Ex. No.	:	02B	Date: 15/02/2026
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Scientific Calculator App

Aim

To develop an Android application using Kotlin that performs scientific calculations such as addition, subtraction, multiplication, division, trigonometric functions (sin, cos, tan), logarithmic functions (log, ln), square root, power, and exponential operations. The app should accept user input through an EditText, perform the selected scientific operation when a Button is pressed, and display the result in a TextView.

Procedure:

Activity_main.xml

<?xml version="1.0" encoding="utf-8"?>

<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"

  xmlns:tools="http://schemas.android.com/tools"

  android:layout_width="match_parent"

  android:layout_height="match_parent"

  android:orientation="vertical"

  android:padding="16dp"

  tools:context=".MainActivity">

  <!-- Display -->

  <EditText

    android:id="@+id/resultEditText"

```xml
    android:layout_width="match_parent"

    android:layout_height="wrap_content"

    android:gravity="end"

    android:inputType="none"

    android:textSize="32sp"

    android:padding="24dp"

    android:background="@android:color/transparent"

    android:hint="0" />


<!-- Buttons -->
<GridLayout

    android:layout_width="match_parent"

    android:layout_height="0dp"

    android:layout_weight="1"

    android:columnCount="4"

    android:useDefaultMargins="true">


    <!-- Row 1 -->
    <Button

        android:id="@+id/buttonClear"

        android:text="C"

        android:layout_columnSpan="2"
```

```xml
        android:layout_width="0dp"

        android:layout_columnWeight="2"

        android:layout_height="wrap_content" />


    <Button

        android:id="@+id/buttonSin"

        android:text="SIN"

        android:layout_width="0dp"

        android:layout_columnWeight="1"

        android:layout_height="wrap_content" />


    <Button

        android:id="@+id/buttonCos"

        android:text="COS"

        android:layout_width="0dp"

        android:layout_columnWeight="1"

        android:layout_height="wrap_content" />


    <!-- Row 2 -->
    <Button

        android:id="@+id/buttonTan"

        android:text="TAN"

        android:layout_width="0dp"
```

```xml
        android:layout_columnWeight="1"

        android:layout_height="wrap_content" />


    <Button

        android:id="@+id/buttonLog"

        android:text="LOG"

        android:layout_width="0dp"

        android:layout_columnWeight="1"

        android:layout_height="wrap_content" />


    <Button

        android:id="@+id/buttonSqrt"

        android:text="√"

        android:layout_width="0dp"

        android:layout_columnWeight="1"

        android:layout_height="wrap_content" />


    <Button

        android:id="@+id/buttonDiv"

        android:text="/"

        android:layout_width="0dp"

        android:layout_columnWeight="1"
```

```xml
        android:layout_height="wrap_content" />


    <!-- Row 3 -->

    <Button android:id="@+id/button7" android:text="7"

        android:layout_width="0dp"

        android:layout_columnWeight="1"

        android:layout_height="wrap_content"/>


    <Button android:id="@+id/button8" android:text="8"

        android:layout_width="0dp"

        android:layout_columnWeight="1"

        android:layout_height="wrap_content"/>


    <Button android:id="@+id/button9" android:text="9"

        android:layout_width="0dp"

        android:layout_columnWeight="1"

        android:layout_height="wrap_content"/>


    <Button android:id="@+id/buttonMulti" android:text="×"

        android:layout_width="0dp"

        android:layout_columnWeight="1"

        android:layout_height="wrap_content"/>
```

