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ФАКУЛЬТЕТ ИУК «Информатика и управление»

КАФЕДРА ИУК4 «Программное обеспечение ЭВМ, информационные технологии»

**ЛАБОРАТОРНАЯ РАБОТА №3**

**«Особенности среды Android Studio для разработки приложений Android. Простое  
Android приложение»**

**ДИСЦИПЛИНА: «Разработка мобильного ПО»**

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**Цель:** приобретение практических навыков разработки приложений с несколькими Activity и Intent-объектами.

**Задачи:**

1. Изучить механизм создания многоэкранных приложений на платформе Android
2. Научиться разрабатывать приложения с использованием явного и неявного вызова классов
3. Понять особенности реализации Android-приложений с использованием Intent-объектов

**Формулировка задания:**

### **ТРЕБОВАНИЯ К РЕАЛИЗАЦИИ**

Задание состоит из двух проектов. Все проекты используют Intent объекты. В первом проекте все требуемые параметры устанавливаются в главном Activity и результат отображается на второстепенном Activity. Во втором проекте результат отображается на главном Activity, а для задания соответствующих параметров используется несколько второстепенных Activity. Один из проектов реализовать с использованием неявного вызова (action), второй проект реализовать с явным вызовом класса(-ов).

#### **Вариант 9**

С использованием RadioButton выбрать фигуру, с помощью EditText задать цвет в пространстве RGB для выбранной фигуры, с использованием Button определить место вывода фигуры (9 областей). Отобразить фигуру с заданными параметрами.

# Проект 1

## Листинг программы:

### CircleView.kt (рисует круг с использованием холста canvas):

```
package com.example.lw_3_1

import android.content.Context
import android.graphics.Canvas
import android.graphics.Color
import android.graphics.Paint
import android.view.View

class CircleView(context: Context?): View(context) {
    private val paint: Paint = Paint()

    private var r: Int = 0
    private var g: Int = 0
    private var b: Int = 0
    private var positions: ArrayList<Int>? = ArrayList()
    private var radius: Float = 100f

    fun init(r: Int, g: Int, b: Int, positions: ArrayList<Int>?) {
        this.positions = positions
        this.r = r
        this.g = g
        this.b = b
        this.paint.apply {
            style = Paint.Style.FILL
            color = Color.rgb(r, g, b)
        }
    }

    override fun onDraw(canvas: Canvas) {
        super.onDraw(canvas)

        this.positions?.let { postList ->
            val metrics = context.resources.displayMetrics
            val horizontalPadding: Float = (metrics.widthPixels - this.radius * 6) / 4
            val verticalPadding: Float = (metrics.heightPixels - this.radius * 6) / 4

            var cx = 0F
            var cy = 0F
            var row = 0
            var col = 0

            for (post in postList) {
                row = post / 3
                col = post % 3
                cx = (1 + col).toFloat() * horizontalPadding + this.radius * ((2 *
col).toFloat() + 1)
                cy = (1 + row).toFloat() * verticalPadding + this.radius * ((2 *
row).toFloat() + 1)
                canvas.drawCircle(cx, cy, this.radius, this.paint)
            }
        }
    }
}
```

```
}
```

## **MainActivity.kt (описывает главную Activity с выбором типа и цвета фигуры):**

```
package com.example.lw_3_1

import android.content.Intent
import android.os.Bundle
import android.widget.Button
import android.widget.EditText
import android.widget.RadioButton
import android.widget.RadioGroup
import android.widget.Toast
import androidx.activity.enableEdgeToEdge
import androidx.appcompat.app.AppCompatActivity
import androidx.core.view.ViewCompat
import androidx.core.view.WindowInsetsCompat

class MainActivity : AppCompatActivity() {
    private lateinit var radioGroup: RadioGroup
    private lateinit var button: Button
    private lateinit var editText: EditText
    private lateinit var selectedFigure: String
    private lateinit var rgb: Array<Int>
    private lateinit var rectangleRadio: RadioButton
    private lateinit var circleRadio: RadioButton

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

        this.circleRadio = findViewById(R.id.circleRadioButton)
        this.rectangleRadio = findViewById(R.id.rectangleRadioButton)

        this.radioGroup = findViewById(R.id.radioGroup)
        this.radioGroup.setOnCheckedChangeListener {
            RadioGroup.OnCheckedChangeListener { group, checkedId ->
                val radio: RadioButton = findViewById(checkedId)
                val text: String = radio.text.toString()
                this.selectedFigure = text
            }
        }

        this.button = findViewById(R.id.selectionButton)
        this.button.setOnClickListener {
            if (!this.rectangleRadio.isChecked && !this.circleRadio.isChecked) {
                Toast.makeText(this, "Select a figure!!!", Toast.LENGTH_LONG).show()
            }
            else {
                this.editText = findViewById(R.id.editText)
                val pattern = Regex("[0-9]{1,3} [0-9]{1,3} [0-9]{1,3}$")
                if (pattern.containsMatchIn(editText.text)) {
                    val text: String = editText.text.toString()
                    this.rgb = (text.split(" ").map { it.toInt() }).toTypedArray()
                    if (rgb[0] <= 255 && rgb[1] <= 255 && rgb[2] <= 255) {
                        val intent = Intent()
```

```

        intent.action = Intent.ACTION_ASSIST
        intent.addCategory(Intent.CATEGORY_DEFAULT)
        intent.putExtra("selectedFigure", this.selectedFigure)
        intent.putExtra("r", this.rgb[0])
        intent.putExtra("g", this.rgb[1])
        intent.putExtra("b", this.rgb[2])
        startActivity(intent)
    }
    else {
        Toast.makeText(this, "Select a figure!!!",
Toast.LENGTH_LONG).show()
    }
}
else {
    Toast.makeText(this, "Incorrect format", Toast.LENGTH_LONG).show()
}
}
}

ViewCompat.setOnApplyWindowInsetsListener(findViewById(R.id.main)) { v, insets
->
    val systemBars = insets.getInsets(WindowInsetsCompat.Type.systemBars())
    v.setPadding(systemBars.left, systemBars.top, systemBars.right,
systemBars.bottom)
    insets
}
}
}
}

