

Report On

Scientific Calculator

Submitted in partial fulfillment of the requirements of the Course project in
Semester III of Second Year Artificial Intelligence and Data Science

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(2023-24)

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CERTIFICATE

This is to certify that the project entitled “Scientific Calculator” is a bonafide work of " Aaryan Gole (Roll No. 12), Aryan Gaikwad (Roll No. 09), Sunit Khaire (Roll No. 21) " submitted to the University of Mumbai in partial fulfillment of the requirement for the Course project in semester III of Second Year Artificial Intelligence and Data Science engineering.

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Abstract

This abstract provides an overview of a course project aimed at developing a scientific calculator using Java programming. The project involves the creation of a comprehensive and user-friendly scientific calculator that incorporates a wide range of mathematical functions and features, suitable for students, scientists, and professionals alike.

The project begins with the design and architecture of the calculator, which includes the selection of appropriate data structures and algorithms for efficient computation. The user interface is also carefully designed to ensure an intuitive and visually appealing experience. The calculator features a user-friendly graphical interface, which allows users to input mathematical expressions using familiar notations and symbols.

The calculator supports a variety of mathematical operations, including basic arithmetic, advanced functions like trigonometric, logarithmic, and exponential calculations, as well as the ability to work with complex numbers. Error handling is implemented to ensure that invalid inputs or operations are appropriately managed, providing a robust and reliable tool for users.

In addition to its mathematical capabilities, the calculator also includes features such as history tracking, allowing users to review and reuse previous calculations. Unit conversion functionalities are integrated, enabling easy conversions between different measurement units. Furthermore, the project includes the incorporation of a graphical representation of functions, such as graphs and plots, enhancing the calculator's versatility for scientific and engineering applications.

The project leverages object-oriented programming principles to create a modular and extensible codebase, making it easy to add new functions and features in the future. Proper documentation is provided to ensure that the codebase is well-understood and can be maintained and extended by other developers.

This scientific calculator project in Java demonstrates the application of programming and software engineering concepts learned in the course, offering a practical and real-world coding experience. It serves as a valuable tool for students to deepen their understanding of Java, object-oriented design, and graphical user interface development while producing a sophisticated scientific calculator as a tangible outcome.

Problem Statement

Develop a Java-based Scientific Calculator using the AWT library including various modules like Swing, AWT, etc.

Module Description:

1. User Interface Module:

- This module is a crucial component of a scientific calculator application, as it directly interfaces with the user and enables them to effectively utilize the calculator's mathematical capabilities.
- It provides the buttons and controls necessary for the user to interact with the calculator. These may include numerical keys (0-9), mathematical operators (+, -, *, /, etc.), functions (sin, cos, log, sqrt, etc.), and special keys (clear, delete, equals, etc.).
- For a scientific calculator, this module should include a comprehensive set of mathematical functions and operations, including but not limited to trigonometric functions, logarithmic functions, exponential functions, and more.

2. Input Handling Module:

- This module manages the user's input, which can include numerical values, mathematical operators, functions, and special keys (e.g., clear, delete, equals).

Brief Description of Software and Hardware Used

Software Used:

1. Java Development Kit (JDK) The calculator is developed using Java, and the JDK provides the necessary tools for Java programming, including the Java compiler and runtime environment.
2. Integrated Development Environment (IDE): An IDE like Eclipse, IntelliJ IDEA, or NetBeans can be used to write, debug, and run the Java code. IDEs provide features like code editing, debugging tools, and project management.
3. AWT (Abstract Window Toolkit): AWT is a Java library used to create graphical user interfaces. It provides classes for display screen, handling events, and computing functions while calculating them on the screen.

Hardware:

1. Computer: A standard computer system with sufficient processing power and memory to run the Java development environment and execute the game. The hardware requirements are typically minimal for Java-based applications.
2. Mouse: Used for clicking buttons of the calculator for various functions calculations/computational operations.

