Mobile Programming

Assignment 1

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Idea: Quadratic Equation Solver

$ax^2 + bx + c = 0$ is the general form of a Quadratic equation. Given some value of a, b and c, one can solve for x using the below equation.

$D = b^2 - 4ac$
$x1 = (-b + \sqrt{D}) / 2a$
$x2 = (-b - \sqrt{D}) / 2a$

In cases where D < 0, the equation can't be solved. When D = 0, there exists only one solution, and there are two solutions when D > 0.

Implementation

Activity Main

```
<?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:id="@+id/main"
    android:layout_width="match_parent"
    android:layout_height="match_parent"

    tools:context=".MainActivity">

    <Button
        android:id="@+id/solveBtn"
        android:layout_width="300dp"
        android:layout_height="69dp"
        android:text="Solve"
        android:textSize="25sp"
```

```
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.474"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.551" />

    <TextView
        android:id="@+id/rootText"
        android:layout_width="152dp"
        android:layout_height="36dp"
        android:hint="Root"
        android:textColor="@color/white"
        android:gravity="center"
        android:textSize="20sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.498"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.781" />

    <TextView
        android:id="@+id/titleText"
        android:layout_width="295dp"
        android:layout_height="39dp"
        android:text="Quadratic Equation Solver"
        android:textSize="22sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.586"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.06" />

    <TextView
        android:id="@+id/headingText"
        android:layout_width="165dp"
        android:layout_height="39dp"
        android:text="ax^2 + bx + c = 0"
        android:textSize="20sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
```

```
    app:layout_constraintVertical_bias="0.147" />

<EditText
    android:id="@+id/valAText"
    android:gravity="center"
    android:layout_width="300dp"
    android:layout_height="50dp"
    android:background="@color/white"
    android:ems="10"
    android:textColor="@color/black"
    android:hint="Enter value of a"
    android:inputType="text"
    android:textColorHint="@color/black"
    android:textSize="15sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.495"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.246" />

<EditText
    android:id="@+id/valCText"
    android:layout_width="300dp"
    android:layout_height="50dp"
    android:background="@color/white"
    android:ems="10"
    android:hint="Enter value of c"
    android:gravity="center"
    android:inputType="text"
    android:textColor="@color/black"
    android:textColorHint="@color/black"
    android:textSize="15sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.495"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.418" />

<EditText
    android:id="@+id/valBText"
    android:layout_width="300dp"
    android:layout_height="50dp"
    android:gravity="center"
```

```
        android:background="@color/white"
        android:ems="10"
        android:textColor="@color/black"
        android:hint="Enter value of b"
        android:inputType="text"
        android:textColorHint="@color/black"
        android:textSize="15sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.495"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.33" />

    <Spinner
        android:id="@+id/rootSpinner"
        android:layout_width="300dp"
        android:layout_height="50dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.481"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.672" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

Kotlin File

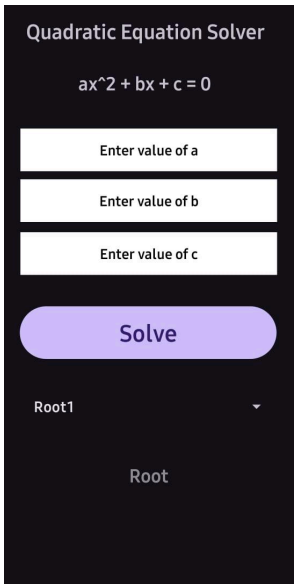
```
package com.example.qsolver

import android.os.Bundle
import android.provider.DocumentsContract.Root
import android.util.Log
import android.view.View
import android.widget.AdapterView
import android.widget.ArrayAdapter
import android.widget.Button
import android.widget.EditText
import android.widget.Spinner
import android.widget.TextView
import androidx.activity.enableEdgeToEdge
import androidx.appcompat.app.AppCompatActivity
import java.util.Locale
import kotlin.math.pow
```

```
import kotlin.math.sqrt

class MainActivity : AppCompatActivity() {
   override fun onCreate(savedInstanceState: Bundle?) {
       super.onCreate(savedInstanceState)
       enableEdgeToEdge()
       setContentView(R.layout.activity_main)

       var root1: Double = Double.NaN
       var root2: Double = Double.NaN
       var flag: String = "Root1"

       val rootSpinner : Spinner = findViewById(R.id.rootSpinner)
       var options = arrayOf("Root1","Root2")
       rootSpinner.adapter =
ArrayAdapter<String>(this,android.R.layout.simple_list_item_1,options
)

       rootSpinner.onItemSelectedListener = object :
AdapterView.OnItemSelectedListener{
           override fun onItemSelected(p0: AdapterView<*>?, p1:
View?, p2: Int, p3: Long) {
               flag = options.get(p2)
           }

           override fun onNothingSelected(p0: AdapterView<*>?) {
               flag = "Root1"
           }
       }