```

## **MainActivity2.kt (описывает Activity с выбором позиций отрисовки):**

```

package com.example.lw_3_1

import android.content.Intent
import android.os.Bundle
import android.widget.Button
import androidx.activity.enableEdgeToEdge
import androidx.appcompat.app.AppCompatActivity
import androidx.core.view.ViewCompat
import androidx.core.view.WindowInsetsCompat

class MainActivity2 : AppCompatActivity() {
    private lateinit var button1: Button
    private lateinit var button2: Button
    private lateinit var button3: Button
    private lateinit var button4: Button
    private lateinit var button5: Button
    private lateinit var button6: Button
    private lateinit var button7: Button
    private lateinit var button8: Button
    private lateinit var button9: Button
    private lateinit var drawButton: Button
    private var positions: MutableList<Int> = ArrayList()
    private lateinit var selectedFigure: String
    private var r: Int = 0
    private var g: Int = 0
    private var b: Int = 0

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
    }
}

```

```

enableEdgeToEdge()
setContentView(R.layout.activity_main2)

this.selectedFigure = intent.getStringExtra("selectedFigure").toString()
this.r = intent.getIntExtra("r", 0)
this.g = intent.getIntExtra("g", 0)
this.b = intent.getIntExtra("b", 0)

this.button1 = findViewById(R.id.button1)
this.button2 = findViewById(R.id.button2)
this.button3 = findViewById(R.id.button3)
this.button4 = findViewById(R.id.button4)
this.button5 = findViewById(R.id.button5)
this.button6 = findViewById(R.id.button6)
this.button7 = findViewById(R.id.button7)
this.button8 = findViewById(R.id.button8)
this.button9 = findViewById(R.id.button9)

this.drawButton = findViewById(R.id.drawButton)
this.drawButton.setOnClickListener {
    val intent = Intent()
    intent.action = Intent.ACTION_CALL
    intent.addCategory(Intent.CATEGORY_DEFAULT)
    intent.putExtra("selectedFigure", this.selectedFigure)
    intent.putExtra("r", this.r)
    intent.putExtra("g", this.g)
    intent.putExtra("b", this.b)
    intent.putIntegerArrayListExtra("positions", ArrayList(this.positions))
    startActivity(intent)
    button1.isEnabled = true
    button2.isEnabled = true
    button3.isEnabled = true
    button4.isEnabled = true
    button5.isEnabled = true
    button6.isEnabled = true
    button7.isEnabled = true
    button8.isEnabled = true
    button9.isEnabled = true
    this.positions = ArrayList()
}

this.button1.setOnClickListener {
    button1.isEnabled = false
    this.positions.add(0)
}

this.button2.setOnClickListener {
    button2.isEnabled = false
    this.positions.add(1)
}

this.button3.setOnClickListener {
    button3.isEnabled = false
    this.positions.add(2)
}

this.button4.setOnClickListener {
    button4.isEnabled = false
    this.positions.add(3)
}

this.button5.setOnClickListener {

```

```

        button5.isEnabled = false
        this.positions.add(4)
    }

    this.button6.setOnClickListener {
        button6.isEnabled = false
        this.positions.add(5)
    }

    this.button7.setOnClickListener {
        button7.isEnabled = false
        this.positions.add(6)
    }

    this.button8.setOnClickListener {
        button8.isEnabled = false
        this.positions.add(7)
    }

    this.button9.setOnClickListener {
        button9.isEnabled = false
        this.positions.add(8)
    }

    ViewCompat.setOnApplyWindowInsetsListener(findViewById(R.id.main)) { v, insets
->
        val systemBars = insets.getInsets(WindowInsetsCompat.Type.systemBars())
        v.setPadding(systemBars.left, systemBars.top, systemBars.right,
systemBars.bottom)
        insets
    }
}
}