CODE:

```
/*
 * Click nbfs://nbhost/SystemFileSystem/Templates/Licenses/license-default.txt to change this license
 * Click nbfs://nbhost/SystemFileSystem/Templates/GUIForms/JFrame.java to edit this template
 */
package javaapplication1;

public class Scicalc2 extends javax.swing.JFrame {

    /**
     * Creates new form Scicalc2
     */
    public Scicalc2() {
        initComponents();
    }

    double num1,num2,result;
    String opr;

    public void enable()
```

```
{  
    jTextField1.setEnabled(true);  
  
    jRadioButton1.setEnabled(false);  
    jRadioButton2.setEnabled(true);  
  
    jButton1.setEnabled(true);  
    jButton2.setEnabled(true);  
    jButton3.setEnabled(true);  
    jButton4.setEnabled(true);  
    jButton5.setEnabled(true);  
    jButton6.setEnabled(true);  
    jButton7.setEnabled(true);  
    jButton8.setEnabled(true);  
    jButton9.setEnabled(true);  
    jButton10.setEnabled(true);  
    jButton11.setEnabled(true);  
    jButton12.setEnabled(true);  
    jButton13.setEnabled(true);  
    jButton14.setEnabled(true);  
    jButton15.setEnabled(true);  
    jButton16.setEnabled(true);  
    jButton17.setEnabled(true);  
    jButton18.setEnabled(true);  
    jButton20.setEnabled(true);  
    jButton22.setEnabled(true);  
    jButton23.setEnabled(true);  
    jButton24.setEnabled(true);  
    jButton25.setEnabled(true);  
    jButton26.setEnabled(true);  
    jButton27.setEnabled(true);  
    jButton28.setEnabled(true);  
    jButton29.setEnabled(true);  
}
```

```

jButton30.setEnabled(true);
jButton31.setEnabled(true);
jButton32.setEnabled(true);
jButton33.setEnabled(true);
jButton34.setEnabled(true);
jButton36.setEnabled(true);
jButton37.setEnabled(true);

}

public void disable()
{
jTextField1.setEnabled(false);

jRadioButton1.setEnabled(true);
jRadioButton2.setEnabled(false);

jButton1.setEnabled(false);
jButton2.setEnabled(false);
jButton3.setEnabled(false);
jButton4.setEnabled(false);
jButton5.setEnabled(false);
jButton6.setEnabled(false);
jButton7.setEnabled(false);
jButton8.setEnabled(false);
jButton9.setEnabled(false);
jButton10.setEnabled(false);
jButton11.setEnabled(false);
jButton12.setEnabled(false);
jButton13.setEnabled(false);
jButton14.setEnabled(false);
jButton15.setEnabled(false);
jButton16.setEnabled(false);

```



```

jButton17.setEnabled(false);
jButton18.setEnabled(false);
jButton20.setEnabled(false);
jButton22.setEnabled(false);
jButton23.setEnabled(false);
jButton24.setEnabled(false);
jButton25.setEnabled(false);
jButton26.setEnabled(false);
jButton27.setEnabled(false);
jButton28.setEnabled(false);
jButton29.setEnabled(false);
jButton30.setEnabled(false);
jButton31.setEnabled(false);
jButton32.setEnabled(false);
jButton33.setEnabled(false);
jButton34.setEnabled(false);
jButton36.setEnabled(false);
jButton37.setEnabled(false);

}

/**
 * This method is called from within the constructor to initialize the form.
 * WARNING: Do NOT modify this code. The content of this method is always
 * regenerated by the Form Editor.
 */
@SuppressWarnings("unchecked")
// <editor-fold defaultstate="collapsed" desc="Generated Code">
private void initComponents() {

    buttonGroup1 = new javax.swing.ButtonGroup();
    jTextField1 = new javax.swing.JTextField();
    jRadioButton1 = new javax.swing.JRadioButton();

