Ex. No. : 02 **Date: 26-01-25**

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Simple Calculator

Aim
Develop a simple calculator to perform arithmetic and mathematical functions using Math class.

Procedure:

Step 1 : File -> NewProject

Provide the application name and Click “Next”

Step 2 : Select the target android devices

Select the minimum SDK to run the application. Click “Next”.

Step 3 : Choose the activity for the application (By default choose “Blank Activity).

Click “Next”.

Step 4 : Enter activity name and click "Finish".

Step 5 : Edit the program.

Step 6 : Run the application, 2-ways to run the application.

1. Running through emulator
2. Running through mobile device

AndroidManifest.xml

```
<?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.Calculator"
        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>
```

Activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:app="http://schemas.android.com/apk/res-auto"
   xmlns:tools="http://schemas.android.com/tools"
   android:id="@+id/main"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   tools:context=".MainActivity">

   <Button
      android:id="@+id/button1"
      android:layout_width="59dp"
      android:layout_height="63dp"
      android:layout_marginStart="4dp"
      android:layout_marginTop="252dp"
      android:text="1"
      app:layout_constraintStart_toStartOf="parent"
      app:layout_constraintTop_toTopOf="parent" />

   <Button
      android:id="@+id/button4"
      android:layout_width="59dp"
      android:layout_height="63dp"
      android:layout_marginStart="4dp"
      android:layout_marginTop="336dp"
      android:text="4"
      app:layout_constraintStart_toStartOf="parent"
      app:layout_constraintTop_toTopOf="parent" />

   <Button
      android:id="@+id/button7"
      android:layout_width="59dp"
      android:layout_height="63dp"
      android:layout_marginStart="4dp"
      android:layout_marginTop="424dp"
      android:text="7"
      app:layout_constraintStart_toStartOf="parent"
      app:layout_constraintTop_toTopOf="parent" />
```

```
<Button
        android:id="@+id/button8"
        android:layout_width="59dp"
        android:layout_height="63dp"
        android:layout_marginStart="80dp"
        android:layout_marginTop="424dp"
        android:text="8"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/button0"
        android:layout_width="59dp"
        android:layout_height="63dp"
        android:layout_marginStart="80dp"
        android:layout_marginTop="504dp"
        android:text="0"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/buttondot"
        android:layout_width="59dp"
        android:layout_height="63dp"
        android:layout_marginStart="4dp"
        android:layout_marginTop="504dp"
        android:text="."
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/buttonC"
        android:layout_width="76dp"
        android:layout_height="50dp"
        android:layout_marginStart="136dp"
        android:layout_marginTop="652dp"
        android:text="C"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/buttonequals"
        android:layout_width="59dp"
        android:layout_height="63dp"
        android:layout_marginStart="152dp"
        android:layout_marginTop="504dp"
        android:text="="
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />
```

```
    <Button   android:id="@+id/buttonpow"
    android:layout_width="76dp"
    android:layout_height="50dp"
    android:layout_marginStart="248dp"
    android:layout_marginTop="436dp"
    android:text="pow"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<Button
    android:id="@+id/buttonAC"
    android:layout_width="76dp"
    android:layout_height="50dp"
    android:layout_marginStart="132dp"
    android:layout_marginTop="584dp"
    android:text="AC"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<Button
    android:id="@+id/button9"
    android:layout_width="59dp"
    android:layout_height="63dp"
    android:layout_marginStart="152dp"
    android:layout_marginTop="424dp"
    android:text="9"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<Button
    android:id="@+id/button2"
    android:layout_width="59dp"
    android:layout_height="63dp"
    android:layout_marginStart="80dp"
    android:layout_marginTop="252dp"
    android:text="2"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />
```

```
<Button
    android:id="@+id/button5"
    android:layout_width="59dp"
    android:layout_height="63dp"
    android:layout_marginStart="80dp"
    android:layout_marginTop="336dp"
    android:text="5"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

  <Button
    android:id="@+id/button6"
    android:layout_width="59dp"
    android:layout_height="63dp"
    android:layout_marginStart="152dp"
    android:layout_marginTop="336dp"
    android:text="6"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

  <Button
    android:id="@+id/button3"
    android:layout_width="59dp"
    android:layout_height="63dp"
    android:layout_marginStart="152dp"
    android:layout_marginTop="252dp"
    android:text="3"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

  <Button
    android:id="@+id/buttonplus"
    android:layout_width="59dp"
    android:layout_height="63dp"
    android:layout_marginStart="248dp"
    android:layout_marginTop="252dp"
    android:text="+"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