```

## **MainActivity3.kt (описывает Activity на основе холста Canvas, отрисовка фигур):**

```

package com.example.lw_3_1

import android.os.Bundle
import androidx.activity.enableEdgeToEdge
import androidx.appcompat.app.AppCompatActivity

class MainActivity3 : AppCompatActivity() {
    private lateinit var selectedFigure: String
    private var r: Int = 0
    private var g: Int = 0
    private var b: Int = 0

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        enableEdgeToEdge()

        this.selectedFigure = intent.getStringExtra("selectedFigure").toString()
        this.r = intent.getIntExtra("r", 0)
        this.g = intent.getIntExtra("g", 0)
        this.b = intent.getIntExtra("b", 0)
        val positions: ArrayList<Int>? = intent.getIntegerArrayListExtra("positions")
    }
}

```

```

        if (this.selectedFigure == "Rectangle") {
            var rectangles = RectangleView(this)
            rectangles.init(this.r, this.g, this.b, positions)
            setContentView(rectangles)
        }
        else {
            var circles = CircleView(this)
            circles.init(this.r, this.g, this.b, positions)
            setContentView(circles)
        }
    }
}

```

## RectangleView.kt (рисует прямоугольник с использованием canvas):

```

package com.example.lw_3_1

import android.content.Context
import android.graphics.Canvas
import android.graphics.Color
import android.graphics.Paint
import android.view.View
import android.widget.Toast

class RectangleView(context: Context?): View(context) {
    private val paint: Paint = Paint()

    private var r: Int = 0
    private var g: Int = 0
    private var b: Int = 0
    private var width: Float = 200F
    private var height: Float = 200F
    private var positions: ArrayList<Int>? = ArrayList()

    fun init(r: Int, g: Int, b: Int, positions: ArrayList<Int>?) {
        this.positions = positions
        this.r = r
        this.g = g
        this.b = b
        this.paint.apply {
            style = Paint.Style.FILL
            color = Color.rgb(r, g, b)
        }
    }

    override fun onDraw(canvas: Canvas) {
        super.onDraw(canvas)

        this.positions?.let { postList ->
            val metrics = context.resources.displayMetrics
            val horizontalPadding: Float = (metrics.widthPixels - this.width * 3) / 4
            val verticalPadding: Float = (metrics.heightPixels - this.height * 3) / 4

            var leftPadding = 0F
            var topPadding = 0F
            var rightPadding = 0F
            var bottomPadding = 0F
            var row = 0
            var col = 0

```



```

        for (post in postList) {
            row = post / 3
            col = post % 3
            leftPadding = (col + 1).toFloat() * horizontalPadding + this.width *
col.toFloat()
            topPadding = (row + 1).toFloat() * verticalPadding + this.height *
row.toFloat()
            rightPadding = (col + 1).toFloat() * horizontalPadding + this.width *
(col + 1).toFloat()
            bottomPadding = (row + 1).toFloat() * verticalPadding + this.height *
(row + 1).toFloat()
            canvas.drawRect(leftPadding, topPadding, rightPadding, bottomPadding,
this.paint)
        }
    }
}
}

```

## activity\_main.xml (разметка для MainActivity.kt):

```

<?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">

    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="140dp"
        android:text="Select a figure:"
        android:textSize="18sp"
        android:textStyle="bold"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <RadioGroup
        android:id="@+id/radioGroup"
        android:layout_width="154dp"
        android:layout_height="0dp"
        android:layout_marginTop="40dp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/textView">

        <RadioButton
            android:id="@+id/circleRadioButton"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Circle"
            tools:layout_editor_absoluteX="65dp"
            tools:layout_editor_absoluteY="295dp" />
    </RadioGroup>
</androidx.constraintlayout.widget.ConstraintLayout>

```

```

        <RadioButton
            android:id="@+id/rectangleRadioButton"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Rectangle"
            tools:layout_editor_absoluteX="65dp"
            tools:layout_editor_absoluteY="295dp" />

    </RadioGroup>

    <TextView
        android:id="@+id/textView2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="70dp"
        android:text="Enter RGB such as 255 123 31:"
        android:textSize="18sp"
        android:textStyle="bold"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/radioGroup" />

    <EditText
        android:id="@+id/editText"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:ems="10"
        android:inputType="text"
        android:minWidth="48dp"
        android:minHeight="48dp"
        android:text="23 213 123"
        android:textSize="18sp"
        app:layout_constraintBottom_toTopOf="@+id/selectionButton"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/textView2" />

    <Button
        android:id="@+id/selectionButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginBottom="100dp"
        android:text="To draw"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

## activity\_main2.xml (разметка для MainActivity2.kt):

```

<?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=".MainActivity2">

```

```

<Button
    android:id="@+id/button6"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginEnd="20dp"
    android:text="Button6"
    app:layout_constraintBottom_toTopOf="@+id/button9"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/button3" />

```

```

<Button
    android:id="@+id/button5"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Button5"
    app:layout_constraintBottom_toTopOf="@+id/button8"
    app:layout_constraintEnd_toStartOf="@+id/button6"
    app:layout_constraintStart_toEndOf="@+id/button4"
    app:layout_constraintTop_toBottomOf="@+id/button2" />

```