```

```
jRadioButton2 = new javax.swing.JRadioButton();
jButton1 = new javax.swing.JButton();
jButton2 = new javax.swing.JButton();
jButton3 = new javax.swing.JButton();
jButton4 = new javax.swing.JButton();
jButton5 = new javax.swing.JButton();
jButton6 = new javax.swing.JButton();
jButton7 = new javax.swing.JButton();
jButton8 = new javax.swing.JButton();
jButton9 = new javax.swing.JButton();
jButton10 = new javax.swing.JButton();
jButton11 = new javax.swing.JButton();
jButton12 = new javax.swing.JButton();
jButton13 = new javax.swing.JButton();
jButton14 = new javax.swing.JButton();
jButton15 = new javax.swing.JButton();
jButton16 = new javax.swing.JButton();
jButton17 = new javax.swing.JButton();
jButton18 = new javax.swing.JButton();
jButton20 = new javax.swing.JButton();
jButton22 = new javax.swing.JButton();
jButton23 = new javax.swing.JButton();
jButton24 = new javax.swing.JButton();
jButton25 = new javax.swing.JButton();
jButton26 = new javax.swing.JButton();
jButton27 = new javax.swing.JButton();
jButton28 = new javax.swing.JButton();
jButton29 = new javax.swing.JButton();
jButton30 = new javax.swing.JButton();
jButton31 = new javax.swing.JButton();
jButton32 = new javax.swing.JButton();
jButton33 = new javax.swing.JButton();
jButton34 = new javax.swing.JButton();
```

```

jButton36 = new javax.swing.JButton();
jButton37 = new javax.swing.JButton();

setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON_CLOSE);
setTitle("Scientific Calculator");
setResizable(false);
setType(java.awt.Window.Type.UTILITY);

jTextField1.setFont(new java.awt.Font("Segoe UI", 1, 24)); // NOI18N
jTextField1.setHorizontalAlignment(javax.swing.JTextField.RIGHT);
jTextField1.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jTextField1ActionPerformed(evt);
    }
});

jRadioButton1.setBackground(new java.awt.Color(255, 255, 255));
buttonGroup1.add(jRadioButton1);
jRadioButton1.setText("on");
jRadioButton1.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jRadioButton1ActionPerformed(evt);
    }
});

jRadioButton2.setBackground(new java.awt.Color(255, 255, 255));
buttonGroup1.add(jRadioButton2);
jRadioButton2.setText("off");
jRadioButton2.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jRadioButton2ActionPerformed(evt);
    }
});

```

```

jButton1.setBackground(new java.awt.Color(102, 102, 102));
jButton1.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton1.setText("x^y");
jButton1.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton1ActionPerformed(evt);
    }
});

```

```

jButton2.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton2.setText("7");
jButton2.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton2ActionPerformed(evt);
    }
});

```

```

jButton3.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton3.setText("9");
jButton3.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton3ActionPerformed(evt);
    }
});

```

```

jButton4.setBackground(new java.awt.Color(102, 102, 102));
jButton4.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton4.setText("1/x");
jButton4.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton4ActionPerformed(evt);
    }
}

```

```

});

jButton5.setBackground(new java.awt.Color(102, 102, 102));
jButton5.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton5.setForeground(new java.awt.Color(255, 255, 255));
jButton5.setText("%");
jButton5.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton5ActionPerformed(evt);
    }
});

```

```

jButton6.setBackground(new java.awt.Color(102, 102, 102));
jButton6.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton6.setForeground(new java.awt.Color(255, 255, 255));
jButton6.setText("sinh");
jButton6.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton6ActionPerformed(evt);
    }
});

```

```

jButton7.setBackground(new java.awt.Color(102, 102, 102));
jButton7.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton7.setText("√");
jButton7.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton7ActionPerformed(evt);
    }
});

```

```

jButton8.setBackground(new java.awt.Color(102, 102, 102));
jButton8.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N

```

```

jButton8.setForeground(new java.awt.Color(255, 255, 255));
jButton8.setText("log");
jButton8.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton8ActionPerformed(evt);
    }
});

```

```

jButton9.setBackground(new java.awt.Color(255, 0, 51));
jButton9.setFont(new java.awt.Font("Segoe UI", 1, 18)); // NOI18N
jButton9.setForeground(new java.awt.Color(255, 255, 255));
jButton9.setText("C");
jButton9.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton9ActionPerformed(evt);
    }
});

```

```

jButton10.setBackground(new java.awt.Color(102, 102, 102));
jButton10.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton10.setText("x³");
jButton10.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton10ActionPerformed(evt);
    }
});

```

```

jButton11.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton11.setText("8");
jButton11.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton11ActionPerformed(evt);
    }
}

```

```

});

jButton12.setFont(new java.awt.Font("Segoe UI", 1, 24)); // NOI18N
jButton12.setForeground(new java.awt.Color(0, 204, 102));
jButton12.setText("-");
jButton12.setMaximumSize(new java.awt.Dimension(26, 26));
jButton12.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton12ActionPerformed(evt);
    }
});

