```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android=
"http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="#52595D">
<TextView
        android:id="@+id/textViewTitle"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:padding="16dp"
        android:text="*SanJesCalc*"
        android:textColor="#A8A9AD"
        android:textSize="40sp"
        android:textStyle="bold"
        android:gravity="center"
        android:fontFamily="sans-serif-thin"
        />
    <EditText
        android:id="@+id/display"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_alignParentTop="true"
        android:layout_marginTop="111dp"
        android:background="#9B9A96"
        android:gravity="end"
        android:importantForAccessibility="yes"
        android:inputType="none"
        android:padding="16dp"
        android:textSize="24sp" />

    <RelativeLayout
        android:id="@+id/button_container"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_alignParentBottom="true"
        android:layout_centerHorizontal="true"
        android:layout_alignParentStart="true"
        android:layout_alignParentEnd="true">

        <GridLayout
            android:id="@+id/button_grid"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
```

```
android:columnCount="4"
        android:rowCount="5"
        >
        <Button android:id="@+id/button1"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="1"
android:textColor="#565051" android:textSize="20dp"
 android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/button2"
android:layout_width="100dp"
android:layout_height="wrap_content"
android:text="2"
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/button3"
 android:layout_width="100dp"
android:layout_height="wrap_content"
 android:text="3"
android:textColor="#565051"
android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonC"
android:layout_width="100dp"
android:layout_height="wrap_content"
android:text="C"
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/button4"
android:layout_width="100dp"
android:layout_height="wrap_content"
 android:text="4" android:textColor="#565051"
android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/button5"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="5"
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/button6"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="6"
android:textColor="#565051" android:textSize="20dp"
```

```
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonPlus"
android:layout_width="100dp"
android:layout_height="wrap_content"
android:text="+" android:textColor="#565051"
android:textSize="20dp" android:backgroundTint="#B6B6B4"/>

        <Button android:id="@+id/button7"
android:layout_width="100dp"
 android:layout_height="wrap_content" android:text="7"
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/button8"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="8"
 android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/button9"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="9"
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonMinus"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="-"
android:textColor="#565051" android:textSize="20dp"
 android:backgroundTint="#B6B6B4"/>

        <Button android:id="@+id/buttonDot"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="."
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/button0"
android:layout_width="100dp"
android:layout_height="wrap_content"
android:text="0" android:textColor="#565051"
android:textSize="20dp" android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonEqual"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="="
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonMultiply"
```

```
android:layout_width="100dp"
android:layout_height="wrap_content"
android:text="*" android:textColor="#565051"
android:textSize="20dp" android:backgroundTint="#B6B6B4"/>

        <Button android:id="@+id/buttonSin"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="sin"
 android:textColor="#565051" android:textSize="20dp"
 android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonTan"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="tan"
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonCos"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="cos"
 android:textColor="#565051" android:textSize="20dp"
 android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonDivide"
 android:layout_width="100dp"
android:layout_height="wrap_content" android:text="/"
 android:textColor="#565051" android:textSize="20dp"
 android:backgroundTint="#B6B6B4"/>

        <Button android:id="@+id/buttonPercent"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="%"
 android:textColor="#565051" android:textSize="20dp"
 android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonLog"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="log"
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonSquare"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="x²"
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonInverse"
android:layout_width="100dp"
 android:layout_height="wrap_content" android:text="1/x"
```

```
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>

        <Button android:id="@+id/buttonLeftParen"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="("
 android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonRightParen"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text=")"
android:textColor="#565051" android:textSize="20dp"
 android:backgroundTint="#B6B6B4"/>

        <!-- Additional Buttons -->
        <Button android:id="@+id/buttonSqrt"
 android:layout_width="100dp"
android:layout_height="wrap_content" android:text="√"
android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>
        <Button android:id="@+id/buttonFactorial"
android:layout_width="100dp"
android:layout_height="wrap_content" android:text="x!"
