

Ex. No. : 02

Date: 11/02/2025

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GUI Components

Aim

Develop a scientific calculator to perform arithmetic and mathematical functions using Math class. [should contain +, *, /, =, cos, sin, tan, pow, sqrt, log, lan and mod].

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"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="16dp"
    android:gravity="center">

    <EditText
        android:id="@+id/input"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Enter expression"
        android:inputType="none"
        android:textSize="20sp"
        android:focusable="false" />

    <TextView
        android:id="@+id/result"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Result: 0"
        android:textSize="24sp"
        android:textStyle="bold"
        android:padding="8dp" />

    <GridLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:columnCount="4"
        android:rowCount="5"
        android:padding="8dp">

        <!-- Number Buttons -->
        <Button android:text="7" style="@style/CalcButton"
android:onClick="onNumberClick" />
        <Button android:text="8" style="@style/CalcButton"
android:onClick="onNumberClick" />
        <Button android:text="9" style="@style/CalcButton"
android:onClick="onNumberClick" />
        <Button android:text="/" style="@style/CalcButton"
android:onClick="onOperatorClick" />
```

```

        <Button android:text="4" style="@style/CalcButton"
android:onClick="onNumberClick" />
        <Button android:text="5" style="@style/CalcButton"
android:onClick="onNumberClick" />
        <Button android:text="6" style="@style/CalcButton"
android:onClick="onNumberClick" />
        <Button android:text="*" style="@style/CalcButton"
android:onClick="onOperatorClick" />

        <Button android:text="1" style="@style/CalcButton"
android:onClick="onNumberClick" />
        <Button android:text="2" style="@style/CalcButton"
android:onClick="onNumberClick" />
        <Button android:text="3" style="@style/CalcButton"
android:onClick="onNumberClick" />
        <Button android:text="-" style="@style/CalcButton"
android:onClick="onOperatorClick" />

        <Button android:text="0" style="@style/CalcButton"
android:onClick="onNumberClick" />
        <Button android:text="." style="@style/CalcButton" android:onClick="onNumberClick"
/>
        <Button android:text="=" style="@style/CalcButton" android:onClick="onEqualsClick"
/>
        <Button android:text="+" style="@style/CalcButton"
android:onClick="onOperatorClick" />

        <!-- Advanced Functions -->
        <Button android:text="C" style="@style/CalcButton" android:onClick="onClearClick"
/>
        <Button android:text="√" style="@style/CalcButton"
android:onClick="onFunctionClick" />
        <Button android:text="^" style="@style/CalcButton"
android:onClick="onOperatorClick" />
        <Button android:text="mod" style="@style/CalcButton"
android:onClick="onOperatorClick" />

        <Button android:text="sin" style="@style/CalcButton"
android:onClick="onFunctionClick" />
        <Button android:text="cos" style="@style/CalcButton"
android:onClick="onFunctionClick" />
        <Button android:text="tan" style="@style/CalcButton"
android:onClick="onFunctionClick" />
        <Button android:text="log" style="@style/CalcButton"

```

```

        android:onClick="onFunctionClick" />

        <Button android:text="ln" style="@style/CalcButton"
        android:onClick="onFunctionClick" />
    </GridLayout>
</LinearLayout>

```

MainActivity.kt package

```
package com.example.ex2
```

```

import android.os.Bundle
import android.view.View
import
    android.widget.Button
import
    android.widget.EditText
import
    android.widget.TextView
import
    androidx.appcompat.app.A
    ppCompatActivity
import kotlin.math.*

```

```

class MainActivity :
    AppCompatActivity() {
    private lateinit var
    inputField: EditText
    private lateinit var
    resultField: TextView
    private var
    currentExpression: String
    = ""

```

```
        override fun  
onCreate(savedInstanceState:  
Bundle?) {  
  
    super.onCreate(savedInstanceState)  
  
    setContentView(R.layout.a  
ctivity_main)
```

```
        inputField =  
findViewById(R.id.input)  
        resultField =  
findViewById(R.id.result)  
    }
```

```
        fun  
onNumberClick(view:  
View) {  
            val button = view as  
Button  
            currentExpression +=  
button.text.toString()
```

```
        inputField.setText(current  
Expression)  
    }
```

```
        fun  
onOperatorClick(view:  
View) {  
            val button = view as
```

Button

```
currentExpression +=  
"${button.text} "
```

```
inputField.setText(current  
Expression)  
}
```

```
fun  
onFunctionClick(view:  
View) {  
    val button = view as  
    Button  
    val expression =  
currentExpression.toDoubl  
eOrNull()
```