```

```

jButton13.setFont(new java.awt.Font("Segoe UI", 1, 24)); // NOI18N
jButton13.setForeground(new java.awt.Color(204, 51, 0));
jButton13.setText("←");
jButton13.setMaximumSize(new java.awt.Dimension(26, 26));
jButton13.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton13ActionPerformed(evt);
    }
});

```

```

jButton14.setBackground(new java.awt.Color(102, 102, 102));
jButton14.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton14.setForeground(new java.awt.Color(255, 255, 255));
jButton14.setText("cosh");
jButton14.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton14ActionPerformed(evt);
    }
});

```

```

jButton15.setBackground(new java.awt.Color(102, 102, 102));

```

```

jButton15.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton15.setForeground(new java.awt.Color(255, 255, 255));
jButton15.setText("cos");
jButton15.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton15ActionPerformed(evt);
    }
});

```

```

jButton16.setBackground(new java.awt.Color(102, 102, 102));
jButton16.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton16.setForeground(new java.awt.Color(255, 255, 255));
jButton16.setText("exp");
jButton16.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton16ActionPerformed(evt);
    }
});

```

```

jButton17.setBackground(new java.awt.Color(102, 102, 102));
jButton17.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton17.setForeground(new java.awt.Color(255, 255, 255));
jButton17.setText("sin");
jButton17.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton17ActionPerformed(evt);
    }
});

```

```

jButton18.setBackground(new java.awt.Color(102, 102, 102));
jButton18.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton18.setForeground(new java.awt.Color(255, 255, 255));
jButton18.setText("tanh");

```



```
jButton18.addActionListener(new java.awt.event.ActionListener() {  
    public void actionPerformed(java.awt.event.ActionEvent evt) {  
        jButton18ActionPerformed(evt);  
    }  
});
```

```
jButton20.setBackground(new java.awt.Color(102, 102, 102));  
jButton20.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N  
jButton20.setForeground(new java.awt.Color(255, 255, 255));  
jButton20.setText("tan");  
jButton20.addActionListener(new java.awt.event.ActionListener() {  
    public void actionPerformed(java.awt.event.ActionEvent evt) {  
        jButton20ActionPerformed(evt);  
    }  
});
```

```
jButton22.setFont(new java.awt.Font("Segoe UI", 1, 18)); // NOI18N  
jButton22.setForeground(new java.awt.Color(0, 204, 102));  
jButton22.setText("+");  
jButton22.addActionListener(new java.awt.event.ActionListener() {  
    public void actionPerformed(java.awt.event.ActionEvent evt) {  
        jButton22ActionPerformed(evt);  
    }  
});
```

```
jButton23.setBackground(new java.awt.Color(102, 102, 102));  
jButton23.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N  
jButton23.setText("x²");  
jButton23.addActionListener(new java.awt.event.ActionListener() {  
    public void actionPerformed(java.awt.event.ActionEvent evt) {  
        jButton23ActionPerformed(evt);  
    }  
});
```

```
jButton24.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton24.setText("5");
jButton24.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton24ActionPerformed(evt);
    }
});
```

```
jButton25.setFont(new java.awt.Font("Segoe UI", 1, 18)); // NOI18N
jButton25.setForeground(new java.awt.Color(0, 204, 102));
jButton25.setText("*");
jButton25.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton25ActionPerformed(evt);
    }
});
```

```
jButton26.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton26.setText("4");
jButton26.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton26ActionPerformed(evt);
    }
});
```

```
jButton27.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton27.setText("6");
jButton27.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton27ActionPerformed(evt);
    }
});
```

```

jButton28.setBackground(new java.awt.Color(102, 102, 102));
jButton28.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton28.setText("n!");
jButton28.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton28ActionPerformed(evt);
    }
});

```

```

jButton29.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton29.setText("2");
jButton29.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton29ActionPerformed(evt);
    }
});

```

```

jButton30.setFont(new java.awt.Font("Segoe UI", 1, 18)); // NOI18N
jButton30.setForeground(new java.awt.Color(0, 204, 51));
jButton30.setText("/");
jButton30.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton30ActionPerformed(evt);
    }
});