 android:textColor="#565051" android:textSize="20dp"
android:backgroundTint="#B6B6B4"/>

    </GridLayout>

  </RelativeLayout>

</RelativeLayout>

package com.example.exp3calc;

import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {

  private EditText display;
  private String currentInput = "";
```

```
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        display = findViewById(R.id.display);

        // Number and operation buttons
        int[] buttonIds = {
                R.id.button0, R.id.button1, R.id.button2, R.id.button3,
 R.id.button4,
                R.id.button5, R.id.button6, R.id.button7, R.id.button8, R.id.button9,
                R.id.buttonDot, R.id.buttonPlus, R.id.buttonMinus, R.id.buttonMultiply,
R.id.buttonDivide,
                R.id.buttonPercent, R.id.buttonSin, R.id.buttonCos, R.id.buttonTan, R.id.buttonLog,
                R.id.buttonSquare, R.id.buttonInverse, R.id.buttonLeftParen, R.id.buttonRightParen,
                R.id.buttonEqual, R.id.buttonC, R.id.buttonSqrt, R.id.buttonFactorial
        };

        for (int id : buttonIds) {
            Button button = findViewById(id);
            button.setOnClickListener(new View.OnClickListener() {
                @Override
                public void onClick(View v) {
                    onButtonClick((Button) v);
                }
            });
        }
    }

    private void onButtonClick(Button button) {
        String text = button.getText().toString();
        if (text.equals("C")) {
            currentInput = "";
            display.setText("");
        } else if (text.equals("=")) {
            try {
                String expression = currentInput;
                expression = handleFactorial(expression);
                expression = handleSquareRoot(expression);
                expression = handleTrigonometricFunctions(expression);
                double result = evaluateExpression(expression);
                display.setText(String.valueOf(result));
```

```
            currentInput = String.valueOf(result);
        } catch (Exception e) {
            display.setText("Error");
            currentInput = "";
        }
    } else {
        currentInput += text;
        display.setText(currentInput);
    }
}

private double evaluateExpression(String expression) {
    try {
        return new ExpressionParser(expression).parse();
    } catch (Exception e) {
        return Double.NaN;
    }
}

private String handleFactorial(String expression) {
    StringBuilder result = new StringBuilder();
    int length = expression.length();
    int i = 0;

    while (i < length) {
        char ch = expression.charAt(i);
        if (Character.isDigit(ch)) {
            StringBuilder number = new StringBuilder();
            while (i < length && Character.isDigit(expression.charAt(i))) {
                number.append(expression.charAt(i));
                i++;
            }
            result.append(number);
            if (i < length && expression.charAt(i) == '!') {
                result.append("factorial(").append(number).append(")");
                i++; // Skip '!'
            }
        } else {
            result.append(ch);
            i++;
        }
    }
    return result.toString();
}
```

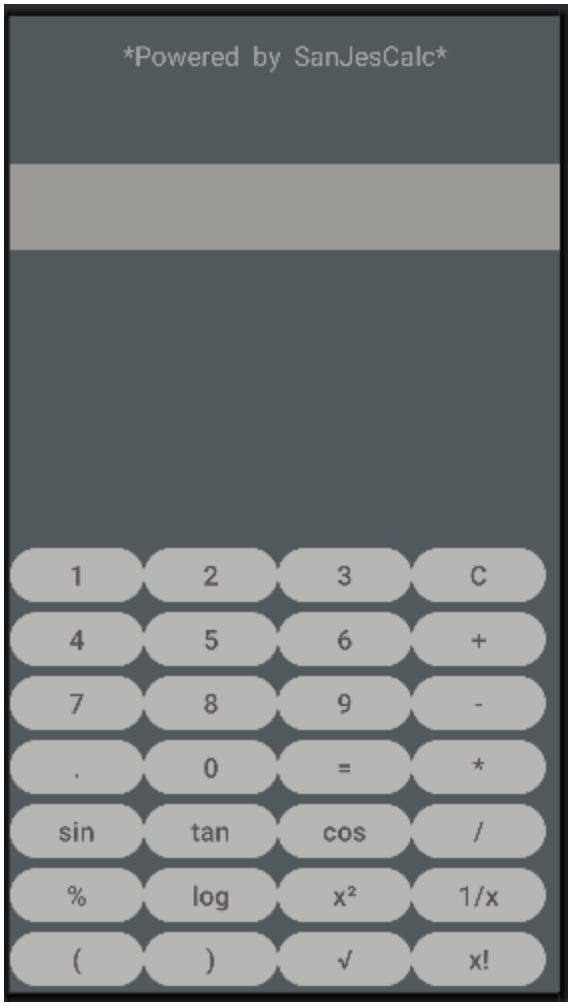
```
private String handleSquareRoot(String expression) {
    return expression.replace("√", "sqrt");
}

private String handleTrigonometricFunctions(String expression) {
    return expression
            .replace("sin", "Math.sin")
            .replace("cos", "Math.cos")
            .replace("tan", "Math.tan")
            .replace("log", "Math.log10");
}

private double factorial(double number) {
    if (number < 0) return Double.NaN;
    double result = 1;
    for (int i = 1; i <= number; i++) {
        result *= i;
    }
    return result;
}

private class ExpressionParser {
    private String expression;
    private int pos = -1, ch;

    public ExpressionParser(String expression) {
        this.expression = expression;
    }

    public double parse() {
        ch = nextChar();
        double result = parseExpression();
        if (pos < expression.length()) throw new RuntimeException("Unexpected: " + (char) ch);
        return result;
    }

    private double parseExpression() {
        double result = parseTerm();
        for (;;) {
            if (ch == '+') {
                ch = nextChar();
                result += parseTerm();
            } else if (ch == '-') {
```

```
            ch = nextChar();
            result -= parseTerm();
        } else {
            return result;
        }
    }
}

private double parseTerm() {
    double result = parseFactor();
    for (;;) {
        if (ch == '*') {
            ch = nextChar();
            result *= parseFactor();
        } else if (ch == '/') {
            ch = nextChar();
            result /= parseFactor();
        } else {
            return result;
        }
    }
}

private double parseFactor() {