```

<Button
    android:id="@+id/button1"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginStart="20dp"
    android:layout_marginTop="120dp"
    android:text="Button1"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

```

```

<Button
    android:id="@+id/button4"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginStart="20dp"
    android:text="Button4"
    app:layout_constraintBottom_toTopOf="@+id/button7"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/button1" />

```

```

<Button
    android:id="@+id/button2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="120dp"
    android:text="Button2"
    app:layout_constraintEnd_toStartOf="@+id/button3"
    app:layout_constraintStart_toEndOf="@+id/button1"
    app:layout_constraintTop_toTopOf="parent" />

```

```

<Button
    android:id="@+id/button3"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="120dp"
    android:layout_marginEnd="20dp"
    android:text="Button3"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

```

```

<Button

```

```

        android:id="@+id/button7"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginStart="20dp"
        android:layout_marginBottom="180dp"
        android:text="Button7"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintStart_toStartOf="parent" />

<Button
    android:id="@+id/button8"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginBottom="180dp"
    android:text="Button8"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toStartOf="@+id/button9"
    app:layout_constraintStart_toEndOf="@+id/button7" />

<Button
    android:id="@+id/button9"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginEnd="20dp"
    android:layout_marginBottom="180dp"
    android:text="Button9"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent" />

<Button
    android:id="@+id/drawButton"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:backgroundTint="#BC2828"
    android:text="Draw"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/button8" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

## activity\_main3.xml (разметка для MainActivity3.kt):

```

<?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=".MainActivity3">

</androidx.constraintlayout.widget.ConstraintLayout>

```

## AndroidManifest.xml (файл, конфигурирующий приложение):

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.LW_3_1"
        tools:targetApi="31">

        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>

        <activity
            android:name=".MainActivity2"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.ASSIST" />

                <category android:name="android.intent.category.DEFAULT" />
            </intent-filter>
        </activity>

        <activity
            android:name=".MainActivity3"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.CALL" />

                <category android:name="android.intent.category.DEFAULT" />
            </intent-filter>
        </activity>

    </application>

</manifest>
```

## Проект 2

### Листинг программы:

#### CustomView.kt (рисует круг с использованием холста canvas):

```
package com.example.lw_3_1

import android.content.Context
import android.graphics.Canvas
import android.graphics.Color
import android.graphics.Paint
import android.util.AttributeSet
import android.view.View

class CustomView @JvmOverloads constructor(
    context: Context,
    attrs: AttributeSet? = null,
    defStyleAttr: Int = 0
) : View(context, attrs, defStyleAttr) {
    private val paint: Paint = Paint()

    private var r: Int = 0
    private var g: Int = 0
    private var b: Int = 0
    private var width: Float = 200F
    private var height: Float = 100F
    private var radius: Float = 50f
    private var positions: ArrayList<Int>? = ArrayList()
    private var selectedFigure: String = "Rectangle";

    private lateinit var can: Canvas

    fun init(r: Int, g: Int, b: Int, positions: ArrayList<Int>?, selectedFigure:
String) {
        this.selectedFigure = selectedFigure
        this.positions = positions
        this.r = r
        this.g = g
        this.b = b
        this.paint.apply {
            style = Paint.Style.FILL
            color = Color.rgb(r, g, b)
        }
    }

    override fun onDraw(canvas: Canvas) {
        super.onDraw(canvas)
        this.can = canvas

        if (this.selectedFigure == "Rectangle") {
            this.positions?.let { postList ->
                val metrics = context.resources.displayMetrics
                val horizontalPadding: Float = (metrics.widthPixels - this.width * 3)
                val verticalPadding: Float = (metrics.heightPixels - this.height *
3) / 4
                val verticalPadding: Float = (400 - this.height * 3) / 4
            }
        }
    }
}
```

```

        var leftPadding = 0F
        var topPadding = 0F
        var rightPadding = 0F
        var bottomPadding = 0F
        var row = 0
        var col = 0

        for (post in postList) {
            row = post / 3
            col = post % 3
            leftPadding =
                (col + 1).toFloat() * horizontalPadding + this.width *
col.toFloat()
            topPadding = (row + 1).toFloat() * verticalPadding + this.height *
row.toFloat()
            rightPadding =
                (col + 1).toFloat() * horizontalPadding + this.width * (col +
1).toFloat()
            bottomPadding =
                (row + 1).toFloat() * verticalPadding + this.height * (row +
1).toFloat()

            canvas.drawRect(
                leftPadding,
                topPadding,
                rightPadding,
                bottomPadding,
                this.paint
            )
        }
    }
}
else if (this.selectedFigure == "Circle"){
    this.positions?.let { postList ->
        val metrics = context.resources.displayMetrics
        val horizontalPadding: Float = (metrics.widthPixels - this.radius * 6)
/ 4
//
6) / 4
        val verticalPadding: Float = (metrics.heightPixels - this.radius *
val verticalPadding: Float = (400 - this.height * 3) / 4
        var cx = 0F
        var cy = 0F
        var row = 0
        var col = 0

        for (post in postList) {
            row = post / 3
            col = post % 3
            cx = (1 + col).toFloat() * horizontalPadding + this.radius * ((2 *
col).toFloat() + 1)
            cy = (1 + row).toFloat() * verticalPadding + this.radius * ((2 *
row).toFloat() + 1)
            canvas.drawCircle(cx, cy, this.radius, this.paint)
        }
    }
}
}
}
}

```

## Figure.kt (описывает Activity с выбором типа фигуры):