```
    if (expression != null) {  
        val result = when  
(button.text.toString()) {  
            "sin" ->  
sin(Math.toRadians(expres  
sion))  
            "cos" ->  
cos(Math.toRadians(expres  
sion))  
            "tan" ->  
tan(Math.toRadians(expres  
sion))  
            "log" ->  
log10(expression)  
            "ln" ->  
ln(expression)
```

```

        "√" ->
sqrt(expression)
        else -> 0.0
    }
    resultField.text =
"Result: $result"
    }
}

```

```

fun onEqualsClick(view:
View) {
    try {
        val tokens =
currentExpression.split(" ")
        if (tokens.size < 3)
return

```

```

        val num1 =
tokens[0].toDouble()
        val operator =
tokens[1]
        val num2 =
tokens[2].toDouble()

```

```

        val result = when
(operator) {
            "+" -> num1 +
num2
            "-" -> num1 -
num2
            "*" -> num1 *
num2
            "/" -> num1 /

```

```

num2
    "mod" -> num1 %
num2
    "^" ->
num1.pow(num2)
    else -> 0.0
}

```

```

    resultField.text =
"Result: $result"
    } catch (e: Exception) {
        resultField.text =
"Error"
    }
}

```

```

fun onClearClick(view:
View) {
    currentExpression = ""
    inputField.setText("")
    resultField.text =
"Result: 0"
}
}

```

Activivty_main.xml

```

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

```



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

```
android:layout_width="match_parent"
```

```
android:layout_height="match_parent"
```

```
android:orientation="vertical"
```

```
android:padding="16dp"
```

```
android:gravity="center">
```

```
<EditText
```

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

```
android:layout_width="match_parent"
```

```
android:layout_height="wrap_content"
```

```
    android:hint="Enter expression"
```

```
android:inputType="none"
```

```
android:textSize="20sp"
```

```
android:focusable="false"
/>
```

```
<TextView
```

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

```
android:layout_width="
match_parent"
```

```
android:layout_height="
wrap_content"
```

```
android:text="Result: 0"
```

```
android:textSize="24sp"
```

```
android:textStyle="bold"
```

```
android:padding="8dp"
/>
```

```
<GridLayout
```

```
android:layout_width="
```

```

match_parent"

android:layout_height="
wrap_content"

android:columnCount="4
"

android:rowCount="5"

android:padding="8dp">

    <!-- Number
Buttons -->
    <Button
android:text="7"
style="@style/CalcButton
"
android:onClick="onNu
mberClick" />
    <Button
android:text="8"
style="@style/CalcButton
"
android:onClick="onNu
mberClick" />
    <Button
android:text="9"
style="@style/CalcButton
"

```

```

        android:onClick="onNumberClick" />
        <Button
        android:text="/"
        style="@style/CalcButton
        "
        android:onClick="onOperatorClick" />

        <Button
        android:text="4"
        style="@style/CalcButton
        "
        android:onClick="onNumberClick" />
        <Button
        android:text="5"
        style="@style/CalcButton
        "
        android:onClick="onNumberClick" />
        <Button
        android:text="6"
        style="@style/CalcButton
        "
        android:onClick="onNumberClick" />
        <Button
        android:text="*"
        style="@style/CalcButton

```

```

"
android:onClick="onOperatorClick" />

        <Button
android:text="1"
style="@style/CalcButton
"
android:onClick="onNumberClick" />
        <Button
android:text="2"
style="@style/CalcButton
"
android:onClick="onNumberClick" />
        <Button
android:text="3"
style="@style/CalcButton
"
android:onClick="onNumberClick" />
        <Button
android:text="-"
style="@style/CalcButton
"
android:onClick="onOperatorClick" />

        <Button

```

```

    android:text="0"
    style="@style/CalcButton
"
    android:onClick="onNu
mberClick" />
    <Button
    android:text="."
    style="@style/CalcButton
"
    android:onClick="onNu
mberClick" />
    <Button
    android:text="="
    style="@style/CalcButton
"
    android:onClick="onEqu
alsClick" />
    <Button
    android:text="+"
    style="@style/CalcButton
"
    android:onClick="onOpe
ratorClick" />

    <!-- Advanced
Functions -->
    <Button
    android:text="C"
    style="@style/CalcButton
"

```

```

        android:onClick="onClearClick" />
        <Button
        android:text="√"
        style="@style/CalcButton"
        "
        android:onClick="onFunctionClick" />
        <Button
        android:text="^"
        style="@style/CalcButton"
        "
        android:onClick="onOperatorClick" />
        <Button
        android:text="mod"
        style="@style/CalcButton"
        "
        android:onClick="onOperatorClick" />