```

```

jButton31.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton31.setText("1");
jButton31.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton31ActionPerformed(evt);
    }
}

```

```

});

jButton32.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton32.setText("3");
jButton32.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton32ActionPerformed(evt);
    }
});

```

```

jButton33.setBackground(new java.awt.Color(102, 102, 102));
jButton33.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton33.setText("+/-");
jButton33.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton33ActionPerformed(evt);
    }
});

```

```

jButton34.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton34.setText(".");
jButton34.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton34ActionPerformed(evt);
    }
});

```

```

jButton36.setFont(new java.awt.Font("Segoe UI", 1, 12)); // NOI18N
jButton36.setText("0");
jButton36.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton36ActionPerformed(evt);
    }
}

```

```

});

jButton37.setBackground(new java.awt.Color(51, 255, 0));
jButton37.setFont(new java.awt.Font("Segoe UI", 1, 18)); // NOI18N
jButton37.setForeground(new java.awt.Color(255, 255, 255));
jButton37.setText("=");
jButton37.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton37ActionPerformed(evt);
    }
});

javax.swing.GroupLayout layout = new javax.swing.GroupLayout(getContentPane());
getContentPane().setLayout(layout);
layout.setHorizontalGroup(
    layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
        .addGroup(layout.createSequentialGroup()
            .addGap(10, 10, 10)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
                .addGroup(layout.createSequentialGroup()
                    .addComponent(jButton7, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
                        javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addGap(10, 10, 10)
                    .addComponent(jButton4, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
                        javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addGap(10, 10, 10)
                    .addComponent(jButton1, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
                        javax.swing.GroupLayout.PREFERRED_SIZE))
                .addGap(10, 10, 10))
        .addGap(10, 10, 10)
    )
    .addContainerGap(10, true)
);

```

```

        .addComponent(jButton10, javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.PREFERRED_SIZE, 58, javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton23, javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.PREFERRED_SIZE, 58, javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton28, javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.PREFERRED_SIZE, 58, javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton33, javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.PREFERRED_SIZE, 58, javax.swing.GroupLayout.PREFERRED_SIZE))
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
        .addGroup(layout.createSequentialGroup())

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
        .addComponent(jButton5, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton2, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton26, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton31, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton36, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE))
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING, false)
        .addGroup(layout.createSequentialGroup()
        .addComponent(jButton9, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)

```

```

        .addComponent(jButton13, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE)

        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton22, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE))
        .addGroup(layout.createSequentialGroup())
        .addComponent(jButton11, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE)

        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton3, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)

        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton12, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE))
        .addGroup(layout.createSequentialGroup())
        .addComponent(jButton24, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE)

        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton27, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE)

        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton25, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE))
        .addGroup(layout.createSequentialGroup())
        .addComponent(jButton29, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE)

        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)

```

```

        .addComponent(jButton32, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton30, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE))
        .addGroup(layout.createSequentialGroup())
        .addComponent(jButton34, javax.swing.GroupLayout.PREFERRED_SIZE,
58, javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton37, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))))
        .addGroup(layout.createSequentialGroup())
        .addComponent(jButton16, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton17, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton15, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton20, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE))
        .addGroup(layout.createSequentialGroup())
        .addComponent(jButton8, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton6, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)

```



```

        .addComponent(jButton14, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addComponent(jButton18, javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE))))
        .addGroup(javax.swing.GroupLayout.Alignment.LEADING,
layout.createSequentialGroup()
        .addComponent(jRadioButton1, javax.swing.GroupLayout.PREFERRED_SIZE, 50,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
        .addComponent(jRadioButton2, javax.swing.GroupLayout.PREFERRED_SIZE, 56,
javax.swing.GroupLayout.PREFERRED_SIZE))
        .addComponent(jTextField1, javax.swing.GroupLayout.Alignment.LEADING))
        .addContainerGap(javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
);
layout.setVerticalGroup(
    layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
    .addGroup(layout.createSequentialGroup()
        .addGap(16, 16, 16)
        .addComponent(jTextField1, javax.swing.GroupLayout.PREFERRED_SIZE, 69,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
            .addComponent(jRadioButton1)
            .addComponent(jRadioButton2))
        .addGap(12, 12, 12)
        .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
            .addComponent(jButton7, javax.swing.GroupLayout.PREFERRED_SIZE, 48,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addComponent(jButton16, javax.swing.GroupLayout.PREFERRED_SIZE, 48,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addComponent(jButton17, javax.swing.GroupLayout.PREFERRED_SIZE, 48,
javax.swing.GroupLayout.PREFERRED_SIZE)

