Date: 11-02-2021

Aim:
First App: To create Android App that can add, subtract, multiply and divide.

Description of App:
This calculator app can be used to perform basic arithmetic operations: addition, subtraction, multiplication and division of two float numbers.
This application contains two TextViews for inputting the operands of type float. Then there are 4 radio buttons for the Add, Subtract, Multiply and Divide.
Finally there is a Calculate button 'Go' which when pressed gives result in final TextView

Device Specifications:

App runs on the minSDK version of 16 and Android version 11 using Pixel 3A API emulator and samsung device. Only default libraries were used.

Technical Concepts Learnt:
Learnt TextView usage, radiobutton usage and Button usage
Learnt to call a event listener trigger function ids using switch case scenario in java code.
Used setText function to set result.

Source Code:

MainActivity.java
```java
package com.example.myapplication;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.RadioButton;
import android.widget.RadioGroup;
import android.widget.TextView;
import android.widget.Toast;

import java.io.BufferedReader;
```

```java
public class MainActivity extends AppCompatActivity {

    EditText number1, number2;
    TextView answer;
    RadioGroup radio;
    Button calculate;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        number1 = (EditText) findViewById(R.id.num1);
        number2 = (EditText) findViewById(R.id.num2);
        answer = (TextView) findViewById(R.id.result);

        radio=(RadioGroup)findViewById(R.id.radio);

        calculate = (Button) findViewById(R.id.calculate);

        calculate.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                String a = number1.getText().toString();
                String b = number2.getText().toString();
                if(a.isEmpty() || b.isEmpty()) {
                    Toast.makeText(getApplicationContext(), "Required fields
cannot be empty", Toast.LENGTH_LONG).show();
                }
                else {
                    Float val1 = Float.valueOf(a);
                    Float val2 = Float.valueOf(b);
                    int id=radio.getCheckedRadioButtonId();
                    switch (id) {
                        case R.id.add: answer.setText(String.valueOf(val1+val2));
                            break;
                        case R.id.sub: answer.setText(String.valueOf(val1-val2));
                            break;
                        case R.id.mul: answer.setText(String.valueOf(val1*val2));
                            break;
                        case R.id.div: answer.setText(String.valueOf(val1/val2));
                            break;
                        default: answer.setText("Choose one button");
                    }
                }
            }
        });


    }
}
```
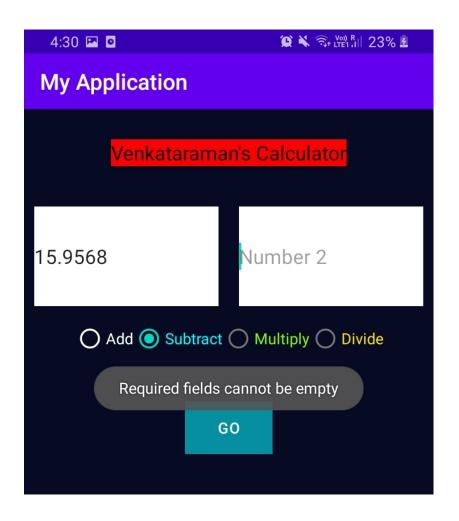
XML file:

```xml
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout 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:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="#060A23"
    android:orientation="vertical"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/head"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_gravity="center"
        android:layout_marginTop="30dp"
        android:background="#FF0000"