```
package com.example.lw_3_2

import android.content.Intent
import android.os.Bundle
import android.widget.Button
import android.widget.EditText
import android.widget.RadioButton
import android.widget.RadioGroup
import android.widget.Toast
import androidx.activity.enableEdgeToEdge
import androidx.appcompat.app.AppCompatActivity
import androidx.core.view.ViewCompat
import androidx.core.view.WindowInsetsCompat

class Figure : AppCompatActivity() {
    private lateinit var radioGroup: RadioGroup
    private lateinit var button: Button
    private lateinit var selectedFigure: String
    private lateinit var rectangleRadio: RadioButton
    private lateinit var circleRadio: RadioButton
    private var positions: ArrayList<Int>? = ArrayList()
    private var r: Int = -1
    private var g: Int = -1
    private var b: Int = -1

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        enableEdgeToEdge()
        setContentView(R.layout.activity_figure)

        this.positions = intent.getIntegerArrayListExtra("positions")
        this.r = intent.getIntExtra("r", -1)
        this.g = intent.getIntExtra("g", -1)
        this.b = intent.getIntExtra("b", -1)

        this.circleRadio = findViewById(R.id.circleRadioButton)
        this.rectangleRadio = findViewById(R.id.rectangleRadioButton)

        this.radioGroup = findViewById(R.id.radioGroup)
        this.radioGroup.setOnCheckedChangeListener {
            group, checkedId ->
            val radio: RadioButton = findViewById(checkedId)
            val text: String = radio.text.toString()
            this.selectedFigure = text
        }

        this.button = findViewById(R.id.selectionButton)
        this.button.setOnClickListener {
            if (!this.rectangleRadio.isChecked && !this.circleRadio.isChecked) {
                Toast.makeText(this, "Select a figure!!!", Toast.LENGTH_LONG).show()
            }
            else {
                val intent = Intent(this, MainActivity::class.java)
                intent.putIntegerArrayListExtra("positions", this.positions)
                intent.putExtra("selectedFigure", this.selectedFigure)
                intent.putExtra("r", this.r)
            }
        }
    }
}
```



```

        intent.putExtra("g", this.g)
        intent.putExtra("b", this.b)
        startActivity(intent)
    }
}

ViewCompat.setOnApplyWindowInsetsListener(findViewById(R.id.main)) { v, insets
->
    val systemBars = insets.getInsets(WindowInsetsCompat.Type.systemBars())
    v.setPadding(systemBars.left, systemBars.top, systemBars.right,
systemBars.bottom)
    insets
}
}
}

```

## **MainActivity.kt (описывает Activity на основе холста canvas):**

```

package com.example.lw_3_2

import android.content.Intent
import android.os.Bundle
import android.widget.Button
import android.widget.LinearLayout
import android.widget.RelativeLayout
import android.widget.Toast
import androidx.activity.enableEdgeToEdge
import androidx.appcompat.app.AppCompatActivity
import androidx.constraintlayout.widget.ConstraintLayout
import com.example.lw_3_1.CustomView

class MainActivity : AppCompatActivity() {
    private lateinit var selectedFigure: String
    private var r: Int = -1
    private var g: Int = -1
    private var b: Int = -1
    private lateinit var figureButton: Button
    private lateinit var positionsButton: Button
    private lateinit var rgbButton: Button
    private var positions: ArrayList<Int>? = ArrayList()

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        enableEdgeToEdge()

        this.selectedFigure = intent.getStringExtra("selectedFigure").toString()
        this.r = intent.getIntExtra("r", -1)
        this.g = intent.getIntExtra("g", -1)
        this.b = intent.getIntExtra("b", -1)
        this.positions = intent.getIntegerArrayListExtra("positions")

        if (this.r >= 0 && this.g >= 0 && this.b >= 0 && this.positions.toString() !=
"null") {
            Toast.makeText(this, this.selectedFigure, Toast.LENGTH_SHORT).show()
            setContentView(R.layout.activity_main)
            val req: LinearLayout = findViewById(R.id.req)
            val custom = CustomView(this)
            custom.init(this.r, this.g, this.b, this.positions, this.selectedFigure)
            req.addView(custom)
        }
        else {

```