```

```

        .addComponent(jButton15,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton20,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE))
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
        .addComponent(jButton4,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton8,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton6,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton14,     javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton18,     javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE))
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
        .addComponent(jButton1,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton5,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton9,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton13,     javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton22,     javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE))
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
        .addComponent(jButton10,     javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)

```

```

        .addComponent(jButton2,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton11,     javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton3,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton12,     javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE))
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
        .addComponent(jButton23,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton26,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton24,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton27,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton25,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE))
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
        .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
        .addComponent(jButton28,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton31,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton29,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton32,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE)
        .addComponent(jButton30,      javax.swing.GroupLayout.PREFERRED_SIZE,      48,
javax.swing.GroupLayout.PREFERRED_SIZE))
        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)

```

```

        .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
            .addComponent(jButton33, javax.swing.GroupLayout.PREFERRED_SIZE, 48,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addComponent(jButton36, javax.swing.GroupLayout.PREFERRED_SIZE, 48,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addComponent(jButton34, javax.swing.GroupLayout.PREFERRED_SIZE, 48,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addComponent(jButton37, javax.swing.GroupLayout.PREFERRED_SIZE, 48,
javax.swing.GroupLayout.PREFERRED_SIZE))
        .addGap(0, 4, Short.MAX_VALUE))
    );

```

```

    pack();
} // </editor-fold>

```

```

private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    enable();
}

```

```

private void jButton15ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Math.cos(Double.parseDouble(jTextField1.getText()));

    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

```

```

private void jButton9ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText("");
}

```

```

private void jButton2ActionPerformed(java.awt.event.ActionEvent evt) {
    disable();
}

```

```
private void jButton10ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Double.parseDouble(jTextField1.getText());

    t=t*t*t;
    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

```

```
private void jButton6ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Math.sinh(Double.parseDouble(jTextField1.getText()));

    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

```

```
private void jButton23ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Double.parseDouble(jTextField1.getText());

    t=t*t;
    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

```

```
private void jButton28ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Double.parseDouble(jTextField1.getText());

    int a = 1;
    long fact = 1;
    while(a <= t)
    {
        fact*= t;
        t--;
    }
}

```

```

    }

    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+fact);
}

private void jButton33ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Double.parseDouble(String.valueOf(jTextField1.getText()));

    t=t*(-1);
    jTextField1.setText(String.valueOf(t));
}

private void jButton4ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=1/(Double.parseDouble(jTextField1.getText()));

    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

private void jButton29ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText()+"2");
}

private void jButton24ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText()+"5");
}

private void jButton3ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText()+"9");
}

private void jButton36ActionPerformed(java.awt.event.ActionEvent evt) {

```

```

    jTextField1.setText(jTextField1.getText()+"0");
}

private void jButton31ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText()+"1");
}

private void jButton32ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText()+"3");
}

private void jButton27ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText()+"6");
}

private void jButton26ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText()+"4");
}

private void jButton11ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText()+"8");
}

private void jButton2ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText()+"7");
}

private void jButton34ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText()+".");
}

private void jTextField1ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:

```

```

}

private void jButton13ActionPerformed(java.awt.event.ActionEvent evt) {
String backSpace=null;

if(jTextField1.getText().length()>0)
{
    StringBuilder s=new StringBuilder(jTextField1.getText());

    s.deleteCharAt(jTextField1.getText().length()-1);
    backSpace=s.toString();
    jTextField1.setText(backSpace);
}
}

private void jButton22ActionPerformed(java.awt.event.ActionEvent evt) {
    num1=Double.parseDouble(jTextField1.getText());

    jTextField1.setText("");

    opr="+";
}

private void jButton12ActionPerformed(java.awt.event.ActionEvent evt) {
    num1=Double.parseDouble(jTextField1.getText());

    jTextField1.setText("");

    opr="-";
}

private void jButton25ActionPerformed(java.awt.event.ActionEvent evt) {
    num1=Double.parseDouble(jTextField1.getText());