        <Button
        android:text="sin"
        style="@style/CalcButton"
        "
        android:onClick="onFunctionClick" />
        <Button
        android:text="cos"
        style="@style/CalcButton

```

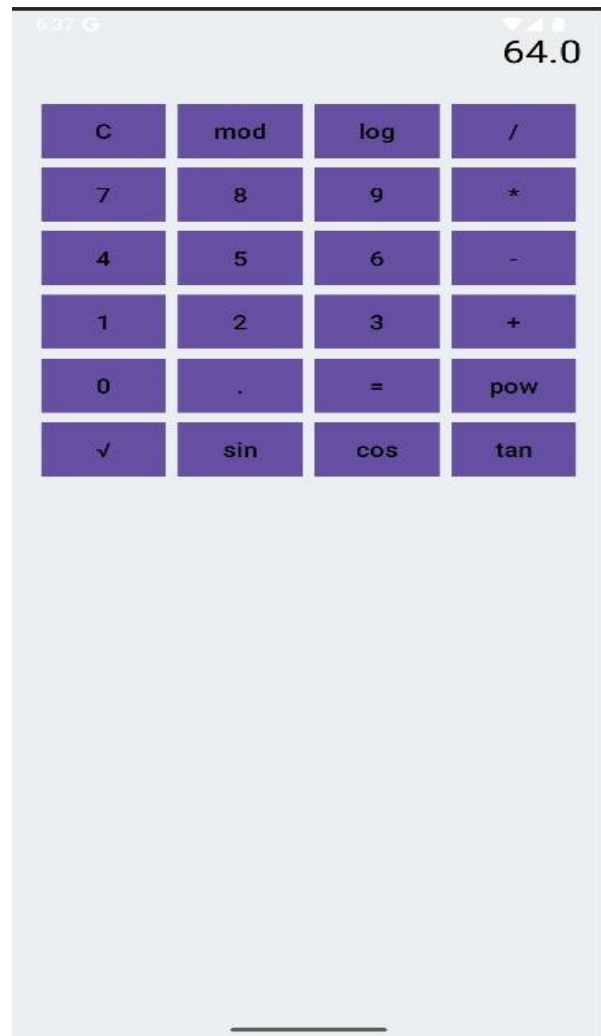
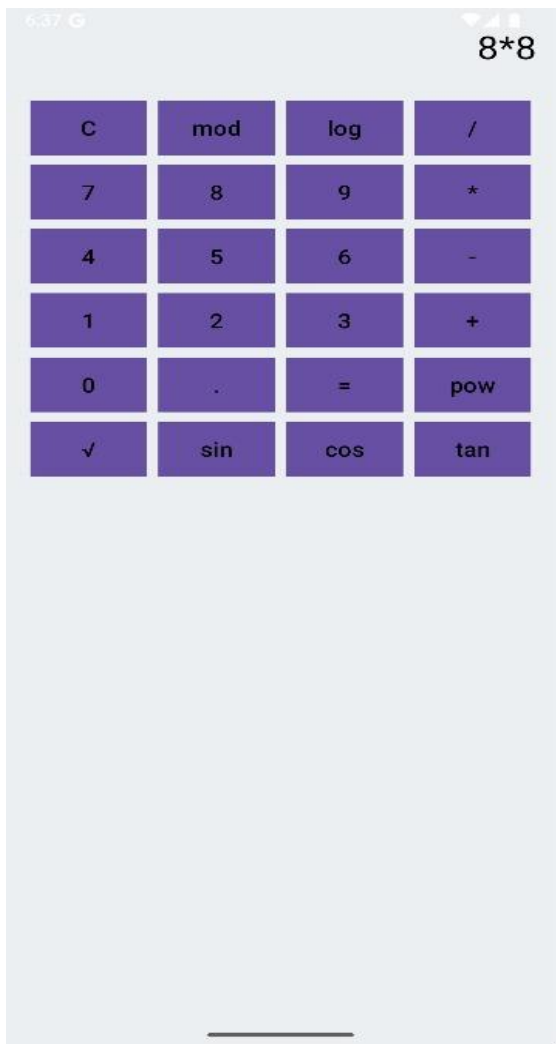
```

"
    android:onClick="onFunctionClick" />
    <Button
        android:text="tan"
        style="@style/CalcButton"
    "
    android:onClick="onFunctionClick" />
    <Button
        android:text="log"
        style="@style/CalcButton"
    "
    android:onClick="onFunctionClick" />

    <Button
        android:text="ln"
        style="@style/CalcButton"
    "
    android:onClick="onFunctionClick" />
</GridLayout>
</LinearLayout>

```


Output :



Result:

The Application developed using Android Studio was done.