U18CO018

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Assignment – 5

ST-IV

Create an android application to make a simple calculator, which perform Addition, Subtraction, Multiplication, and Division.

**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:layout\_width="match\_parent"

    android:layout\_height="match\_parent"

    tools:context=".MainActivity">

    <TextView

        android:id="@+id/equ"

        android:layout\_width="0dp"

        android:layout\_height="80dp"

        android:layout\_marginStart="10dp"

        android:layout\_marginLeft="10dp"

        android:layout\_marginEnd="10dp"

        android:layout\_marginRight="10dp"

        android:gravity="bottom|right"

        android:maxLength="35"

        android:textSize="36sp"

        android:textStyle="normal|bold"

        app:layout\_constraintEnd\_toEndOf="parent"

        app:layout\_constraintStart\_toStartOf="parent"

        app:layout\_constraintTop\_toTopOf="parent" />

    <TableLayout

        android:id="@+id/tableLayout"

        android:layout\_width="wrap\_content"

        android:layout\_height="wrap\_content"

        android:layout\_marginTop="20dp"

        app:layout\_constraintEnd\_toEndOf="parent"

        app:layout\_constraintStart\_toStartOf="parent"

        app:layout\_constraintTop\_toBottomOf="@+id/equ">

        <TableRow

            android:layout\_width="match\_parent"

            android:layout\_height="match\_parent">

            <Button

                android:id="@+id/btn7"

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:layout\_margin="2dp"

                android:text="7"

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn8"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="8"

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn9"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="9"

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <ImageButton

                android:id="@+id/btn\_ce"

                style="@style/Widget.AppCompat.ImageButton"

                android:layout\_width="match\_parent"

                android:layout\_height="88dp"

                android:layout\_gravity="center\_vertical"

                android:layout\_margin="1dp"

                android:background="#FFFFFF"

                android:tint="#60B7D5"

                app:srcCompat="@drawable/backspace"

                tools:ignore="VectorDrawableCompat" />

        </TableRow>

        <TableRow

            android:layout\_width="match\_parent"

            android:layout\_height="match\_parent">

            <Button

                android:id="@+id/btn4"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="4"

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn5"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="5"

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn6"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="6"

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn\_div"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="÷"

                android:textColor="#60B7D5"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

        </TableRow>

        <TableRow

            android:layout\_width="match\_parent"

            android:layout\_height="match\_parent">

            <Button

                android:id="@+id/btn1"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="1"

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn2"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="2"

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn3"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="3"

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn\_mul"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="x"

                android:textColor="#60B7D5"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

        </TableRow>

        <TableRow

            android:layout\_width="match\_parent"

            android:layout\_height="match\_parent">

            <Button

                android:id="@+id/btn0"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="0"

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn\_dot"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="."

                android:textColor="#776464"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn\_add"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="+"

                android:textColor="#60B7D5"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

            <Button

                android:id="@+id/btn\_sub"

                android:layout\_width="match\_parent"

                android:layout\_height="100dp"

                android:layout\_margin="2dp"

                android:text="-"

                android:textColor="#60B7D5"

                android:textSize="30sp"

                android:textStyle="normal|bold"

                app:backgroundTint="#FFFFFF" />

        </TableRow>

    </TableLayout>

    <LinearLayout

        android:layout\_width="250dp"

        android:layout\_height="0dp"

        android:orientation="horizontal"

        app:layout\_constraintBottom\_toBottomOf="parent"

        app:layout\_constraintEnd\_toEndOf="parent"

        app:layout\_constraintStart\_toStartOf="parent"

        app:layout\_constraintTop\_toBottomOf="@+id/tableLayout">

        <Button

            android:id="@+id/btn\_ac"

            android:layout\_width="wrap\_content"

            android:layout\_height="90dp"

            android:layout\_margin="5dp"

            android:layout\_weight="1"

            android:text="AC"

            android:textColor="#FB6637"

            android:textSize="30sp"

            android:textStyle="normal|bold"

            app:backgroundTint="#F8F8F8" />

        <Button

            android:id="@+id/btn\_ans"

            android:layout\_width="wrap\_content"

            android:layout\_height="90dp"