```

        setContentView(R.layout.activity_main)

        this.figureButton = findViewById(R.id.figureButton)
        this.positionsButton = findViewById(R.id.positionsButton)
        this.rgbButton = findViewById(R.id.RGBButton)

        this.positionsButton.setOnClickListener {
            val intent = Intent(this, Positions::class.java)
            intent.putExtra("selectedFigure", this.selectedFigure)
            intent.putExtra("r", this.r)
            intent.putExtra("g", this.g)
            intent.putExtra("b", this.b)
            startActivity(intent)
        }

        this.figureButton.setOnClickListener {
            val intent = Intent(this, Figure::class.java)
            intent.putIntegerArrayListExtra("positions", this.positions)
            intent.putExtra("r", this.r)
            intent.putExtra("g", this.g)
            intent.putExtra("b", this.b)
            startActivity(intent)
        }

        this.rgbButton.setOnClickListener {
            val intent = Intent(this, RGB::class.java)
            intent.putIntegerArrayListExtra("positions", this.positions)
            intent.putExtra("selectedFigure", this.selectedFigure)
            startActivity(intent)
        }
    }
}
}

```

## Positions.kt (описывает Activity с выбором позиций отрисовки):

```

package com.example.lw_3_2

import android.content.Intent
import android.os.Bundle
import android.widget.Button
import androidx.activity.enableEdgeToEdge
import androidx.appcompat.app.AppCompatActivity
import androidx.core.view.ViewCompat
import androidx.core.view.WindowInsetsCompat

class Positions : AppCompatActivity() {
    private lateinit var button1: Button
    private lateinit var button2: Button
    private lateinit var button3: Button
    private lateinit var button4: Button
    private lateinit var button5: Button
    private lateinit var button6: Button
    private lateinit var button7: Button
    private lateinit var button8: Button
    private lateinit var button9: Button
    private lateinit var drawButton: Button
    private var positions: MutableList<Int> = ArrayList()
    private lateinit var selectedFigure: String
    private var r: Int = -1

```

```

private var g: Int = -1
private var b: Int = -1

override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    enableEdgeToEdge()
    setContentView(R.layout.activity_positions)

    this.selectedFigure = intent.getStringExtra("selectedFigure").toString()
    this.r = intent.getIntExtra("r", -1)
    this.g = intent.getIntExtra("g", -1)
    this.b = intent.getIntExtra("b", -1)

    this.button1 = findViewById(R.id.button1)
    this.button2 = findViewById(R.id.button2)
    this.button3 = findViewById(R.id.button3)
    this.button4 = findViewById(R.id.button4)
    this.button5 = findViewById(R.id.button5)
    this.button6 = findViewById(R.id.button6)
    this.button7 = findViewById(R.id.button7)
    this.button8 = findViewById(R.id.button8)
    this.button9 = findViewById(R.id.button9)

    this.drawButton = findViewById(R.id.drawButton)
    this.drawButton.setOnClickListener {
        val intent = Intent(this, MainActivity::class.java)
        intent.putIntegerArrayListExtra("positions", ArrayList(this.positions))
        intent.putExtra("selectedFigure", this.selectedFigure)
        intent.putExtra("r", this.r)
        intent.putExtra("g", this.g)
        intent.putExtra("b", this.b)
        startActivity(intent)
        button1.isEnabled = true
        button2.isEnabled = true
        button3.isEnabled = true
        button4.isEnabled = true
        button5.isEnabled = true
        button6.isEnabled = true
        button7.isEnabled = true
        button8.isEnabled = true
        button9.isEnabled = true
        this.positions = ArrayList()
    }

    this.button1.setOnClickListener {
        button1.isEnabled = false
        this.positions.add(0)
    }

    this.button2.setOnClickListener {
        button2.isEnabled = false
        this.positions.add(1)
    }

    this.button3.setOnClickListener {
        button3.isEnabled = false
        this.positions.add(2)
    }

    this.button4.setOnClickListener {
        button4.isEnabled = false

```

```

        this.positions.add(3)
    }

    this.button5.setOnClickListener {
        button5.isEnabled = false
        this.positions.add(4)
    }

    this.button6.setOnClickListener {
        button6.isEnabled = false
        this.positions.add(5)
    }

    this.button7.setOnClickListener {
        button7.isEnabled = false
        this.positions.add(6)
    }

    this.button8.setOnClickListener {
        button8.isEnabled = false
        this.positions.add(7)
    }

    this.button9.setOnClickListener {
        button9.isEnabled = false
        this.positions.add(8)
    }

    ViewCompat.setOnApplyWindowInsetsListener(findViewById(R.id.main)) { v, insets
->
        val systemBars = insets.getInsets(WindowInsetsCompat.Type.systemBars())
        v.setPadding(systemBars.left, systemBars.top, systemBars.right,
systemBars.bottom)
        insets
    }
}
}

```

## RGB.kt (activity выбора цвета фигуры):

```

package com.example.lw_3_2

import android.content.Intent
import android.os.Bundle
import android.widget.Button
import android.widget.EditText
import androidx.activity.enableEdgeToEdge
import androidx.appcompat.app.AppCompatActivity
import androidx.core.view.ViewCompat
import androidx.core.view.WindowInsetsCompat

class RGB : AppCompatActivity() {
    private var positions: ArrayList<Int>? = ArrayList()

```

