```
Q1.Perfect number
```

```
<!-- activity main.xml -->
<RelativeLayout
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:padding="16dp"
tools:context=".MainActivity">
  <EditText
                android:id="@+id/editTextNumber1"
android:layout width="match parent"
android:layout height="wrap content"
android:hint="Enter Number 1"
android:inputType="numberDecimal" />
  <EditText
                android:id="@+id/editTextNumber2"
android:layout width="match parent"
android:layout height="wrap content"
android:layout below="@id/editTextNumber1"
android:layout marginTop="16dp"
android:hint="Enter Number 2"
android:inputType="numberDecimal" />
  <Button
               android:id="@+id/buttonSubmit"
android:layout width="wrap content"
android:layout height="wrap content"
android:layout below="@id/editTextNumber2"
android:layout marginTop="16dp"
android:text="Submit" />
```

```
<TextView
    android:id="@+id/textViewResult"
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:layout_below="@id/buttonSubmit"
android:layout_marginTop="16dp"
android:text="Result:" android:textSize="18sp" />
```

</RelativeLayout>

MainActivity.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.TextView;

public class MainActivity extends AppCompatActivity {

```
private EditText editTextNumber1;
private EditText editTextNumber2; private
Button buttonSubmit;
                      private TextView
textViewResult;
               protected void onCreate(Bundle
  @Override
savedInstanceState) {
                         super.onCreate(savedInstanceState);
setContentView(R.layout.activity main);
    editTextNumber1
                                 findViewById(R.id.editTextNumber1);
                                 findViewById(R.id.editTextNumber2);
editTextNumber2
buttonSubmit = findViewById(R.id.buttonSubmit);
                                                      textViewResult =
findViewById(R.id.textViewResult);
    buttonSubmit.setOnClickListener(new
View.OnClickListener() {
                                @Override
      public void onClick(View v) {
submitNumbers();
      }
    });
  }
  private void submitNumbers() {
    String number1String = editTextNumber1.getText().toString().trim();
    String number2String = editTextNumber2.getText().toString().trim();
    if (number1String.isEmpty() || number2String.isEmpty()) {
textViewResult.setText("Please enter both numbers.");
```

```
return;
    }
       double number1 = Double.parseDouble(number1String);
                                                                double
             number2 = Double.parseDouble(number2String);
    if (number1 > 20 && number2 > 20) {
      textViewResult.setText("Both numbers are greater than
20. Please enter new numbers.");
      editTextNumber1.setText("");
editTextNumber2.setText("");
                             return;
    }
    textViewResult.setText("Number 1: " + number1 + "\nNumber 2: " +
number2);
}
```

**Q2.** Java Android Program to perform all arithmetic Operations using Calculators.

```
Ans
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<!-- activity_calculator.xml -->
<RelativeLayout
```

```
xmlns:android="http://schemas.android.com/apk/res/android"
android:layout width="match parent"
android:layout height="match parent"
                                       android:padding="16dp">
  <TextView
                 android:id="@+id/textViewResult"
android:layout width="match parent"
android:layout height="wrap content"
android:textSize="24sp"
android:layout marginBottom="16dp"
    android:text="0"
    android:textAlignment="textEnd"/>
  <GridLayout
    android:layout width="match parent"
android:layout height="wrap content"
android:layout below="@id/textViewResult"
                                               android:columnCount="4"
android:orientation="horizontal">
    <Button
                   android:id="@+id/button0"
android:layout width="wrap content"
android:layout height="wrap content"
android:text="0"
android:onClick="onButtonClick"/>
    <Button
                   android:id="@+id/button1"
android:layout_width="wrap_content"
android:layout height="wrap content"
android:text="1"
android:onClick="onButtonClick"/>
```

```
<Button
                   android:id="@+id/button2"
android:layout_width="wrap_content"
android:layout height="wrap content"
android:text="2"
android:onClick="onButtonClick"/>
    <Button
      android:id="@+id/button3"
android:layout width="wrap content"
android:layout height="wrap content"
                                           android:text="3"
android:onClick="onButtonClick"/>
                                       <Button
android:id="@+id/button4"
android:layout width="wrap content"
android:layout height="wrap content"
                                           android:text="4"
android:onClick="onButtonClick"/>
                   android:id="@+id/button5"
    <Button
android:layout width="wrap content"
android:layout height="wrap content"
android:text="5"
android:onClick="onButtonClick"/>
    <Button
                   android:id="@+id/button6"
android:layout width="wrap content"
android:layout height="wrap content"
android:text="6"
android:onClick="onButtonClick"/>
```