            android:layout\_margin="5dp"

            android:layout\_weight="1"

            android:text="="

            android:textColor="#FFFFFF"

            android:textSize="30sp"

            android:textStyle="normal|bold"

            app:backgroundTint="#60B7D5" />

    </LinearLayout>

</androidx.constraintlayout.widget.ConstraintLayout>

**MainActivity.java**

package com.example.mycalculator;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;

import android.view.View;

import android.widget.Button;

import android.widget.ImageButton;

import android.widget.TextView;

import java.util.Stack;

import java.util.concurrent.ExecutionException;

public class MainActivity extends AppCompatActivity {

    Button btn0, btn1, btn2, btn3, btn4, btn5, btn6, btn7, btn8, btn9, btn\_dot, btn\_div, btn\_mul, btn\_sub, btn\_add, btn\_ac, btn\_ans;

    ImageButton btn\_ce;

    TextView equation;

    boolean preDot = false;

    boolean preOp = true;

    int topA=0;

    int topB=-1;

    char[] A= new char[100];

    Node[] B= new Node[100];

    boolean solve=true;

    @Override

    protected void onCreate(Bundle savedInstanceState) {

        super.onCreate(savedInstanceState);

        setContentView(R.layout.activity\_main);

        btn0 = findViewById(R.id.btn0);

        btn1 = findViewById(R.id.btn1);

        btn2 = findViewById(R.id.btn2);

        btn3 = findViewById(R.id.btn3);

        btn4 = findViewById(R.id.btn4);

        btn5 = findViewById(R.id.btn5);

        btn6 = findViewById(R.id.btn6);

        btn7 = findViewById(R.id.btn7);

        btn8 = findViewById(R.id.btn8);

        btn9 = findViewById(R.id.btn9);

        btn\_dot = findViewById(R.id.btn\_dot);

        btn\_div = findViewById(R.id.btn\_div);

        btn\_mul = findViewById(R.id.btn\_mul);

        btn\_sub = findViewById(R.id.btn\_sub);

        btn\_add = findViewById(R.id.btn\_add);

        btn\_ac = findViewById(R.id.btn\_ac);

        btn\_ans = findViewById(R.id.btn\_ans);

        btn\_ce = findViewById(R.id.btn\_ce);

        equation = findViewById(R.id.equ);

        btn\_ans.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                preDot = false;

                preOp = true;

                topA = 0;

                topB = -1;

                solve = true;

                String str = equation.getText().toString();

                if (str.length() > 0) {

                    str = SolveEquation(str);

                    boolean checkDig = false, checDt = false;

                    for (int i = 0; i < str.length(); i++) {

                        if (CheckDigit(str.charAt(i)))

                            checkDig = true;

                        else if (str.charAt(i) == '.')

                            checDt = true;

                    }

                    if (checkDig)

                        preOp = false;

                    if (checDt)

                        preDot = true;

                    equation.setText(str);

                }

            }

        });

        btn\_ce.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                int len = equation.getText().toString().length();

                String str = equation.getText().toString();

                if (len > 0) {

                    if (str.charAt(len - 1) == '.')

                        preDot = false;

                    else if (str.charAt(len - 1) == '+' || str.charAt(len - 1) == '-' || str.charAt(len - 1) == 'x' || str.charAt(len - 1) == '÷')

                        preOp = false;

                    if(len==1) {

                        preOp=true;

                    }

                    equation.setText(str.substring(0, len - 1));

                }

            }

        });

        btn\_ac.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText("");

                solve=true;

                preDot = false;

                preOp = true;

                topA=0;

                topB=-1;

            }

        });

        btn\_dot.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                if (!preDot) {

                    if(preOp) {

                        equation.setText(equation.getText().toString().concat("0"));

                    }

                    equation.setText(equation.getText().toString().concat("."));

                    preOp = true;

                }

                preDot = true;

            }

        });

        btn\_add.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                if (!preOp) {

                    equation.setText(equation.getText().toString().concat("+"));

                    preDot = false;

                }

                preOp = true;

            }

        });

        btn\_sub.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                if (!preOp) {

                    equation.setText(equation.getText().toString().concat("-"));

                    preDot = false;