        android:foregroundGravity="center_vertical|center"
        android:gravity="center"
        android:text="Venkataraman's Calculator"
        android:textColor="@android:color/black"
        android:textSize="18sp" />

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="110dp"
        android:layout_marginTop="30dp"
        android:orientation="horizontal">

        <EditText
            android:id="@+id/num1"
            android:layout_width="wrap_content"
            android:layout_height="100dp"
            android:layout_margin="10dp"
            android:layout_weight="0.5"
            android:background="#FFFFFF"
            android:hint="Number 1"
            android:inputType="numberDecimal" />

        <EditText
            android:id="@+id/num2"
            android:layout_width="wrap_content"
            android:layout_height="100dp"
            android:layout_margin="10dp"
            android:layout_weight="0.5"
            android:background="#FFFFFF"
            android:hint="Number 2"
            android:inputType="numberDecimal" />
    </LinearLayout>

    <RadioGroup
```

```xml
    android:id="@+id/radio"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_gravity="center"
    android:layout_margin="5dp"
    android:gravity="center"
    android:orientation="horizontal">

    <RadioButton
        android:id="@+id/add"
        android:layout_width="wrap_content"
        android:layout_height="55dp"
        android:layout_gravity="center_vertical"
        android:checked="false"
        android:text="Add"
        android:textColor="#FFFFFF"
        android:textSize="14sp"
        app:buttonTint="#FFFFFF" />

    <RadioButton
        android:id="@+id/sub"
        android:layout_width="wrap_content"
        android:layout_height="55dp"
        android:layout_gravity="center_vertical"
        android:checked="false"
        android:text="Subtract"
        android:textColor="#00FFFF"
        android:textSize="14sp" />

    <RadioButton
        android:id="@+id/mul"
        android:layout_width="wrap_content"
        android:layout_height="55dp"
        android:layout_gravity="center_vertical"
        android:checked="false"
        android:text="Multiply"
        android:textColor="#88FD00"
        android:textSize="14sp" />

    <RadioButton
        android:id="@+id/div"
        android:layout_width="wrap_content"
        android:layout_height="55dp"
        android:layout_gravity="center_vertical"
        android:checked="false"
        android:text="Divide"
        android:textColor="#FFE500"
        android:textSize="14sp" />
</RadioGroup>

<Button
```

```
        android:id="@+id/calculate"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_gravity="center"
        android:layout_margin="30dp"
        android:background="@color/teal_200"
        android:foregroundGravity="center"
        android:padding="10dp"
        android:text="GO"
        app:backgroundTint="#058FA1" />

    <TextView
        android:id="@+id/result"
        android:layout_width="match_parent"
        android:layout_height="100dp"
        android:layout_gravity="center"
        android:layout_marginTop="10dp"
        android:background="#FFFFFF"
        android:gravity="center"
        android:textColor="@color/black"
        android:textSize="30sp" />

</LinearLayout>
```
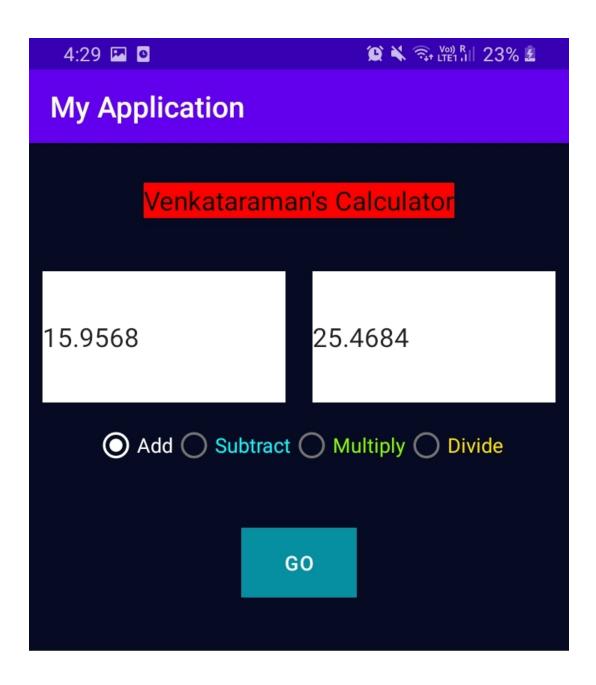
Screenshots:

My Application

Venkataraman's Calculator

15.9568

Number 2

⦿ Add ◉ Subtract ○ Multiply ○ Divide

Required fields cannot be empty

GO

0.6265333

My Application

Venkataraman's Calculator

15.9568

25.4684

⦿ Add ◯ Subtract ◯ Multiply ◯ Divide

GO

41.4252

My Application

Venkataraman's Calculator

15.9568

25.4684

○ Add ○ Subtract ◉ Multiply ○ Divide

GO

406.39417

My Application

Venkataraman's Calculator

15.9568

25.4684

○ Add ○ Subtract ○ Multiply ● Divide

GO

0.6265333

My Application

Venkataraman's Calculator

15.9568

25.4684

○ Add ◉ Subtract ○ Multiply ○ Divide

GO
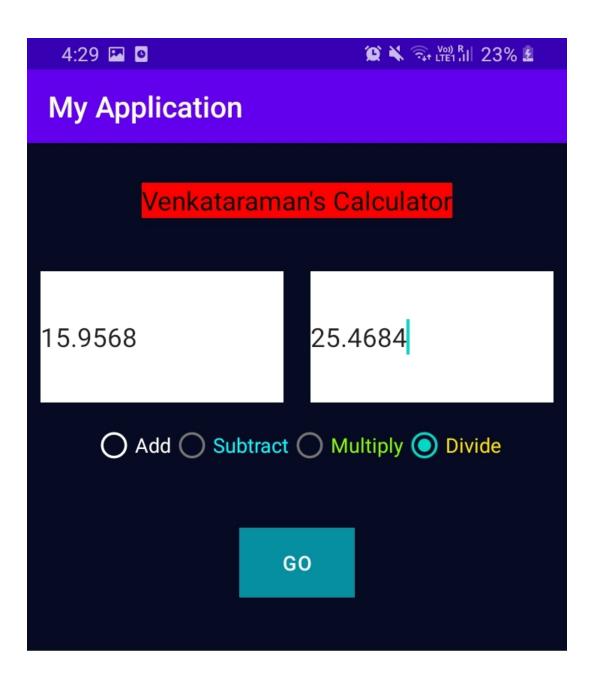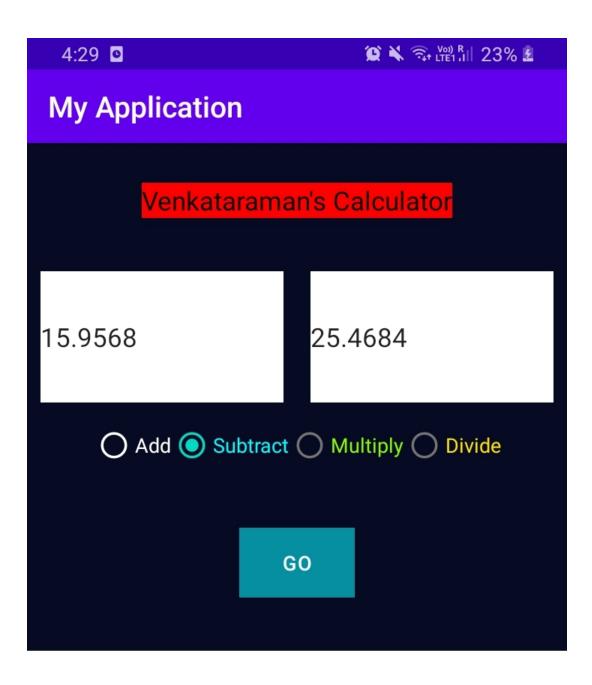
-9.511599

Outcomes:
Android app for arithmetic calculator used successfully.

Date: 11-02-2021

Aim:
Second App: To create a button wise UI calculator to perform operations +, -, /, x, %

Description of App:
This modified calculator app has 10 buttons for 10 digits of decimal. 5 buttons for addition, subtraction, division, multiplication and remainder.
It has 2 text views one for displaying result and storing history.
The history field is dynamically updated as we type and stores all operations performed.

Device Specifications:

App runs on the minSDK version of 16 and Android version 11 using Pixel 3A API emulator and samsung device. Only default libraries were used.

Technical Concepts Learnt:
Linear Layout and Buttton concept. Text View usage
Event Listeners and Event Handling.
Getting text from field converting to string and performing operations

Source Code:
JAVA:

```java
package com.example.calculator_new;

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


public class MainActivity extends AppCompatActivity {

    double input1 = 0, input2 = 0;
    TextView edt1;
    TextView hist;
    boolean Addition, Subtract, Multiplication, Division, mRemainder, decimal;
    Button button0, button1, button2, button3, button4, button5, button6, button7, button8, button9, buttonAdd, buttonSub,
            buttonMul, buttonDivision, buttonEqual, buttonDel, buttonDot,
    Remainder;

    @Override
```