  <Button
    android:id="@+id/buttonminus"
    android:layout_width="59dp"
    android:layout_height="63dp"
    android:layout_marginStart="324dp"
    android:layout_marginTop="252dp"
    android:text="-"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />
```

```
<Button
    android:id="@+id/buttonmultiply"
    android:layout_width="59dp"
    android:layout_height="63dp"
    android:layout_marginStart="248dp"
    android:layout_marginTop="332dp"
    android:text="x"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

  <Button
    android:id="@+id/buttonsin"
    android:layout_width="76dp"
    android:layout_height="50dp"
    android:layout_marginStart="332dp"
    android:layout_marginTop="436dp"
    android:text="sin"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

  <Button
    android:id="@+id/buttoncos"
    android:layout_width="76dp"
    android:layout_height="50dp"
    android:layout_marginStart="332dp"
    android:layout_marginTop="504dp"
    android:text="cos"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

  <Button
    android:id="@+id/buttonmod"
    android:layout_width="78dp"
    android:layout_height="50dp"
    android:layout_marginStart="248dp"
    android:layout_marginTop="652dp"
    android:text="mod"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />
```

```
<Button
    android:id="@+id/buttontan"
    android:layout_width="76dp"
    android:layout_height="50dp"
    android:layout_marginStart="248dp"
    android:layout_marginTop="504dp"
    android:text="tan"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

  <Button
    android:id="@+id/buttonlog"
    android:layout_width="76dp"
    android:layout_height="50dp"
    android:layout_marginStart="248dp"
    android:layout_marginTop="576dp"
    android:text="log"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

  <Button
    android:id="@+id/buttondivide"
    android:layout_width="59dp"
    android:layout_height="63dp"
    android:layout_marginStart="324dp"
    android:layout_marginTop="332dp"
    android:text="/"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

  <TextView
    android:id="@+id/textView"
    android:layout_width="344dp"
    android:layout_height="193dp"
    android:layout_marginStart="32dp"
    android:layout_marginTop="28dp"
    android:text="0"
    android:textAlignment="viewEnd"
    android:textSize="24dp"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