    if (ch == '+') {
        ch = nextChar();
        return parseFactor();
    } else if (ch == '-') {
        ch = nextChar();
        return -parseFactor();
    } else if (ch == '(') {
        ch = nextChar();
        double result = parseExpression();
        if (ch == ')') ch = nextChar();
        return result;
    } else if (Character.isDigit(ch)) {
        StringBuilder sb = new StringBuilder();
        while (Character.isDigit(ch) || ch == '.') {
            sb.append((char) ch);
            ch = nextChar();
        }
        return Double.parseDouble(sb.toString());
    } else if (ch == 's') {
        ch = nextChar();
```

```
    if (ch == 'q') {
        ch = nextChar();
        if (ch == 'r') {
            ch = nextChar();
            if (ch == 't') {
                ch = nextChar();
                return Math.sqrt(parseFactor());
            }
        }
    }
} else if (ch == 'f') {
    ch = nextChar();
    if (ch == 'a') {
        ch = nextChar();
        if (ch == 'c') {
            ch = nextChar();
            if (ch == 't') {
                ch = nextChar();
                if (ch == 'o') {
                    ch = nextChar();
                    if (ch == 'r') {
                        ch = nextChar();
                        if (ch == 'i') {
                            ch = nextChar();
                            if (ch == 'a') {
                                ch = nextChar();
                                if (ch == 'l') {
                                    ch = nextChar();
                                    if (ch == '(') {
                                        double result = factorial(parseFactor());
                                        if (ch == ')') ch = nextChar();
                                        return result;
                                    }
                                }
                            }
                        }
                    }
                }
            }
        }
    }
} else if (ch == 'M') {
    ch = nextChar();
    if (ch == 'a') {
```

```
ch = nextChar();
if (ch == 't') {
    ch = nextChar();
    if (ch == 'h') {
        ch = nextChar();
        if (ch == '.') {
            ch = nextChar();
            if (ch == 's') {
                ch = nextChar();
                if (ch == 'i') {
                    ch = nextChar();
                    if (ch == 'n') {
                        ch = nextChar();
                        if (ch == '(') {
                            double result = Math.sin(parseFactor());
                            if (ch == ')') ch = nextChar();
                            return result;
                        }
                    }
                }
            } else if (ch == 'c') {
                ch = nextChar();
                if (ch == 'o') {
                    ch = nextChar();
                    if (ch == 's') {
                        ch = nextChar();
                        if (ch == '(') {
                            double result = Math.cos(parseFactor());
                            if (ch == ')') ch = nextChar();
                            return result;
                        }
                    }
                }
            } else if (ch == 't') {
                ch = nextChar();
                if (ch == 'a') {
                    ch = nextChar();
                    if (ch == 'n') {
                        ch = nextChar();
                        if (ch == '(') {
                            double result = Math.tan(parseFactor());
                            if (ch == ')') ch = nextChar();
                            return result;
                        }
```

```
                        }
                    }
                } else if (ch == 'l') {
                    ch = nextChar();
                    if (ch == 'o') {
                        ch = nextChar();
                        if (ch == 'g') {
                            ch = nextChar();
                            if (ch == '1') {
                                ch = nextChar();
                                if (ch == '0') {
                                    ch = nextChar();
                                    if (ch == '(') {
                                        double result = Math.log10(parseFactor());
                                        if (ch == ')') ch = nextChar();
                                        return result;
                                    }
                                }
                            }
                        }
                    }
                }
            }
        }
    }
    throw new RuntimeException("Unexpected: " + (char) ch);
}

private int nextChar() {
    return (++pos < expression.length()) ? expression.charAt(pos) : -1;
}
}
}
```




```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.Exp3calc"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
```

```
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```