```



```

jTextField1.setText("");

opr="*";
}

private void jButton30ActionPerformed(java.awt.event.ActionEvent evt) {
    num1=Double.parseDouble(jTextField1.getText());

    jTextField1.setText("");

    opr="/";
}

private void jButton5ActionPerformed(java.awt.event.ActionEvent evt) {
    num1=Double.parseDouble(jTextField1.getText());

    jTextField1.setText("");

    opr="%";
}

private void jButton37ActionPerformed(java.awt.event.ActionEvent evt) {
    num2=Double.parseDouble(jTextField1.getText());

    if(opr=="+")
    {
        result=num1+num2;
        jTextField1.setText(Double.toString(result));
    }

    else if(opr=="-")
    {

```

```

        result=num1-num2;
        jTextField1.setText(Double.toString(result));
    }

    else if(opr=="*")
    {
        result=num1*num2;
        jTextField1.setText(Double.toString(result));
    }

    else if(opr=="/")
    {
        result=num1/num2;
        jTextField1.setText(Double.toString(result));
    }

    else if(opr=="%")
    {
        result=(num1/100)*num2;
        jTextField1.setText(Double.toString(result));
    }

    else if(opr=="x^y")
    {
        result = (int)Math.pow(num1,num2);

        jTextField1.setText(Double.toString(result));
    }
}

private void jButton17ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Math.sin(Double.parseDouble(jTextField1.getText()));

```

```

    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

private void jButton20ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Math.tan(Double.parseDouble(jTextField1.getText()));

    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

private void jButton14ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Math.cosh(Double.parseDouble(jTextField1.getText()));

    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

private void jButton18ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Math.tan(Double.parseDouble(jTextField1.getText()));

    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

private void jButton16ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Math.exp(Double.parseDouble(jTextField1.getText()));

    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

private void jButton7ActionPerformed(java.awt.event.ActionEvent evt) {

```

```

double t=Math.sqrt(Double.parseDouble(jTextField1.getText()));

jTextField1.setText("");
jTextField1.setText(jTextField1.getText()+t);
}

private void jButton8ActionPerformed(java.awt.event.ActionEvent evt) {
    double t=Math.log(Double.parseDouble(jTextField1.getText()));

    jTextField1.setText("");
    jTextField1.setText(jTextField1.getText()+t);
}

private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    num1=Double.parseDouble(jTextField1.getText());

    jTextField1.setText("");

    opr="x^y";
}

/**
 * @param args the command line arguments
 */
public static void main(String args[]) {
    /* Set the Nimbus look and feel */
    //<editor-fold defaultstate="collapsed" desc=" Look and feel setting code (optional) ">
    /* If Nimbus (introduced in Java SE 6) is not available, stay with the default look and feel.
     * For details see http://download.oracle.com/javase/tutorial/uiswing/lookandfeel/plaf.html
     */
    try {
        for (javax.swing.UIManager.LookAndFeelInfo info :
javax.swing.UIManager.getInstalledLookAndFeels()) {

```

```

        if ("Nimbus".equals(info.getName())) {
            javax.swing.UIManager.setLookAndFeel(info.getClassName());
            break;
        }
    }
} catch (ClassNotFoundException ex) {

java.util.logging.Logger.getLogger(Scialc2.class.getName()).log(java.util.logging.Level.SEVERE,
null, ex);

    } catch (InstantiationException ex) {

java.util.logging.Logger.getLogger(Scialc2.class.getName()).log(java.util.logging.Level.SEVERE,
null, ex);

    } catch (IllegalAccessException ex) {

java.util.logging.Logger.getLogger(Scialc2.class.getName()).log(java.util.logging.Level.SEVERE,
null, ex);

    } catch (javax.swing.UnsupportedLookAndFeelException ex) {

java.util.logging.Logger.getLogger(Scialc2.class.getName()).log(java.util.logging.Level.SEVERE,
null, ex);

    }
}
//</editor-fold>

/* Create and display the form */
java.awt.EventQueue.invokeLater(new Runnable() {
    public void run() {
        new Scialc2().setVisible(true);
    }
});
}

// Variables declaration - do not modify