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

    button0 = (Button) findViewById(R.id.button0);
    button1 = (Button) findViewById(R.id.button1);
    button2 = (Button) findViewById(R.id.button2);
    button3 = (Button) findViewById(R.id.button3);
    button4 = (Button) findViewById(R.id.button4);
    button5 = (Button) findViewById(R.id.button5);
    button6 = (Button) findViewById(R.id.button6);
    button7 = (Button) findViewById(R.id.button7);
    button8 = (Button) findViewById(R.id.button8);
    button9 = (Button) findViewById(R.id.button9);
    buttonDot = (Button) findViewById(R.id.buttonDot);
    buttonAdd = (Button) findViewById(R.id.buttonadd);
    buttonSub = (Button) findViewById(R.id.buttonsub);
    buttonMul = (Button) findViewById(R.id.buttonmul);
    buttonDivision = (Button) findViewById(R.id.buttondiv);
    Remainder = (Button) findViewById(R.id.Remainder);
    buttonDel = (Button) findViewById(R.id.buttonDel);
    buttonEqual = (Button) findViewById(R.id.buttoneql);

    edt1 = (TextView) findViewById(R.id.display);
    hist = (TextView) findViewById(R.id.hist);
    hist.setText("");

    button1.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            edt1.setText(edt1.getText() + "1");
            hist.setText(hist.getText() + "1");
        }
    });

    button2.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            edt1.setText(edt1.getText() + "2");
            hist.setText(hist.getText() + "2");
        }
    });

    button3.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            edt1.setText(edt1.getText() + "3");
            hist.setText(hist.getText() + "3");
        }
    });
```

```java
button4.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        edt1.setText(edt1.getText() + "4");
        hist.setText(hist.getText() + "4");
    }
});

button5.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        edt1.setText(edt1.getText() + "5");
        hist.setText(hist.getText() + "5");
    }
});

button6.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        edt1.setText(edt1.getText() + "6");
        hist.setText(hist.getText() + "6");
    }
});

button7.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        edt1.setText(edt1.getText() + "7");
        hist.setText(hist.getText() + "7");
    }
});

button8.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        edt1.setText(edt1.getText() + "8");
        hist.setText(hist.getText() + "8");
    }
});

button9.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        edt1.setText(edt1.getText() + "9");
        hist.setText(hist.getText() + "9");
    }
});

button0.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
```

```java
            edt1.setText(edt1.getText() + "0");
            hist.setText(hist.getText() + "0");
        }
    });

    buttonAdd.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            if (edt1.getText().length() != 0) {
                input1 = Float.parseFloat(edt1.getText() + "");
                hist.setText(hist.getText() + "+");
                Addition = true;
                decimal = false;
                edt1.setText(null);
            }
        }
    });

    buttonSub.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            if (edt1.getText().length() != 0) {
                input1 = Float.parseFloat(edt1.getText() + "");
                hist.setText(hist.getText() + "-");
                Subtract = true;
                decimal = false;
                edt1.setText(null);
            }
        }
    });

    buttonMul.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            if (edt1.getText().length() != 0) {
                input1 = Float.parseFloat(edt1.getText() + "");
                hist.setText(hist.getText() + "x");
                Multiplication = true;
                decimal = false;
                edt1.setText(null);
            }
        }
    });

    buttonDivision.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            if (edt1.getText().length() != 0) {
                input1 = Float.parseFloat(edt1.getText() + "");
                hist.setText(hist.getText() + "/" );
                Division = true;
```

```java
                    decimal = false;
                    edt1.setText(null);
                }
            }
        });

        Remainder.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                if (edt1.getText().length() != 0) {
                    input1 = Float.parseFloat(edt1.getText() + "");
                    hist.setText(hist.getText() + "%" );
                    mRemainder = true;
                    decimal = false;
                    edt1.setText(null);
                }
            }
        });

        buttonEqual.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                if (Addition || Subtract || Multiplication || Division ||
mRemainder) {
                    input2 = Float.parseFloat(edt1.getText() + "");
                }

                if (Addition) {

                    edt1.setText(input1 + input2 + "");
                    Addition = false;
                }

                if (Subtract) {

                    edt1.setText(input1 - input2 + "");
                    Subtract = false;
                }

                if (Multiplication) {
                    edt1.setText(input1 * input2 + "");
                    Multiplication = false;
                }

                if (Division) {
                    edt1.setText(input1 / input2 + "");
                    Division = false;
                }
                if (mRemainder) {
                    edt1.setText(input1 % input2 + "");
                    mRemainder = false;
```

