import javax.swing.\*;  
import javax.swing.border.LineBorder;  
import java.awt.\*;  
import java.awt.event.ActionEvent;  
import java.awt.event.ActionListener;  
import java.text.DecimalFormat;  
  
  
public class Calculator extends JFrame implements ActionListener {  
  
 private DecimalFormat df = new DecimalFormat("#,###.00");  
  
 private String[] functionsLabels = {  
 "(", ")", "mc", "m+", "m-", "mr", "C", "+/-", "%", "÷",  
 "2ⁿᵈ", "x²", "x³", "xʸ", "eˣ", "10ˣ", "7", "8", "9", "x",  
 "1/x", "²√x", "³√x", "ʸ√x", "ln", "log₁₀", "4", "5", "6", "-",  
 "x!", "sin", "cos", "tan", "e", "EE", "1", "2", "3", "+",  
 "Rad", "sinh", "cosh", "tanh", "π", "Rand", "0", ".","Del", "=",  
 };  
  
  
  
 private int operator = 0;  
 private JPanel panel = new JPanel(new BorderLayout(5, 5));  
 private JPanel functionsPanel = new JPanel(new GridLayout(5, 10, 2, 2));  
 private JButton[] functions = new JButton[50];  
 private JTextArea textfield = new JTextArea(5, 40);  
 private double Num1 = 0, Num2 = 0;  
  
  
 public Calculator() {  
 init();  
 }  
  
 private void init() {  
 textfield.setFont(new Font("Times New Roman", Font.*BOLD*, 30));  
 setTitle("Calculator");  
 textfield.setBackground(Color.*BLACK*);  
 panel.setBackground(Color.*BLACK*);  
 functionsPanel.setBackground(Color.*BLACK*);  
 textfield.setForeground(Color.*WHITE*);  
  
 for (int i = 0; i < functions.length; i++) {  
 functions[i] = new JButton(functionsLabels[i]);  
  
  
 functions[i].setOpaque(true);  
 functions[i].setBorder(new LineBorder(Color.*BLUE*));  
 functions[i].setBorderPainted(false);  
 functions[i].setBackground(Color.*darkGray*);  
 functions[i].setForeground(Color.*WHITE*);  
 functions[i].addActionListener(this);  
 functionsPanel.add(functions[i]);  
 }  
  
 int[] specificButtonIndices = {9, 19, 29, 39, 49};  
  
  
 for (int i : specificButtonIndices) {  
 functions[i].setBackground(Color.*ORANGE*); // Change Color.RED to the desired color  
 }  
  
 int[] numberButtons = {16,17,18,26,27,28,36,37,38,46,47,48};  
  
  
 for (int i : numberButtons) {  
 functions[i].setBackground(Color.*lightGray*);  
 }  
  
  
  
  
 panel.add(functionsPanel, BorderLayout.*CENTER*);  
 panel.add(textfield, BorderLayout.*NORTH*);  
 textfield.setEditable(false);  
 add(panel);  
 setSize(800, 600);  
 setDefaultCloseOperation(JFrame.*EXIT\_ON\_CLOSE*);  
 setVisible(true);  
 }  
  
 public static void main(String[] args) {  
 SwingUtilities.*invokeLater*(Calculator::new);  
 }  
  
 @Override  
 public void actionPerformed(ActionEvent e) {  
 try {  
 String cmd = e.getActionCommand().toString();  
  
  
 switch (cmd) {  
 case ".":  
 if (!textfield.getText().contains(".")) {  
 textfield.setText(textfield.getText() + ".");  
 }  
 break;  
 case "0":  
 textfield.setText(textfield.getText() + "0");  
 break;  
 case "1":  
 textfield.setText(textfield.getText() + "1");  
 break;  
 case "2":  
 textfield.setText(textfield.getText() + "2");  
 break;  
 case "3":  
 textfield.setText(textfield.getText() + "3");  
 break;  
 case "4":  
 textfield.setText(textfield.getText() + "4");  
 break;  
 case "5":  
 textfield.setText(textfield.getText() + "5");  
 break;  
 case "6":  
 textfield.setText(textfield.getText() + "6");  
 break;  
 case "7":  
 textfield.setText(textfield.getText() + "7");  
 break;  
 case "8":  
 textfield.setText(textfield.getText() + "8");  
 break;  
 case "9":  
 textfield.setText(textfield.getText() + "9");  
 break;  
 case "(":  
 textfield.setText(textfield.getText() + "(");  
 break;  
 case ")":  
 textfield.setText(textfield.getText() + ")");  
 break;  
  
 case "π":  
 textfield.setText(textfield.getText() + Math.*PI*);  
 break;  
 case "e":  
 textfield.setText(textfield.getText() + Math.*exp*(1));  
 break;  
 case "Rand":  
 textfield.setText(textfield.getText() + Math.*random*());  
 break;  
  
 case "+":  
 if (!textfield.getText().isEmpty()) {  
 Num1 = Double.*parseDouble*(textfield.getText().toString());  
 operator = 1;  
 textfield.setText("");  
 }  
 break;  
 case "-":  
 if (!textfield.getText().isEmpty()) {  
 Num1 = Double.*parseDouble*(textfield.getText().toString());  
 operator = 2;  
 textfield.setText("");  
 }  
 break;  
 case "x":  
 if (!textfield.getText().isEmpty()) {  
 Num1 = Double.*parseDouble*(textfield.getText().toString());  
 operator = 3;  
 textfield.setText("");  
 }  
 break;  
  