<!-- Row 4 -->

<Button android:id="@+id/button4" android:text="4"

   android:layout_width="0dp"

   android:layout_columnWeight="1"

   android:layout_height="wrap_content"/>

<Button android:id="@+id/button5" android:text="5"

   android:layout_width="0dp"

   android:layout_columnWeight="1"

   android:layout_height="wrap_content"/>

<Button android:id="@+id/button6" android:text="6"

   android:layout_width="0dp"

   android:layout_columnWeight="1"

   android:layout_height="wrap_content"/>

<Button android:id="@+id/buttonSub" android:text="-"

   android:layout_width="0dp"

   android:layout_columnWeight="1"

   android:layout_height="wrap_content"/>

<!-- Row 5 -->

```xml
<Button android:id="@+id/button1" android:text="1"

    android:layout_width="0dp"

    android:layout_columnWeight="1"

    android:layout_height="wrap_content"/>


<Button android:id="@+id/button2" android:text="2"

    android:layout_width="0dp"

    android:layout_columnWeight="1"

    android:layout_height="wrap_content"/>


<Button android:id="@+id/button3" android:text="3"

    android:layout_width="0dp"

    android:layout_columnWeight="1"

    android:layout_height="wrap_content"/>


<Button android:id="@+id/buttonAdd" android:text="+"

    android:layout_width="0dp"

    android:layout_columnWeight="1"

    android:layout_height="wrap_content"/>


<!-- Row 6 -->
<Button

    android:id="@+id/button0"
```

```xml
        android:text="0"

        android:layout_columnSpan="2"

        android:layout_width="0dp"

        android:layout_columnWeight="2"

        android:layout_height="wrap_content"/>


    <Button

        android:id="@+id/buttonDot"

        android:text="."

        android:layout_width="0dp"

        android:layout_columnWeight="1"

        android:layout_height="wrap_content"/>


    <Button

        android:id="@+id/buttonEqual"

        android:text="="

        android:layout_width="0dp"

        android:layout_columnWeight="1"

        android:layout_height="wrap_content"/>

</GridLayout>
```

</LinearLayout>

MainActivity.kt

package com.example.calculatorapp

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

class MainActivity : AppCompatActivity() {

   private lateinit var resultEditText: EditText

   private var operand1: Double? = null
   private var pendingOperation: String = "="

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

     resultEditText = findViewById(R.id.resultEditText)