```java
                }
            }
        });

        buttonDel.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                edt1.setText("");
                hist.setText("");
                input1 = 0.0;
                input2 = 0.0;
            }
        });

        buttonDot.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                if (decimal) {
                    //do nothing or you can show the error
                } else {
                    edt1.setText(edt1.getText() + ".");
                    hist.setText(hist.getText() + ".");
                    decimal = true;
                }

            }
        });
    }
}
```

XML:

```xml
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout 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:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="#000000"
    android:orientation="vertical"
    tools:context=".MainActivity">


    <TextView
        android:id="@+id/textView4"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginStart="50dp"
        android:layout_marginLeft="50dp"
        android:layout_marginEnd="30dp"
        android:layout_marginRight="30dp"
```

```xml
        android:paddingLeft="30dp"
        android:text="Venkataraman's Calculator"
        android:textColor="#FF1100"
        android:textSize="20sp" />

    <TextView
        android:id="@+id/hist"
        android:layout_width="match_parent"
        android:layout_height="20dp"
        android:layout_gravity="center"
        android:layout_marginTop="20dp"
        android:gravity="center"

        android:textColor="@android:color/white"

        android:textSize="15sp" />

    <TextView
        android:id="@+id/display"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_gravity="center"
        android:layout_marginTop="20dp"
        android:gravity="center"
        android:textColor="@color/white"
        android:textSize="30sp" />

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginTop="30dp"
        android:orientation="vertical">

        <LinearLayout
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:orientation="horizontal">

            <Button
                android:id="@+id/buttonDel"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_margin="10dp"
                android:background="#00BCD4"
                android:text="Clear"
                app:backgroundTint="#00BCD4" />

            <Button
                android:id="@+id/Remainder"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
```

```xml
            android:layout_margin="10dp"
            android:background="#00BCD4"
            android:text="%"
            app:backgroundTint="#00BCD4" />

        <Button
            android:id="@+id/buttondiv"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_margin="10dp"
            android:background="#00BCD4"
            android:text="/"
            app:backgroundTint="#00BCD4" />


    </LinearLayout>

    <LinearLayout
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:orientation="horizontal">

        <Button
            android:id="@+id/button7"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_margin="10dp"
            android:background="#FFEB3B"
            android:text="7"
            android:textColor="#000000"
            app:backgroundTint="#FFEB3B" />

        <Button
            android:id="@+id/button8"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_margin="10dp"
            android:background="#FFEB3B"
            android:text="8"
            android:textColor="#000000"
            app:backgroundTint="#FFEB3B" />

        <Button
            android:id="@+id/button9"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_margin="10dp"
            android:background="#FFEB3B"
            android:text="9"
            android:textColor="#000000"
            app:backgroundTint="#FFEB3B" />
```
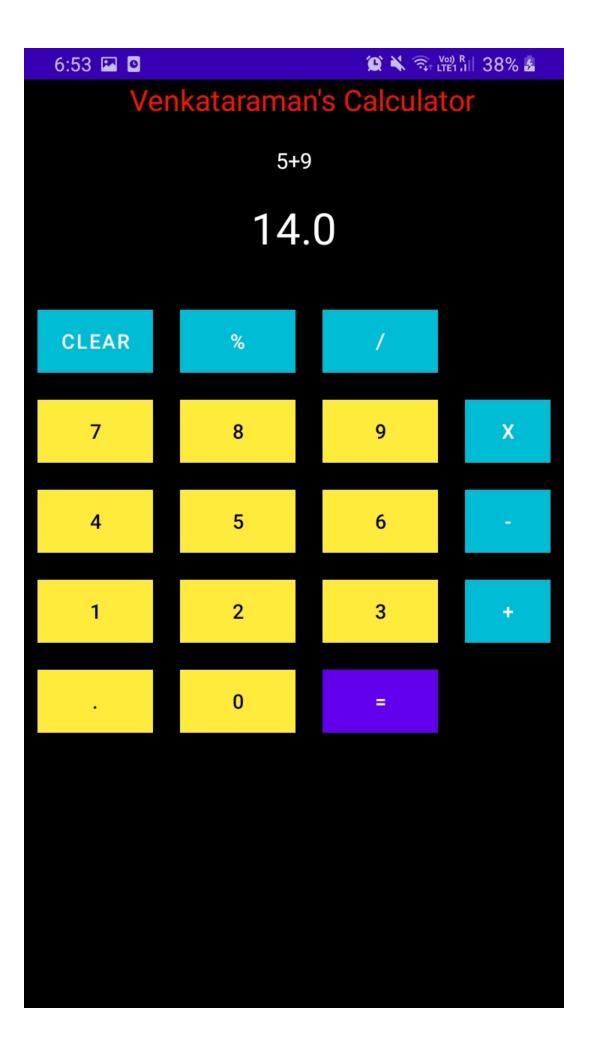
```xml
    <Button
        android:id="@+id/buttonmul"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_margin="10dp"
        android:background="#00BCD4"
        android:text="X"
        app:backgroundTint="#00BCD4" />