<Button

```
android:id="@+id/button7"
android:layout width="wrap content"
android:layout height="wrap content"
                                            android:text="7"
android:onClick="onButtonClick"/>
                                       <Button
android:id="@+id/button8"
android:layout width="wrap content"
android:layout height="wrap content"
                                            android:text="8"
android:onClick="onButtonClick"/>
                   android:id="@+id/button9"
    <Button
android:layout width="wrap content"
android:layout height="wrap content"
android:text="9"
android:onClick="onButtonClick"/>
    <Button
                   android:id="@+id/buttonPlus"
android:layout width="wrap content"
android:layout height="wrap content"
      android:text="+"
                              android:onClick="onButtonClick"/>
                   android:id="@+id/buttonsubtraction"
    <Button
android:layout width="wrap content"
android:layout height="wrap content"
      android:text="-"
                             android:onClick="onButtonClick"/>
    <Button
      android:id="@+id/buttonmultipliaction"
android:layout width="wrap content"
android:layout height="wrap content"
```

```
android:text="x"
                              android:onClick="onButtonClick"/>
    <Button
                   android:id="@+id/buttondivision"
android:layout_width="wrap_content"
android:layout height="wrap content"
      android:text="÷"
                              android:onClick="onButtonClick"/>
                   android:id="@+id/buttonequal"
    <Button
android:layout width="wrap content"
android:layout height="wrap content"
android:text="="
android:onClick="onButtonClick"/>
                   android:id="@+id/buttonclear"
    <Button
android:layout width="wrap content"
android:layout height="wrap content"
android:text="C"
android:onClick="onButtonClick"/>
  </GridLayout>
</RelativeLayout>
```

## MainActivity.java-

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

 $import\ and roid x. app compat. app. App Compat Activity;$ 

```
public class CalculatorActivity extends AppCompatActivity {
  private TextView textViewResult;
                                     private
String input = "";
  private double operand1 = Double.NaN;
                                          private
double operand2 = Double.NaN;
  private String operator = "";
  @Override
               protected void onCreate(Bundle
savedInstanceState) {
                         super.onCreate(savedInstanceState);
setContentView(R.layout.activity calculator);
                                                 textViewResult
= findViewById(R.id.textViewResult);
  }
  public void onButtonClick(View view) {
    Button button = (Button) view;
     String buttonText = button.getText().toString();
    switch (buttonText) {
       case "C":
clear();
break; case "+":
case "-":
               case
"×": case "÷":
         if (!input.isEmpty()) {
            operand1 = Double.parseDouble(input);
                                                              operator
= buttonText:
           input = "";
```

```
}
        break;
case "=":
        if (!Double.isNaN(operand1) && !input.isEmpty()) {
operand2 = Double.parseDouble(input);
                                              input =
String.valueOf(calculate());
                                   operand1 = Double.NaN;
          operand2 = Double.NaN;
          operator = "";
        }
break;
default:
        input += buttonText;
    }
    textViewResult.setText(input);
  }
  private void clear() {
input = "";
    operand1 = Double.NaN; operand2 =
Double.NaN;
    operator = ""; textViewResult.setText("0");
  }
  (operator) {
                 case "+":
                                  return
operand1 + operand2;
      case "-":
                      return operand1 -
operand2; case "×":
```

```
return operand1 * operand2;
case "÷":
    if (operand2 == 0) return Double.NaN; // handle division by
zero    return operand1 / operand2;    default:
    return Double.NaN;
}
}
```