SUKKUR IBA UNIVERSITY

MERIT – QUALITY – EXCELLENCE

Lab handout 07

Mobile Application Development (CSE-426), Fall 2022, BE-EE(CS)-VIII		
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Section: A Lab group: NA	Department: Electrical Engineering	Marks obtained out of 100%
NOTE: Must follow submission instructions		

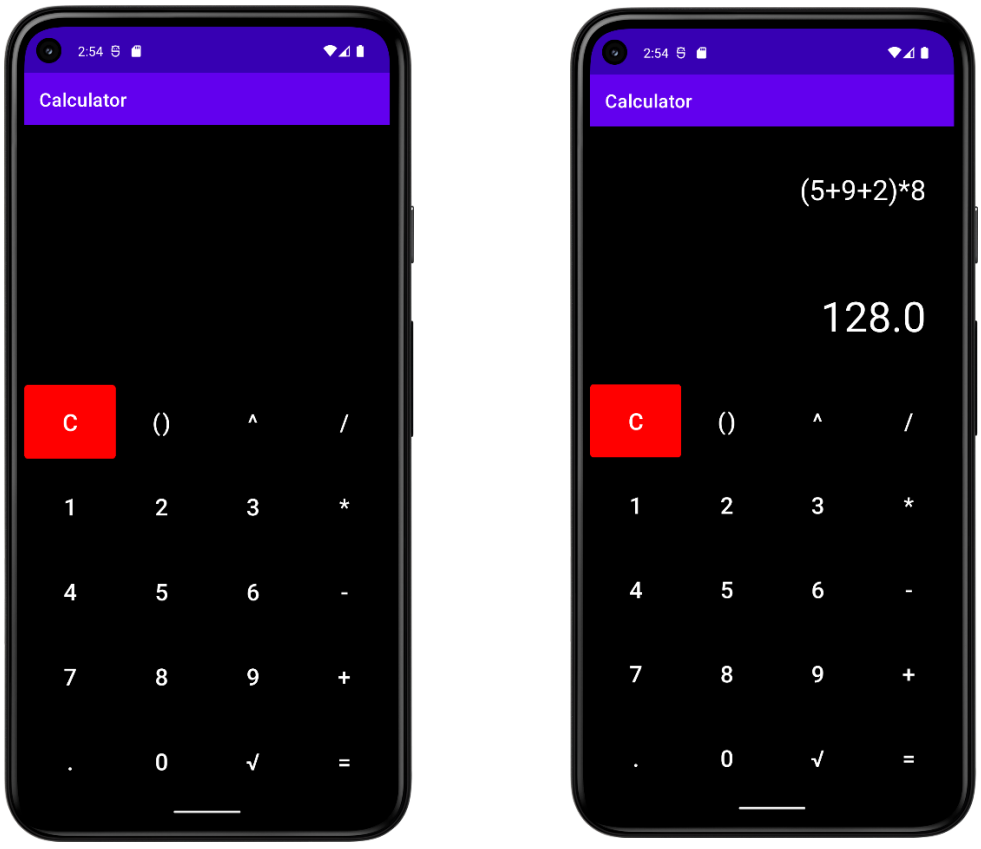
Design & develop calculator application

Lab Exercise and Submission

Exercise 1

Design & develop calculator application.

Screenshot of AVD output here:



Insert XML code for layout here:

```
<?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="@color/black"
    android:orientation="vertical"
    tools:context=".MainActivity">
```

```
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="0dp"
        android:orientation="vertical"
        android:layout_weight="3">

        <TextView
            android:id="@+id/workingTextView"
            android:layout_width="wrap_content"
            android:layout_height="0dp"
            android:layout_weight="1"
            android:paddingRight="30dp"
            android:gravity="center_vertical"
            android:layout_gravity="end"
            android:textAlignment="textEnd"
            android:textColor="@color/white"
            android:textSize="30sp" />
        <TextView
            android:id="@+id/resultTextView"
            android:layout_width="wrap_content"
            android:layout_height="0dp"
            android:layout_weight="1"
            android:paddingRight="30dp"
            android:gravity="center_vertical"
            android:layout_gravity="end"
            android:textAlignment="textEnd"
            android:textColor="@color/white"
            android:textSize="45sp" />

    </LinearLayout>

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="0dp"
        android:layout_weight="1">


        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:backgroundTint="@color/red"
            android:onClick="clearOnClick"
            android:text="C"
            android:textColor="@color/white"
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="()"
            android:onClick="bracketsOnClick"
            android:backgroundTint="@color/black"
            android:textColor="@color/white"
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="^"
            android:onClick="powerOfOnClick"
            android:backgroundTint="@color/black"
            android:textColor="@color/white"
```

```
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="/"
            android:onClick="divisionOnClick"
            android:backgroundTint="@color/black"
            android:textColor="@color/white"
            android:textSize="@dimen/calcButtonTextSize" />
    </LinearLayout>

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="0dp"
        android:layout_weight="1">


        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="1"
            android:onClick="oneOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />


        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="2"
            android:onClick="twoOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="3"
            android:onClick="threeOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="*"
            android:onClick="timesOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />
    </LinearLayout>

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="0dp"
        android:layout_weight="1">
```

```
        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="4"
            android:onClick="fourOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />


        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="5"
            android:onClick="fiveOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="6"
            android:onClick="sixOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="-"
            android:onClick="minusOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />
    </LinearLayout>

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="0dp"
        android:layout_weight="1">


        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="7"
            android:onClick="sevenOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />


        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="8"
            android:onClick="eightOnClick"
            android:textColor="@color/white"
```

```
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="9"
            android:onClick="nineOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="+"
            android:onClick="plusOnClick"
            android:backgroundTint="@color/black"
            android:textColor="@color/white"
            android:textSize="@dimen/calcButtonTextSize" />
    </LinearLayout>
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="0dp"
        android:layout_weight="1">


        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="."
            android:onClick="decimalOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />


        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="0"
            android:onClick="zeroOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="√"
            android:onClick="sqrtOnClick"
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />

        <Button
            android:layout_width="0dp"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:text="="
            android:onClick="equalsOnClick"
```

```
            android:textColor="@color/white"
            android:backgroundTint="@color/black"
            android:textSize="@dimen/calcButtonTextSize" />
    </LinearLayout>
</LinearLayout>
```