 case "÷":  
 if (!textfield.getText().isEmpty()) {  
 Num1 = Double.*parseDouble*(textfield.getText().toString());  
 operator = 4;  
 textfield.setText("");  
 }  
 break;  
 case "xʸ":  
 if (!textfield.getText().isEmpty()) {  
 Num1 = Double.*parseDouble*(textfield.getText().toString());  
 operator = 5;  
 textfield.setText("");  
 }  
 break;  
 case "ʸ√x":  
 if (!textfield.getText().isEmpty()) {  
 Num1 = Double.*parseDouble*(textfield.getText().toString());  
 operator = 6;  
 textfield.setText("");  
 }  
 break;  
  
 case "%":  
 double num = Double.*parseDouble*(textfield.getText().toString());  
 textfield.setText(String.*valueOf*(num / 100.0));  
 break;  
 case "+/-":  
 double neg = Double.*parseDouble*(textfield.getText().toString());  
 neg \*= -1;  
 textfield.setText(String.*valueOf*(neg));  
 break;  
 case "x!":  
 double currentInput = Double.*parseDouble*(textfield.getText().toString());  
 int fact = 1;  
 for(int i=1;i<=currentInput;i++){  
 fact = fact\*i;  
 }  
 textfield.setText(String.*valueOf*(fact));  
 break;  
 case "C":  
 textfield.setText("");  
 break;  
  
 case "Del":  
 if(!textfield.getText().isEmpty()) {  
  
 String string = textfield.getText();  
  
 textfield.setText("");  
  
 for(int i=0;i<string.length()-1;i++) {  
  
 textfield.setText(textfield.getText()+string.charAt(i));  
  
 }  
 }  
 break;  
  
  
  
 case "sin", "cos", "tan", "²√x", "x²", "x³", "³√x", "10ˣ", "1/x",  
 "log₁₀", "ln", "eˣ", "sinh", "cosh", "tanh":  
 specialFunctions(cmd);  
 break;  
  
 default:  
 }  
  
 if (cmd.equalsIgnoreCase("=")) {  
  
 if (!textfield.getText().isEmpty()) {  
  
 Num2 = Double.*parseDouble*(textfield.getText().toString());  
  
 switch (operator) {  
 case 1: // addition  
 textfield.setText(String.*valueOf*(Num1 + Num2));  
 break;  
 case 2: // subtraction  
 textfield.setText(String.*valueOf*(Num1 - Num2));  
 break;  
 case 3: // multiplication  
 textfield.setText(String.*valueOf*(Num1 \* Num2));  
 break;  
 case 4: // division  
 if (Num2 != 0){  
 textfield.setText(String.*valueOf*(Num1 / Num2));  
 }else {  
 throw new ArithmeticException("Cannot divide by zero");  
 }  
 break;  
 case 5: // xʸ  
 textfield.setText(String.*valueOf*(Math.*pow*(Num1, Num2)));  
 break;  
 case 6: // ʸ√x  
 textfield.setText(String.*valueOf*(Math.*pow*(Num1, (1 / Num2))));  
 break;  
 default:  
 }  
 }  
 }  
 }catch (NumberFormatException e1){  
 textfield.setText("Error: Invalid input");  
 }catch (ArithmeticException e2){  
 textfield.setText("Error: " + e2.getMessage());  
 }  
 }  
  
 private void specialFunctions(String operation) {  
 try {  
 if (!textfield.getText().isEmpty()) {  
 double currentInput = Double.*parseDouble*(textfield.getText().toString());  
 double result = 0;  
 double radian = (currentInput \* (Math.*PI* / 180));  
  
 switch (operation) {  
 case "sin":  
 result = Math.*sin*(radian);  
 break;  
 case "cos":  
 result = Math.*cos*(radian);  
 break;  
 case "tan":  
 result = Math.*tan*(radian);  
 break;  
 case "x²":  
 result = Math.*pow*(currentInput, 2);  
 break;  
 case "²√x":  
 result = Math.*sqrt*(currentInput);  
 break;  
 case "x³":  
 result = Math.*pow*(currentInput, 3);  
 break;  
 case "³√x":  
 result = Math.*cbrt*(currentInput);  
 break;  
 case "10ˣ":  
 result = Math.*pow*(10, currentInput);  
 break;  
 case "eˣ":  
 result = Math.*exp*(currentInput);  
 break;  
 case "1/x":  
 if (currentInput != 0){  
 result = 1 / currentInput;  
 }else {  
 throw new ArithmeticException("Cannot divide by zero");  
 }  
 break;  
 case "log₁₀":  
 result = Math.*log10*(currentInput);  
 break;  
 case "ln":  
 result = Math.*log*(currentInput);  
 break;  
 case "sinh":  
 result = Math.*sinh*(currentInput);  
 break;  
 case "cosh":  
 result = Math.*cosh*(currentInput);  
 break;  
 case "tanh":  
 result = Math.*tanh*(currentInput);  
 break;  
  
 }  
 textfield.setText(String.*valueOf*(result));  
 }  
 }catch (NumberFormatException e1){  
 textfield.setText("Error: Invalid input");  
 }catch (ArithmeticException e2){  
 textfield.setText("Error:" + e2.getMessage());  
 }  
 }  
  
}