       val solveBtn = findViewById<Button>(R.id.solveBtn)
       solveBtn.setOnClickListener {
           var a: Double =
findViewById<EditText>(R.id.valAText).text.toString().toDouble()
           var b: Double =
findViewById<EditText>(R.id.valBText).text.toString().toDouble()
           var c: Double =
findViewById<EditText>(R.id.valCText).text.toString().toDouble()

           if(a == 0.0){
               root1 = -c/b
               root2 = Double.NaN
           }
           else{
               var delta: Double = sqrt(b.pow(2) - (4 * a * c))
```

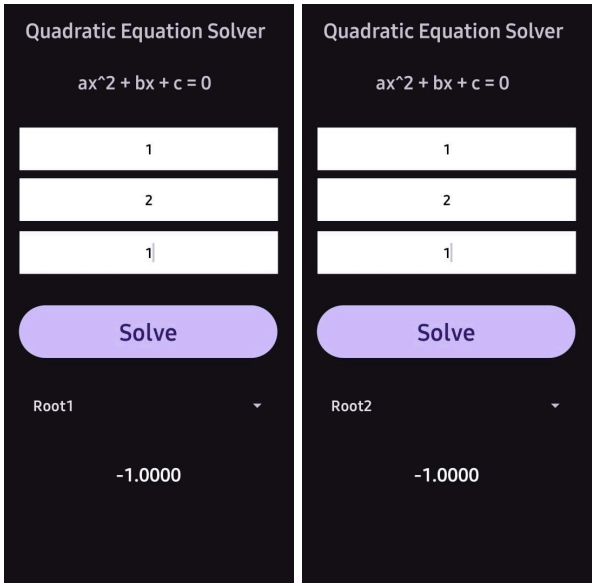
```
                root1 = (-b + delta) / (2 * a);
                root2 = (-b - delta) / (2 * a);
            }

            val rootText = findViewById<TextView>(R.id.rootText)
            if(flag == "Root1"){
                if(root1.isNaN()){
                    rootText.text = "NA"
                }
                else {
                    rootText.text = String.format(Locale.US, "%.4f",
root1)
                }
            }
            else{
                if(root2.isNaN()){
                    rootText.text = "NA"
                }
                else {
                    rootText.text = String.format(Locale.US, "%.4f",
root2)
                }
            }

        }
    }
}
```

Screenshots

Design

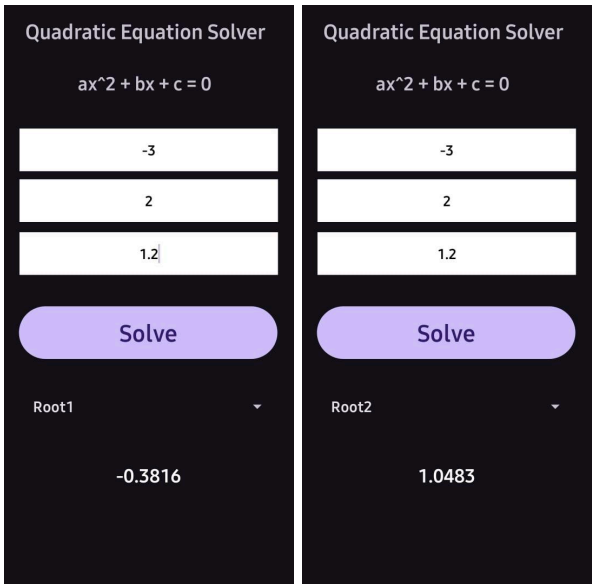


When D = 0



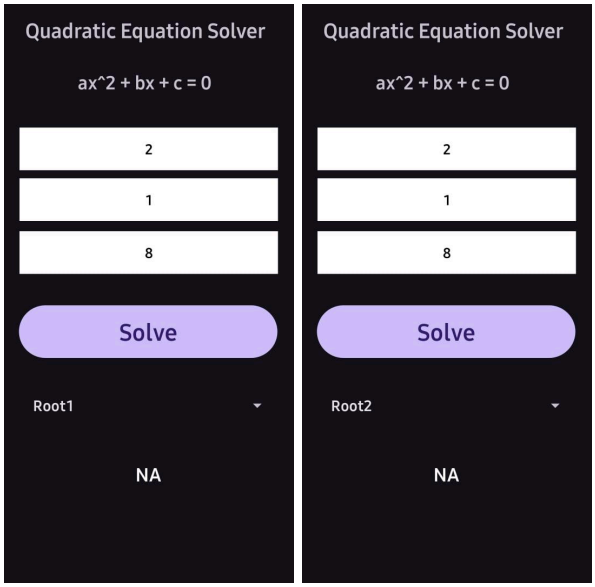
Since there is just one solution, both roots are the same, as you can see in the image.

When D > 0



There are two valid solutions in this case, as seen above.

When D < 0



In this case, there are no solutions. Hence, root 1 and root 2 are shown as NA - Not Applicable.