                }

                preOp = true;

                preDot = false;

            }

        });

        btn\_mul.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                if (!preOp) {

                    equation.setText(equation.getText().toString().concat("x"));

                    preDot = false;

                }

                preOp = true;

                preDot = false;

            }

        });

        btn\_div.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                if (!preOp) {

                    equation.setText(equation.getText().toString().concat("÷"));

                    preDot = false;

                }

                preOp = true;

                preDot = false;

            }

        });

        btn0.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText(equation.getText().toString().concat("0"));

                preOp = false;

            }

        });

        btn1.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText(equation.getText().toString().concat("1"));

                preOp = false;

            }

        });

        btn2.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText(equation.getText().toString().concat("2"));

                preOp = false;

            }

        });

        btn3.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText(equation.getText().toString().concat("3"));

                preOp = false;

            }

        });

        btn4.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText(equation.getText().toString().concat("4"));

                preOp = false;

            }

        });

        btn5.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText(equation.getText().toString().concat("5"));

                preOp = false;

            }

        });

        btn6.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText(equation.getText().toString().concat("6"));

                preOp = false;

            }

        });

        btn7.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText(equation.getText().toString().concat("7"));

                preOp = false;

            }

        });

        btn8.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText(equation.getText().toString().concat("8"));

                preOp = false;

            }

        });

        btn9.setOnClickListener(new View.OnClickListener() {

            @Override

            public void onClick(View view) {

                equation.setText(equation.getText().toString().concat("9"));

                preOp = false;

            }

        });

    }

    String SolveEquation(String str) {

        boolean Invalid = CheckEquation(str);

        if (Invalid)

            return "Invalid Input";

        ConvertInfixToPost(str);

        double res = FindAns();

        String Ans = "Math Error!!";

        if (solve) {

            Ans = String.format("%.3f", res);

        }

        return Ans;

    }

    double FindAns() {

        Stack<Double> st = new Stack<Double>();

        for (int i = 0; i <= topB; i++) {

            if (CheckOperator(B[i].op)) {

                try {

                    double y = st.pop(), x = st.pop();

                    if (B[i].op == '+') {

                        st.push(x + y);

                    } else if (B[i].op == '-')

                        st.push(x - y);

                    else if (B[i].op == 'x')

                        st.push(x \* y);

                    else if (B[i].op == '÷')

                        st.push(x / y);

                } catch (Exception e) {

                    solve = false;

                    return -1;

                }

            } else {

                try {

                    st.push(B[i].number);

                } catch (Exception e) {

                    solve = false;

                    return -1;

                }

            }

        }

        double res=st.pop();

        return res;

    }

    void ConvertInfixToPost(String str) {

        str = "(" + str + ")";

        for (int i = 0; i < str.length(); i++) {

            char c = str.charAt(i);

            if (CheckDigit(c) || c=='.') {

                String x="0";

                while(i<str.length() && (CheckDigit(str.charAt(i)) || str.charAt(i)=='.')) {

                    x=x+str.charAt(i);

                    i++;

                }

                try {

                    pushB('@', Double.parseDouble(x));

                } catch (Exception e) {

                    solve=false;

                }

                i--;

            } else if (c == '(')

                pushA(c);

            else if (c == ')')

                checkbrakets();

            else

                InsertOperator(c);

        }

    }

    char popA() {

        if (topA < 0)

            return '@';

        topA--;

        return A[topA + 1];

    }

    void pushA(char c) {

        topA++;

        A[topA] = c;

    }

    void pushB(char c,double x) {

        topB++;

        B[topB]=new Node(c,x);

    }

    void checkbrakets() {

        while (A[topA] != '(') {

            char x = popA();

            if (x == '@')

                break;

            pushB(x,-1);

        }

        popA();

    }

    void InsertOperator(char c) {

        while (topA >= 0 && priority(A[topA]) >= priority(c)) {

            char x = popA();

            pushB(x,-1);

        }

        pushA(c);

    }

    int priority(char c) {

        if(c=='(')

            return 0;

        if (c == '+' || c == '-')

            return 1;

        return 2;