MainActivity.kt

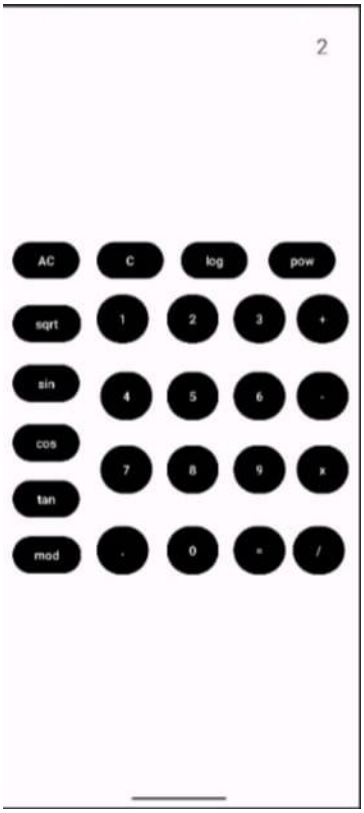
```
package com.example.calculator

import android.os.Bundle
import android.view.View
import android.widget.Button
import android.widget.TextView
import androidx.appcompat.app.AppCompatActivity
import kotlin.math.cos
import kotlin.math.log10
import kotlin.math.sin
import kotlin.math.sqrt
import kotlin.math.tan

class MainActivity : AppCompatActivity() {

    private lateinit var display: TextView
    private var currentInput: String = ""
    private var operator: String? = null
    private var firstNumber: Double? = null
    private var secondNumber: Double? = null

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_main)

        display = findViewById(R.id.textView)

        // Number buttons (dynamically mapped to all numbers 0-9)
        val numberButtons = listOf(
            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,
        )

        // Loop to set click listeners for number buttons dynamically
        numberButtons.forEach { id ->
            findViewById<Button>(id).setOnClickListener {
                val number = (it as Button).text.toString()
                appendNumber(number)
            }
        }
```

```
// Operator buttons
    val buttonPlus: Button = findViewById(R.id.buttonplus)
    buttonPlus.setOnClickListener { setOperator("+") }

    val buttonMinus: Button = findViewById(R.id.buttonminus)
    buttonMinus.setOnClickListener { setOperator("-") }

    val buttonMultiply: Button = findViewById(R.id.buttonmultiply)
    buttonMultiply.setOnClickListener { setOperator("*") }

    val buttonDivide: Button = findViewById(R.id.buttondivide)
    buttonDivide.setOnClickListener { setOperator("/") }

    val buttonEquals: Button = findViewById(R.id.buttonequals)
    buttonEquals.setOnClickListener { calculateResult() }

    val buttonPower: Button = findViewById(R.id.buttonpow)
    buttonPower.setOnClickListener { setOperator("pow") }

    val buttonSqrt: Button = findViewById(R.id.buttonsqrt)
    buttonSqrt.setOnClickListener { setOperator("sqrt") }
    //log and trignomentric functions
    val buttonSin: Button = findViewById(R.id.buttonsin)
    buttonSin.setOnClickListener { setOperator("sin") }

    val buttonCos: Button = findViewById(R.id.buttoncos)
    buttonCos.setOnClickListener { setOperator("cos") }

    val buttonTan: Button = findViewById(R.id.buttontan)
    buttonTan.setOnClickListener { setOperator("tan") }

    val buttonLog: Button = findViewById(R.id.buttonlog)
    buttonLog.setOnClickListener { setOperator("log") }


    // Clear button for resetting the calculator
    val buttonClear: Button = findViewById(R.id.buttonAC)
    buttonClear.setOnClickListener { resetCalculator() }

    val buttonClearLast: Button = findViewById(R.id.buttonC)
    buttonClearLast.setOnClickListener { clearLastInput() }

    val buttonModulus: Button = findViewById(R.id.buttonmod)
    buttonModulus.setOnClickListener { setOperator("%") }
}
```

```
// Function to append numbers to the current input
    private fun appendNumber(number: String) {
        currentInput += number
        display.text = currentInput
    }

    // Function to set the operator (like +, -, *, /, ^, √)
    private fun setOperator(op: String) {
        if (firstNumber == null) {
            firstNumber = currentInput.toDouble()
            currentInput = ""
        }
        operator = op
        display.text = operator
    }

    // Function to calculate the result
    private fun calculateResult() {
        if (firstNumber != null && operator != null) {
            when (operator) {
                "+" -> {
                    secondNumber = currentInput.toDouble()
                    val result = firstNumber!! + secondNumber!!
                    display.text = result.toString()
                }
                "-" -> {
                    secondNumber = currentInput.toDouble()
                    val result = firstNumber!! - secondNumber!!
                    display.text = result.toString()
                }
                "*" -> {
                    secondNumber = currentInput.toDouble()
                    val result = firstNumber!! * secondNumber!!
                    display.text = result.toString()
                }
                "/" -> {
                    secondNumber = currentInput.toDouble()
                    val result = if (secondNumber != 0.0) firstNumber!! / secondNumber!! else Double.NaN
                    display.text = result.toString()
                }
                "pow" -> {  // Power operation (exponentiation)
                    secondNumber = currentInput.toDouble()
                    val result = Math.pow(firstNumber!!, secondNumber!!)
                    display.text = result.toString()
                }
```

```
"sqrt" -> {  // Square Root operation
                val result = sqrt(firstNumber!!)
                display.text = result.toString()
            }
            "sin" -> {  // Sine operation (in radians)
                val result = sin(Math.toRadians(firstNumber!!))
                display.text = result.toString()
            }
            "cos" -> {  // Cosine operation (in radians)
                val result = cos(Math.toRadians(firstNumber!!))
                display.text = result.toString()
            }
            "tan" -> {  // Tangent operation (in radians)
                val result = tan(Math.toRadians(firstNumber!!))
                display.text = result.toString()
            }
            "log" -> {  // Logarithm operation (base 10)
                val result = log10(firstNumber!!)
                display.text = result.toString()
            }
            "%" -> {  // Modulus operation
                secondNumber = currentInput.toDouble()
                val result = firstNumber!! % secondNumber!!
                display.text = result.toString()
            }
            else -> display.text = "Error"
        }
        //resetCalculator() // Reset after showing the result
    }
  }

  // Function to reset calculator for next calculation
  private fun resetCalculator() {
    firstNumber = null
    secondNumber = null
    currentInput = ""
    operator = null
    display.text = "0"  // Reset the display text to "0"
  }

  // Function to clear the last digit or value from the current input
  private fun clearLastInput() {
    // Clears the last character from the current input (from right to left)
    if (currentInput.isNotEmpty()) {
        currentInput = currentInput.dropLast(1) // Remove last character
        // Update the display to reflect the current input (or "0" if input is empty)
        display.text = if (currentInput.isNotEmpty()) currentInput else "0"
    }       }       }
```

Output



Result:

The experiment was conducted successfully