</LinearLayout>

<LinearLayout
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:orientation="horizontal">

    <Button
        android:id="@+id/button4"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_margin="10dp"
        android:background="#FFEB3B"
        android:text="4"
        android:textColor="#000000"
        app:backgroundTint="#FFEB3B" />

    <Button
        android:id="@+id/button5"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_margin="10dp"
        android:background="#FFEB3B"
        android:text="5"
        android:textColor="#000000"
        app:backgroundTint="#FFEB3B" />

    <Button
        android:id="@+id/button6"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_margin="10dp"
        android:background="#FFEB3B"
        android:text="6"
        android:textColor="#000000"
        app:backgroundTint="#FFEB3B" />

    <Button
        android:id="@+id/buttonsub"
        android:layout_width="wrap_content"
```
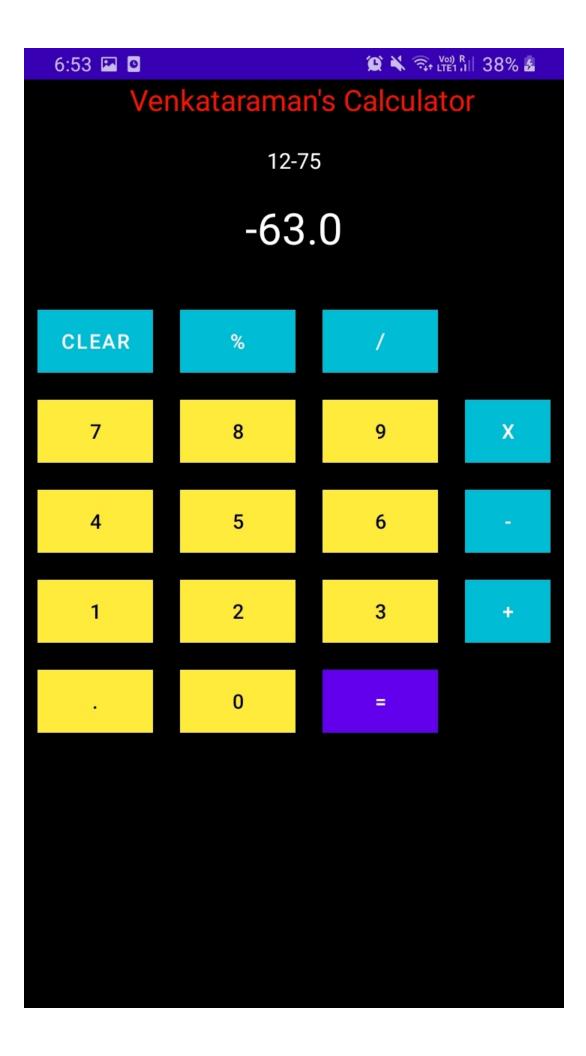
```xml
        android:layout_height="wrap_content"
        android:layout_margin="10dp"
        android:background="#00BCD4"
        android:text="-"
        app:backgroundTint="#00BCD4" />


</LinearLayout>

<LinearLayout
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:orientation="horizontal">