    }

    boolean CheckEquation(String str) {

        boolean dot = false, op = false;

        for (int i = 0; i < str.length(); i++) {

            char c = str.charAt(i);

            System.out.println(c + " " + dot + " " + op);

            if (c == '.' && dot) {

                return true;

            } else if (CheckOperator(c)) {

                op = true;

                dot = false;

            } else if (CheckDigit(c)) {

                op = false;

            } else if (c == '.') {

                dot = true;

            } else {

                return true;

            }

        }

        return (op && dot) || (op);

    }

    boolean CheckOperator(char c) {

        return (c == '+' || c == '-' || c == 'x' || c == '÷');

    }

    boolean CheckDigit(char c) {

        return (c >= '0' && c <= '9');

    }

    class Node {

        char op;

        double number;

        public Node(char op, double number) {

            this.op = op;

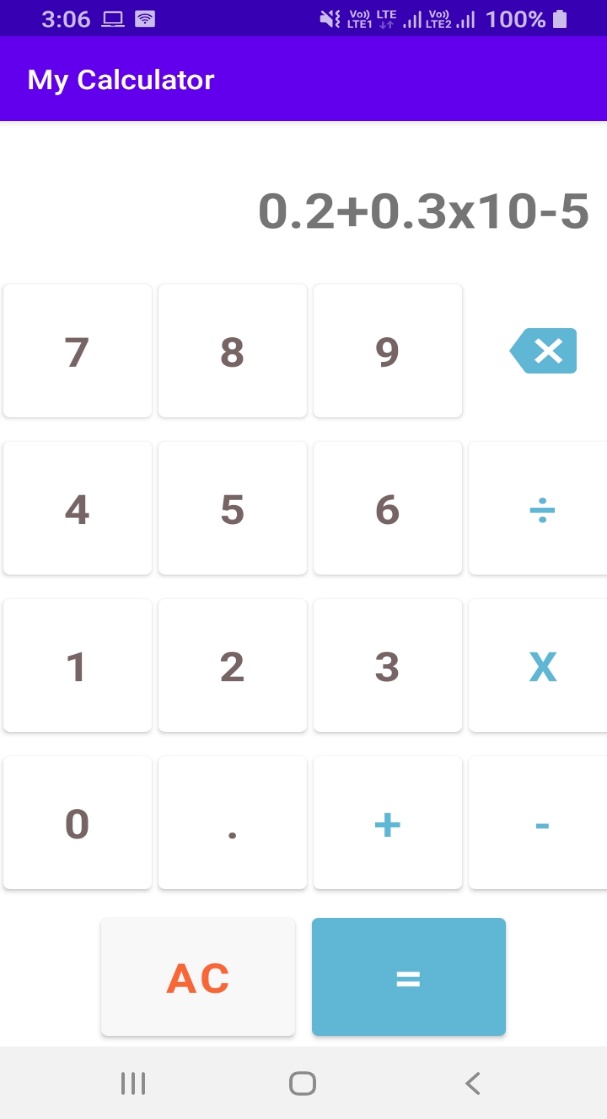
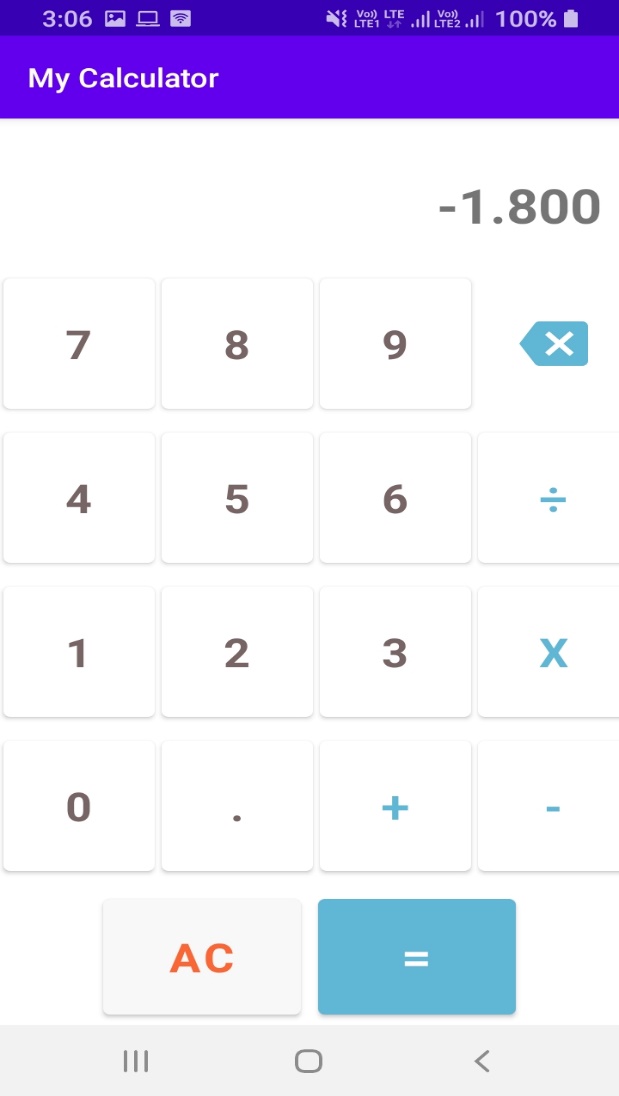
            this.number = number;