```

private var r: Int = -1
private var g: Int = -1
private var b: Int = -1
private lateinit var button: Button
private lateinit var editText: EditText

private lateinit var selectedFigure: String
override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    enableEdgeToEdge()
    setContentView(R.layout.activity_rgb)

    this.positions = intent.getIntegerArrayListExtra("positions")
    this.selectedFigure = intent.getStringExtra("selectedFigure").toString()

    this.button = findViewById(R.id.goButton)
    this.button.setOnClickListener {
        this.editText = findViewById(R.id.editText)
        this.r = this.editText.text.toString().split(" ")[0].toInt()
        this.g = this.editText.text.toString().split(" ")[1].toInt()
        this.b = this.editText.text.toString().split(" ")[2].toInt()
        val intent = Intent(this, MainActivity::class.java)
        intent.putIntegerArrayListExtra("positions", this.positions)
        intent.putExtra("selectedFigure", this.selectedFigure)
        intent.putExtra("r", this.r)
        intent.putExtra("g", this.g)
        intent.putExtra("b", this.b)
        startActivity(intent)
    }

    ViewCompat.setOnApplyWindowInsetsListener(findViewById(R.id.main)) { v, insets
->
        val systemBars = insets.getInsets(WindowInsetsCompat.Type.systemBars())
        v.setPadding(systemBars.left, systemBars.top, systemBars.right,
systemBars.bottom)
        insets
    }
}
}

```

## activity\_figure.xml (разметка Activity с выбором типа фигуры):

```
<?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=".Figure">

    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="140dp"
        android:text="Select a figure:"
        android:textSize="18sp"
        android:textStyle="bold"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <RadioGroup
        android:id="@+id/radioGroup"
        android:layout_width="154dp"
        android:layout_height="0dp"
        android:layout_marginTop="40dp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/textView">

        <RadioButton
            android:id="@+id/circleRadioButton"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Circle"
            tools:layout_editor_absoluteX="65dp"
            tools:layout_editor_absoluteY="295dp" />

        <RadioButton
            android:id="@+id/rectangleRadioButton"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Rectangle"
            tools:layout_editor_absoluteX="65dp"
            tools:layout_editor_absoluteY="295dp" />

    </RadioGroup>

    <Button
        android:id="@+id/selectionButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginBottom="100dp"
        android:text="To draw"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

```
</androidx.constraintlayout.widget.ConstraintLayout>
```

## **activity\_main.xml (разметка Activity на основе холста canvas, ортисовка фигур):**

```
<?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/figureButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="140dp"
        android:text="Select figure"
        android:textSize="20sp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/positionsButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="20dp"
        android:text="Select positions"
        android:textSize="20sp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/figureButton" />

    <Button
        android:id="@+id/RGBButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="20dp"
        android:text="Select RGB"
        android:textSize="20sp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/positionsButton" />

    <LinearLayout
        android:id="@+id/req"
        android:layout_width="match_parent"
        android:layout_height="400dp"
        android:orientation="vertical"
        app:layout_constraintBottom_toBottomOf="parent">
    </LinearLayout>

</androidx.constraintlayout.widget.ConstraintLayout>
```

## activity\_positions.xml (разметка Activity с выбором позиций отрисовки):

```
<?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=".Positions">

    <Button
        android:id="@+id/button6"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginEnd="20dp"
        android:text="Button6"
        app:layout_constraintBottom_toTopOf="@+id/button9"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/button3" />

    <Button
        android:id="@+id/button5"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Button5"
        app:layout_constraintBottom_toTopOf="@+id/button8"
        app:layout_constraintEnd_toStartOf="@+id/button6"
        app:layout_constraintStart_toEndOf="@+id/button4"
        app:layout_constraintTop_toBottomOf="@+id/button2" />

    <Button
        android:id="@+id/button1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginStart="20dp"
        android:layout_marginTop="120dp"
        android:text="Button1"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/button4"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginStart="20dp"
        android:text="Button4"
        app:layout_constraintBottom_toTopOf="@+id/button7"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/button1" />

    <Button
        android:id="@+id/button2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="120dp"
        android:text="Button2"
        app:layout_constraintEnd_toStartOf="@+id/button3"
        app:layout_constraintStart_toEndOf="@+id/button1"
        app:layout_constraintTop_toTopOf="parent" />
```



```

<Button
    android:id="@+id/button3"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="120dp"
    android:layout_marginEnd="20dp"
    android:text="Button3"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<Button
    android:id="@+id/button7"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginStart="20dp"
    android:layout_marginBottom="180dp"
    android:text="Button7"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintStart_toStartOf="parent" />

<Button
    android:id="@+id/button8"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginBottom="180dp"
    android:text="Button8"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toStartOf="@+id/button9"
    app:layout_constraintStart_toEndOf="@+id/button7" />

<Button
    android:id="@+id/button9"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginEnd="20dp"
    android:layout_marginBottom="180dp"
    android:text="Button9"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent" />

<Button
    android:id="@+id/drawButton"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:backgroundTint="#BC2828"
    android:text="Draw"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/button8" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

## activity\_rgb.xml (разметка activity выбора цвета фигуры):

