double.toString(res); //convert result to string
```

```
   l.setText(te); //display
                        s0 = te; //set s0 to the result
                        s1 = s2 = ""; //clear other fields
}
                else {
                        // if there was no operand
                        if (s1.equals("") || s2.equals(""))
                                s1 = s;
                        // else evaluate
                        else {
                                double te;

                                // store the value in 1st
                                if (s1.equals("+"))
                                        te = (Double.parseDouble(s0) + Double.parseDouble(s2));
                                else if (s1.equals("-"))
                                        te = (Double.parseDouble(s0) - Double.parseDouble(s2));
                                else if (s1.equals("/"))
                                        te = (Double.parseDouble(s0) / Double.parseDouble(s2));
      else if (s1.equals("cos"))
         te = Math.cos(Double.parseDouble(s0));
                                else
                                        te = (Double.parseDouble(s0) * Double.parseDouble(s2));

                                // convert it to string
                                s0 = Double.toString(te);
```

```
                    // place the operator
                    s1 = s;

                    // make the operand blank
                    s2 = "";
                }

                // set the value of text
                l.setText(s0 + s1 + s2);
            }
        }
}
```

Results:



The above pictures is showcasing the output of the program and output of calculator when an input is placed.

Conclusion:

While I was coding my program, I had issues with creating buttons for the sin, cos and rest of the trig formulas. I took the time to review the lessons on creating buttons with actions and how to use math equations and was able to solve my issue with no worries. As a result, my program is able to execute the objectives that are stated above with no issues and accomplish all challenges.