MOBILE APPLICATION & DEVELOPMENT ASSIGNMENT

EX-02 GUI COMPONENTS

AIM:

To develop a scientific calculator to perform arithmetic and mathematical functions using Math class.

PROCEDURE:

Step 1:

Open Android Studio → File → New Project → Choose Empty Activity → Language: Kotlin → Click Finish.

Step 2:

In activity_main.xml, design the layout:

- Use EditText for input.
- Use Buttons for operations: +, –, ×, ÷, sin, cos, tan, log, sqrt, power, etc.
- Use a TextView to show the result.

Step 3:

In MainActivity.kt, perform logic:

- Fetch input from EditText.
- Use Math class methods like Math.sin(), Math.log(), Math.sqrt(), etc.
- Handle arithmetic: +, -, *, / with basic Kotlin operations.

Step 4:

Add button click listeners for each operation and update the TextView with results.

Step 5:

Run the app using Emulator or USB-connected device.

MOBILE APPLICATION & DEVELOPMENT ASSIGNMENT

EX-02 GUI COMPONENTS

CODE:

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"
    package="com.example.scientificcalculator">

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.ScientificCalculator"
        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"?>
<ScrollView xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="16dp">

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="vertical"
        android:gravity="center_horizontal">
```

MOBILE APPLICATION & DEVELOPMENT ASSIGNMENT

EX-02 GUI COMPONENTS

```
<com.google.android.material.textfield.TextInputLayout
   android:layout_width="match_parent"
   android:layout_height="wrap_content"
   android:minHeight="56dp"
   app:boxBackgroundMode="outline"
   app:boxStrokeColor="@android:color/black">

   <com.google.android.material.textfield.TextInputEditText
      android:id="@+id/etInput"
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:hint="Enter number(s) (e.g. 5 3)"
      android:inputType="text"/>
</com.google.android.material.textfield.TextInputLayout>

<!-- Trigonometric Functions -->
<LinearLayout
   android:layout_width="match_parent"
   android:layout_height="wrap_content"
   android:orientation="horizontal"
   android:gravity="center"
   android:paddingTop="16dp">

   <Button android:id="@+id/btnSin"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:text="sin"/>
   <Button android:id="@+id/btnCos"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:text="cos"/>
   <Button android:id="@+id/btnTan"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:text="tan"/>
</LinearLayout>

<!-- Arithmetic Operations -->
<LinearLayout
   android:layout_width="match_parent"
   android:layout_height="wrap_content"
   android:orientation="horizontal"
   android:gravity="center"
   android:paddingTop="8dp">
```

MOBILE APPLICATION & DEVELOPMENT ASSIGNMENT

EX-02 GUI COMPONENTS

```
 <Button android:id="@+id/btnAdd" android:layout_width="wrap_content"
android:layout_height="wrap_content" android:text="+"/>
        <Button android:id="@+id/btnSubtract"
android:layout_width="wrap_content" android:layout_height="wrap_content"




android:text="-"/>
        <Button android:id="@+id/btnMultiply"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:text="*"/>
        <Button android:id="@+id/btnDivide"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:text="/"/>
    </LinearLayout>

    <!-- Scientific Functions -->
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="horizontal"
        android:gravity="center"
        android:paddingTop="8dp">

        <Button android:id="@+id/btnSqrt"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:text="√"/>
        <Button android:id="@+id/btnPow"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:text="^"/>
        <Button android:id="@+id/btnLog"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:text="ln"/>
        <Button android:id="@+id/btnMod"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:text="%"/>
    </LinearLayout>

    <!-- Result Display -->
    <TextView
```

EX-02 GUI COMPONENTS

```
   android:id="@+id/tvResult"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Result:"
        android:textSize="24sp"
        android:gravity="center"
        android:paddingTop="24dp"/>
   </LinearLayout>
</ScrollView>
```

MainActivity.kt:

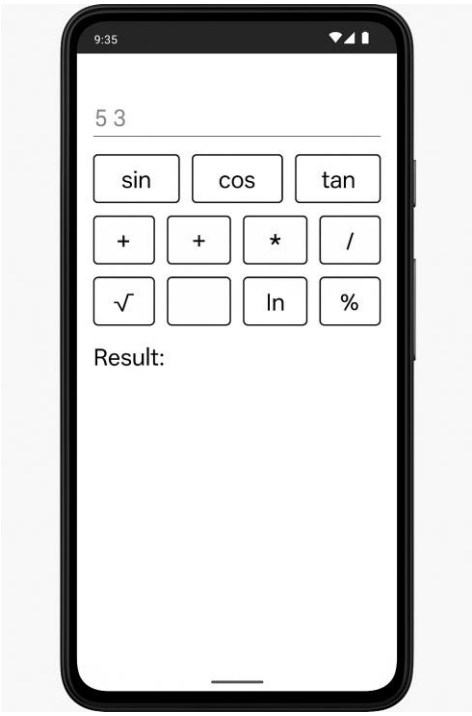
```
package com.example.scientificcalculator

import android.os.Bundle
import android.widget.*
import androidx.appcompat.app.AppCompatActivity
import kotlin.math.*

class MainActivity : AppCompatActivity() {

   private lateinit var input: EditText
   private lateinit var resultView: TextView

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

      input = findViewById(R.id.etInput)
      resultView = findViewById(R.id.tvResult)

      setClick(R.id.btnAdd) { calculateBinary("+") }
      setClick(R.id.btnSubtract) { calculateBinary("-") }
      setClick(R.id.btnMultiply) { calculateBinary("*") }
      setClick(R.id.btnDivide) { calculateBinary("/") }
      setClick(R.id.btnPow) { calculateBinary("^") }
      setClick(R.id.btnMod) { calculateBinary("%") }

      setClick(R.id.btnSin) { calculateSingle { sin(Math.toRadians(it)) } }
      setClick(R.id.btnCos) { calculateSingle { cos(Math.toRadians(it)) } }
      setClick(R.id.btnTan) { calculateSingle { tan(Math.toRadians(it)) } }
      setClick(R.id.btnSqrt) { calculateSingle { if (it >= 0) sqrt(it) else
```

EX-02 GUI COMPONENTS

```
return@calculateSingle null } }
        setClick(R.id.btnLog) { calculateSingle { if (it > 0) ln(it) else
return@calculateSingle null } }
    }

    private fun setClick(buttonId: Int, action: () -> Unit) {
        findViewById<Button>(buttonId).setOnClickListener { action() }
    }

    private fun calculateSingle(operation: (Double) -> Double?) {
        val number = input.text.toString().toDoubleOrNull()
        if (number != null) {
            val result = operation(number)
            resultView.text = "Result: ${result ?: "Invalid input"}"
        } else {
            showError()
        }
    }

    private fun calculateBinary(op: String) {
        val parts = input.text.toString().split(" ")
        if (parts.size != 2) {
            resultView.text = "Enter two numbers separated by space"
            return
        }

        val a = parts[0].toDoubleOrNull()
        val b = parts[1].toDoubleOrNull()

        if (a == null || b == null) {
            showError()
            return
        }

        val result = when (op) {
            "+" -> a + b
            "-" -> a - b
            "*" -> a * b
            "/" -> if (b != 0.0) a / b else "Error: Division by zero"
            "^" -> a.pow(b)
            "%" -> a % b
            else -> "Unknown"
        }
```

```
        resultView.text = "Result: $result"
    }

    private fun showError() {
        Toast.makeText(this, "Invalid input!", Toast.LENGTH_SHORT).show()
    }
}
```

OUTPUT IMAGE:



RESULT:

The application has been successfully developed using Kotlin and android studio.