```

```
private javax.swing.ButtonGroup buttonGroup1;  
private javax.swing.JButton jButton1;  
private javax.swing.JButton jButton10;  
private javax.swing.JButton jButton11;  
private javax.swing.JButton jButton12;  
private javax.swing.JButton jButton13;  
private javax.swing.JButton jButton14;  
private javax.swing.JButton jButton15;  
private javax.swing.JButton jButton16;  
private javax.swing.JButton jButton17;  
private javax.swing.JButton jButton18;  
private javax.swing.JButton jButton2;  
private javax.swing.JButton jButton20;  
private javax.swing.JButton jButton22;  
private javax.swing.JButton jButton23;  
private javax.swing.JButton jButton24;  
private javax.swing.JButton jButton25;  
private javax.swing.JButton jButton26;  
private javax.swing.JButton jButton27;  
private javax.swing.JButton jButton28;  
private javax.swing.JButton jButton29;  
private javax.swing.JButton jButton3;  
private javax.swing.JButton jButton30;  
private javax.swing.JButton jButton31;  
private javax.swing.JButton jButton32;  
private javax.swing.JButton jButton33;  
private javax.swing.JButton jButton34;  
private javax.swing.JButton jButton36;  
private javax.swing.JButton jButton37;  
private javax.swing.JButton jButton4;  
private javax.swing.JButton jButton5;  
private javax.swing.JButton jButton6;  
private javax.swing.JButton jButton7;
```

```
private javax.swing.JButton jButton8;  
private javax.swing.JButton jButton9;  
private javax.swing.JRadioButton jRadioButton1;  
private javax.swing.JRadioButton jRadioButton2;  
private javax.swing.JTextField jTextField1;  
// End of variables declaration  
  
private static class jButton19 {  
  
    public jButton19() {  
    }  
}  
}
```

Results and Conclusion:



Figure 6.1

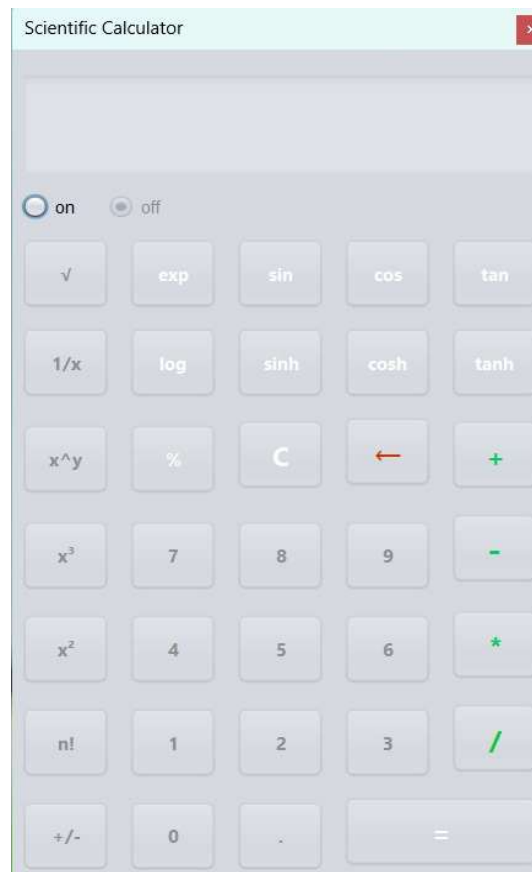


Figure 6.2

In conclusion, the development of the Java-based Scientific Calculator using the AWT library showcases the fundamental principles of event-driven programming, graphic rendering, and user interface design as shown in Figures 6.1 and 6.2. This project provides an engaging and interactive experience, allowing users to calculate within a visually appealing display. The use of Java, Swing and AWT enables a responsive and interesting experience. Further enhancements, such as degree to radian conversions,

Simultaneous Polynomial Equations solving, etc. can be integrated to make this project a foundation for more complex Scientific Calculator development. Overall, this project illustrates the versatility and potential of Java in creating interactive graphical applications.