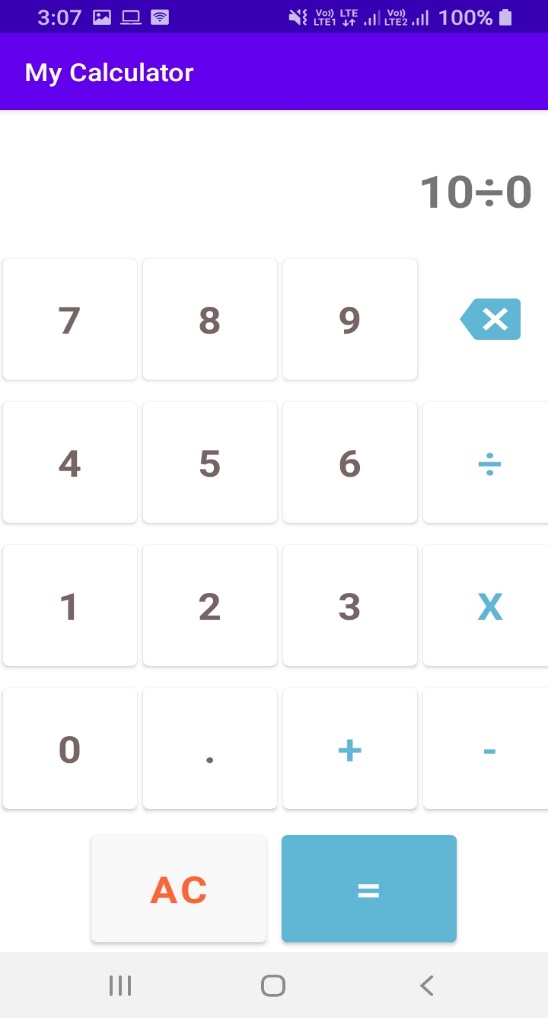
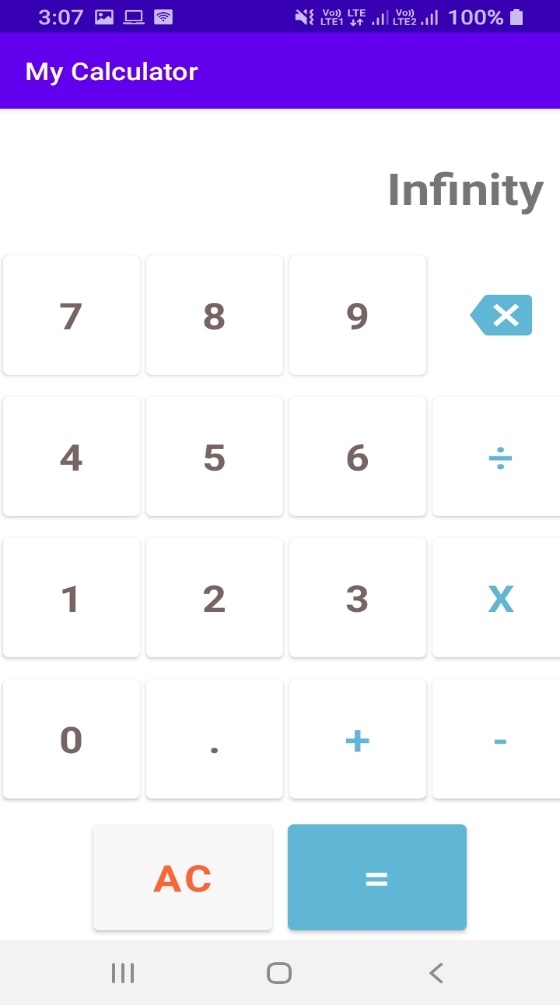
        }