    <Button
        android:id="@+id/button1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_margin="10dp"
        android:background="#FFEB3B"
        android:text="1"
        android:textColor="#000000"
        app:backgroundTint="#FFEB3B" />

    <Button
        android:id="@+id/button2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_margin="10dp"
        android:background="#FFEB3B"
        android:text="2"
        android:textColor="#000000"
        app:backgroundTint="#FFEB3B" />

    <Button
        android:id="@+id/button3"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_margin="10dp"
        android:background="#FFEB3B"
        android:text="3"
        android:textColor="#000000"
        app:backgroundTint="#FFEB3B" />

    <Button
        android:id="@+id/buttonadd"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_margin="10dp"
        android:background="#00BCD4"
        android:text="+"
```

```xml
                app:backgroundTint="#00BCD4" />


    </LinearLayout>

    <LinearLayout
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:orientation="horizontal">

        <Button
            android:id="@+id/buttonDot"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_margin="10dp"
            android:background="#FFEB3B"
            android:text="."
            android:textColor="#000000"
            app:backgroundTint="#FFEB3B" />

        <Button
            android:id="@+id/button0"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_margin="10dp"
            android:background="#FFEB3B"
            android:text="0"
            android:textColor="#000000"
            app:backgroundTint="#FFEB3B" />

        <Button
            android:id="@+id/buttoneql"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_margin="10dp"
            android:background="#00BCD4"
            android:text="=" />


    </LinearLayout>


</LinearLayout>
```
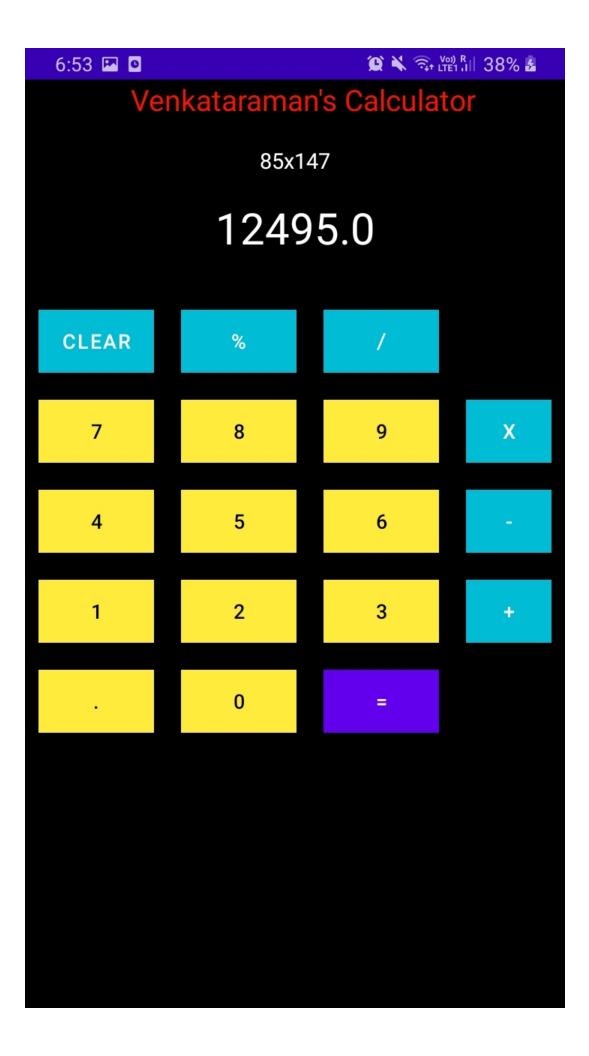
Screenshots:

Venkataraman's Calculator

5+9

14.0

CLEAR	%	/

7	8	9	X
4	5	6	-
1	2	3	+
.	0	=	

Venkataraman's Calculator

12-75

-63.0

CLEAR	%	/	
7	8	9	X
4	5	6	-
1	2	3	+
.	0	=	

Venkataraman's Calculator

85x147

12495.0

CLEAR	%	/	
7	8	9	X
4	5	6	-
1	2	3	+
.	0	=	

Venkataraman's Calculator

8/94

0.0851063829787234

CLEAR	%	/
7	8	9	X
4	5	6	-
1	2	3	+
.	0	=

Outcome:
App was coded and run successfully without any errors and bugs.