```

<?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=".RGB">

<TextView
    android:id="@+id/textView2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="50dp"
    android:text="Enter RGB such as 255 123 31:"
    android:textSize="18sp"
    android:textStyle="bold"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.496"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<EditText
    android:id="@+id/editText"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="50dp"
    android:ems="10"
    android:inputType="text"
    android:minWidth="48dp"
    android:minHeight="48dp"
    android:text="23 213 123"
    android:textSize="18sp"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/textView2" />

<Button
    android:id="@+id/goButton"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="50dp"
    android:text="Go back"
    android:textSize="20sp"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/editText" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

## AndroidManifest.xml (конфигурационный файл приложения):

```

<?xml version="1.0" encoding="utf-8"?>

<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools" >

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"

```

```

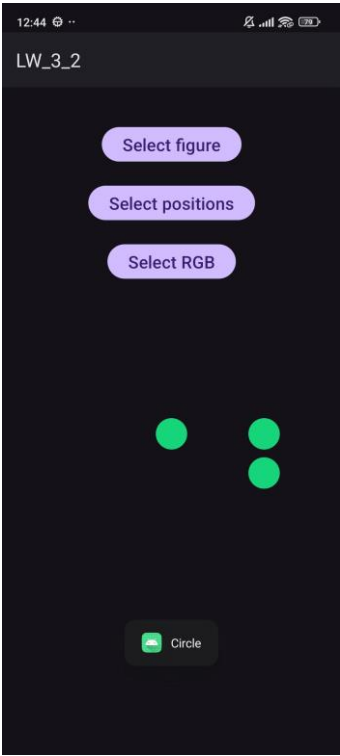
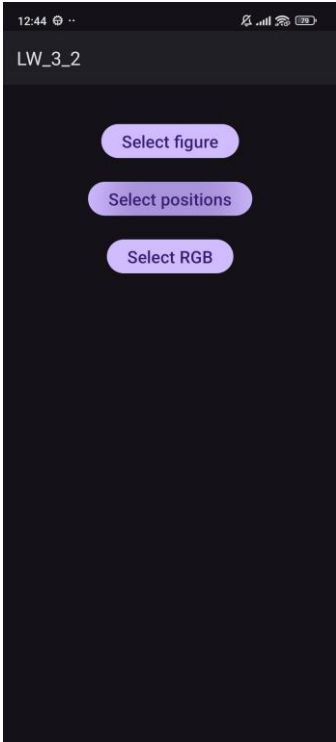
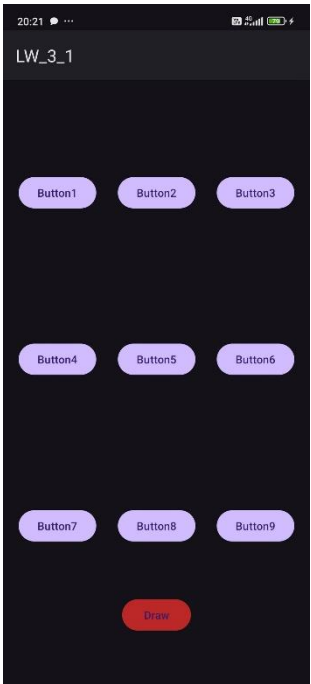
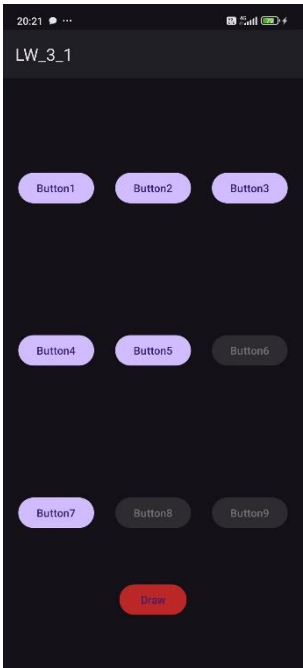
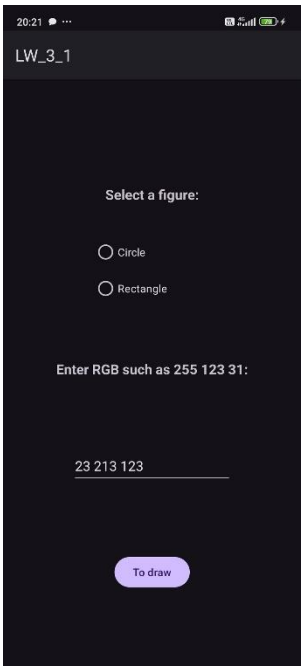
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.LW_3_2"
        tools:targetApi="31" >
        <activity
            android:name=".RGB"
            android:exported="false" />
        <activity
            android:name=".Positions"
            android:exported="false" />
        <activity
            android:name=".Figure"
            android:exported="false" />
        <activity
            android:name=".MainActivity"
            android:exported="true" >
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>

```

Результаты выполнения работы:



**Вывод:** в ходе лабораторной работы были получены практические навыки по созданию и взаимодействия нескольких Activity.