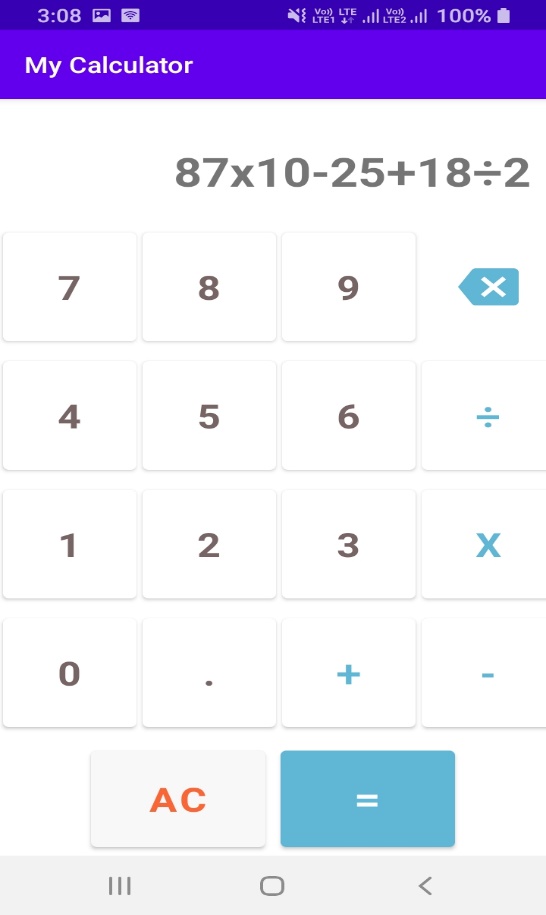
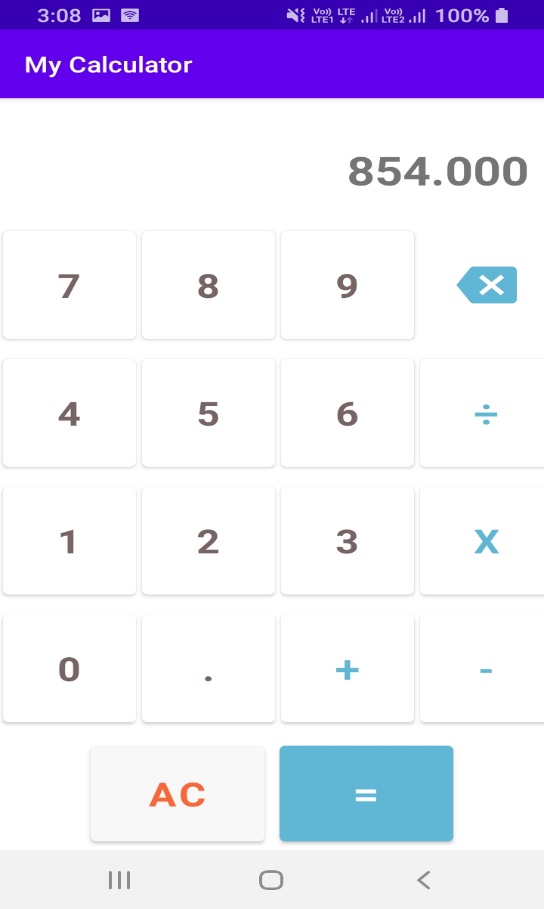
    }

}

**Output:-**

** **

** **

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