     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,

```
      R.id.buttonDot
    )

    for (id in numberButtons) {
      findViewById<Button>(id).setOnClickListener {
        val button = it as Button
        resultEditText.append(button.text)
      }
    }

    findViewById<Button>(R.id.buttonAdd).setOnClickListener { performOperation("+") }
    findViewById<Button>(R.id.buttonSub).setOnClickListener { performOperation("-") }
    findViewById<Button>(R.id.buttonMulti).setOnClickListener { performOperation("*") }
    findViewById<Button>(R.id.buttonDiv).setOnClickListener { performOperation("/") }
    findViewById<Button>(R.id.buttonEqual).setOnClickListener { performOperation("=") }

    findViewById<Button>(R.id.buttonSin).setOnClickListener { scientific("sin") }
    findViewById<Button>(R.id.buttonCos).setOnClickListener { scientific("cos") }
    findViewById<Button>(R.id.buttonTan).setOnClickListener { scientific("tan") }
    findViewById<Button>(R.id.buttonLog).setOnClickListener { scientific("log") }
    findViewById<Button>(R.id.buttonSqrt).setOnClickListener { scientific("sqrt") }

    findViewById<Button>(R.id.buttonClear).setOnClickListener {
      resultEditText.setText("")
      operand1 = null
      pendingOperation = "="
    }
  }
```

```kotlin
private fun performOperation(operation: String) {
    val value = resultEditText.text.toString()

    if (value.isNotEmpty()) {
        val operand2 = value.toDouble()

        if (operand1 == null) {
            operand1 = operand2
        } else {
            operand1 = when (pendingOperation) {
                "=" -> operand2
                "+" -> operand1!! + operand2
                "-" -> operand1!! - operand2
                "*" -> operand1!! * operand2
                "/" -> if (operand2 != 0.0) operand1!! / operand2 else 0.0
                else -> operand2
            }
        }
    }

    pendingOperation = operation
    resultEditText.setText(operand1.toString())
}

private fun scientific(type: String) {
    val value = resultEditText.text.toString()

    if (value.isNotEmpty()) {
```

```kotlin
            val number = value.toDouble()
            val result = when (type) {
                "sin" -> sin(Math.toRadians(number))
                "cos" -> cos(Math.toRadians(number))
                "tan" -> tan(Math.toRadians(number))
                "log" -> log10(number)
                "sqrt" -> sqrt(number)
                else -> number
            }

            resultEditText.setText(result.toString())
        }
    }
}
```
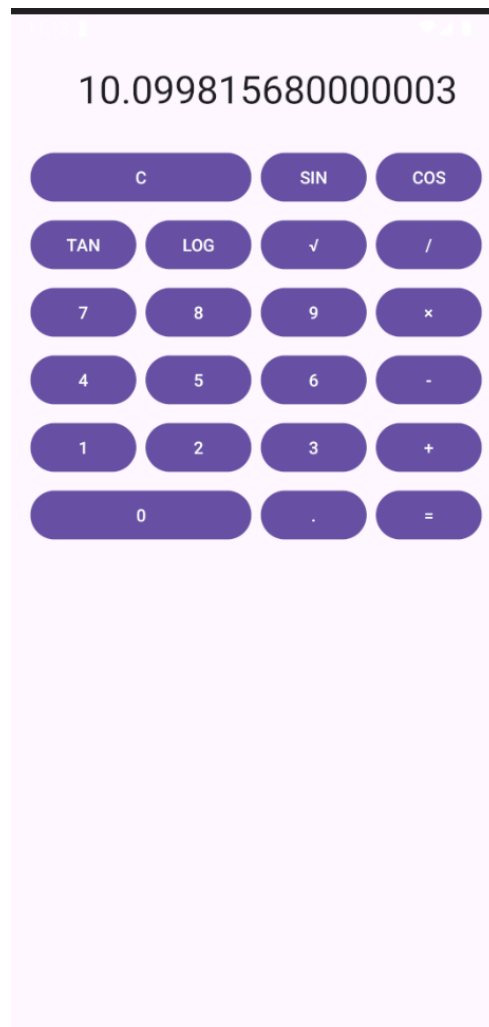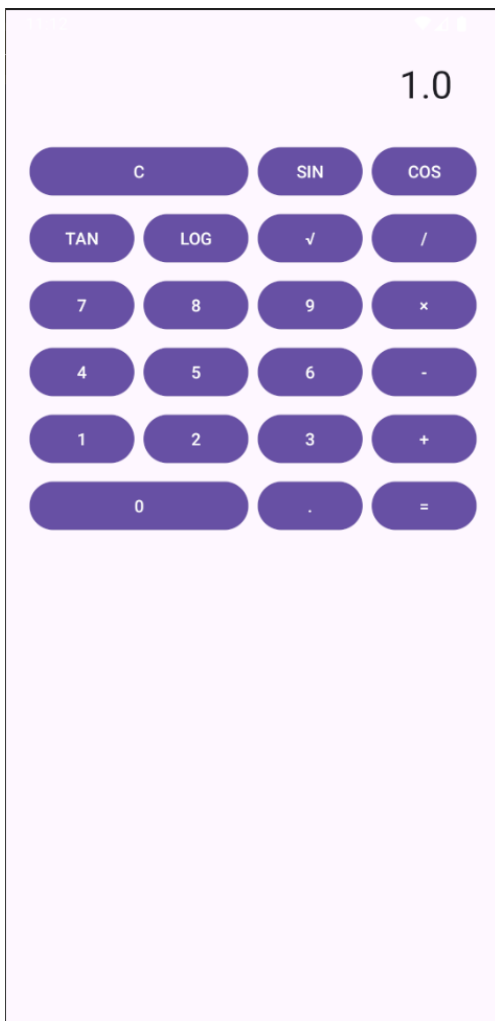
Output

Result:

Hence the experiment is completed and the output is verified..