Insert Activity code here:

```
package com.example.calculator;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;
import android.view.View;
import android.widget.TextView;

import java.util.ArrayList;


public class MainActivity extends AppCompatActivity {
    TextView workingsTV;
    TextView resultsTV;

    String workings = "";
    String formula = "";
    String tempFormula = "";

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        workingsTV = (TextView) findViewById(R.id.workingTextView);
        resultsTV = (TextView) findViewById(R.id.resultTextView);
    }


    private void setWorkings(String givenValue) {
        workings = workings + givenValue;
        workingsTV.setText(workings);
    }


    public void equalsOnClick(View view) {
        checkForPowerOf();

        String val = workings;
        String replacedstr = val.replace('÷', '/').replace('×', '*');
        double result = eval(replacedstr);


            resultsTV.setText(String.valueOf(result));

    }

    private void checkForPowerOf() {
        ArrayList<Integer> indexOfPowers = new ArrayList<>();
        for (int i = 0; i < workings.length(); i++) {
            if (workings.charAt(i) == '^')
                indexOfPowers.add(i);
        }

        formula = workings;
        tempFormula = workings;
        for (Integer index : indexOfPowers) {
            changeFormula(index);
```

```
        }
        formula = tempFormula;
    }

    private void changeFormula(Integer index) {
        String numberLeft = "";
        String numberRight = "";

        for (int i = index + 1; i < workings.length(); i++) {
            if (isNumeric(workings.charAt(i)))
                numberRight = numberRight + workings.charAt(i);
            else
                break;
        }

        for (int i = index - 1; i >= 0; i--) {
            if (isNumeric(workings.charAt(i)))
                numberLeft = numberLeft + workings.charAt(i);
            else
                break;
        }

        String original = numberLeft + "^" + numberRight;
        String changed = "Math.pow(" + numberLeft + "," + numberRight +
")";
        tempFormula = tempFormula.replace(original, changed);
    }

    private boolean isNumeric(char c) {
        if ((c <= '9' && c >= '0') || c == '.')
            return true;

        return false;
    }


    public void clearOnClick(View view) {
        workingsTV.setText("");
        workings = "";
        resultsTV.setText("");
        leftBracket = true;
    }

    boolean leftBracket = true;

    public void bracketsOnClick(View view) {
        if (leftBracket) {
            setWorkings("(");
            leftBracket = false;
        } else {
            setWorkings(")");
            leftBracket = true;
        }
    }

    public void powerOfOnClick(View view) {
        setWorkings("^");
    }

    public void divisionOnClick(View view) {
        setWorkings("/");
    }

    public void sevenOnClick(View view) {
        setWorkings("7");
    }
```

```
    public void eightOnClick(View view) {
        setWorkings("8");
    }

    public void nineOnClick(View view) {
        setWorkings("9");
    }

    public void timesOnClick(View view) {
        setWorkings("*");
    }
    public void sqrtOnClick(View view) {
        setWorkings("√");
    }

    public void fourOnClick(View view) {
        setWorkings("4");
    }

    public void fiveOnClick(View view) {
        setWorkings("5");
    }

    public void sixOnClick(View view) {
        setWorkings("6");
    }

    public void minusOnClick(View view) {
        setWorkings("-");
    }

    public void oneOnClick(View view) {
        setWorkings("1");
    }

    public void twoOnClick(View view) {
        setWorkings("2");
    }

    public void threeOnClick(View view) {
        setWorkings("3");
    }

    public void plusOnClick(View view) {
        setWorkings("+");
    }

    public void decimalOnClick(View view) {
        setWorkings(".");
    }

    public void zeroOnClick(View view) {
        setWorkings("0");
    }

    //eval function
    public static double eval(final String str) {
        return new Object() {
            int pos = -1, ch;

            void nextChar() {
                ch = (++pos < str.length()) ? str.charAt(pos) : -1;
            }

            boolean eat(int charToEat) {
```

```
                while (ch == ' ') nextChar();
                if (ch == charToEat) {
                    nextChar();
                    return true;
                }
                return false;
            }

            double parse() {
                nextChar();
                double x = parseExpression();
                if (pos < str.length()) throw new
RuntimeException("Unexpected: " + (char)ch);
                return x;
            }


            double parseExpression() {
                double x = parseTerm();
                for (;;) {
                    if      (eat('+')) x += parseTerm(); // addition
                    else if (eat('-')) x -= parseTerm(); // subtraction
                    else return x;
                }
            }

            double parseTerm() {
                double x = parseFactor();
                for (;;) {
                    if      (eat('*')) x *= parseFactor(); //
multiplication
                    else if (eat('/')) x /= parseFactor(); // division
                    else return x;
                }
            }

            double parseFactor() {
                if (eat('+')) return parseFactor(); // unary plus
                if (eat('-')) return -parseFactor(); // unary minus

                double x;
                int startPos = this.pos;
                if (eat('(')) { // parentheses
                    x = parseExpression();
                    eat(')');
                } else if ((ch >= '0' && ch <= '9') || ch == '.') { //
numbers
                    while ((ch >= '0' && ch <= '9') || ch == '.')
nextChar();
                    x = Double.parseDouble(str.substring(startPos,
this.pos));
                } else if (ch >= 'a' && ch <= 'z') { // functions
                    while (ch >= 'a' && ch <= 'z') nextChar();
                    String func = str.substring(startPos, this.pos);
                    x = parseFactor();
                    if (func.equals("sqrt")) x = Math.sqrt(x);
                    else throw new RuntimeException("Unknown function: "
+ func);
                } else {
                    throw new RuntimeException("Unexpected: " +
(char)ch);
                }

                if (eat('^')) x = Math.pow(x, parseFactor()); //
exponentiation
```

```
                return x;
            }
        }.parse();
    }
}
```