

[1]MyKinjiofp102.java

/*

無限級数による π の近似10
Android 4.1 (Jelly Bean)
Copyright (C) K. Niwa 2021. 2. 1

*/

package jp.kiyo.wuena.mykinjiofp102;

import android.content.Context;

import android.graphics.Canvas;

import android.graphics.Color;

import android.graphics.Paint;

import android.graphics.Rect;

import android.util.AttributeSet;

import android.view.View;

import android.content.res.Resources; //画像用

import android.graphics.*;

import android.view.*;

public class MyKinjiofp102 **extends** View {

private Bitmap **bitmap1** = **null**;

int **flag**=0; //自動識別子

int **ct**=0; //分子・分母の項の数

int **count**; //ループカウンター

double **pai**; // π の近似値

double **s**=1; // $\pi/8$ を求める過程での無限級数

public MyKinjiofp102(Context context) {

super(context);

init(context);

}

```

public MyKinjiofp102(Context context, AttributeSet attrs) {
    super(context, attrs);
    init(context);
}

public MyKinjiofp102(Context context, AttributeSet attrs, int defStyle) {
    super(context, attrs, defStyle);
    init(context);
}

private void init(Context context) {
    Resources res = context.getResources(); //画像用
    bitmap1 = BitmapFactory.decodeResource(res, R.drawable.wallis); //画像用
}

@Override
protected void onDraw(Canvas canvas) {
    // TODO 自動生成されたメソッド・スタブ

    float a=0;
    float b=0;

    super.onDraw(canvas);
    canvas.drawColor(Color.WHITE);
    Paint paint = new Paint();
    paint.setColor(Color.BLUE);
    paint.setAlpha(50);
    canvas.drawRect((getWidth()/2-360)+20, (getHeight()/2-600)+10, (getWidth()/2-
360)+700, (getHeight()/2-600)+1190, paint);

    paint.setAlpha(10000);
    paint.setColor(Color.BLUE);

    for (int i=0;i<3;i++) {
        canvas.drawLine((getWidth()/2-360)+20+i, (getHeight()/2-600)+10+i, (getWidth()/2-

```

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360)+20+i, (getHeight()/2-600)+1190-i, paint);
        canvas.drawLine((getWidth()/2-360)+20+i, (getHeight()/2-600)+1190-i, (getWidth()/2-
360)+700-i, (getHeight()/2-600)+1190-i, paint);
        canvas.drawLine((getWidth()/2-360)+700-i, (getHeight()/2-600)+1190-i, (getWidth()/2-
360)+700-i, (getHeight()/2-600)+10+i, paint);
        canvas.drawLine((getWidth()/2-360)+700-i, (getHeight()/2-600)+10+i, (getWidth()/2-
360)+20+i, (getHeight()/2-600)+10+i, paint);
    }

    if (MainActivity.ritsu != 0) {
        a=(float) (1.0*320/MainActivity.ritsu); //----- <画像の
        拡大・縮小の横の倍率を指定する>
        b=(float) (1.0*320/MainActivity.ritsu); //----- <画像
        の拡大・縮小の縦の倍率を指定する>
    }
    else {
        a=(float) 1.0;
        b=(float) 1.0;
    }

    Matrix Mat = new Matrix(); //----- <画像を拡大・縮小す
    る>
    Mat.postScale(a, b); //-----
    Bitmap bitmap2 = Bitmap.createBitmap( //-----
        bitmap1, 0, 0, //-----
        bitmap1.getWidth(), //-----
        bitmap1.getHeight(), //-----
        Mat, true //-----
    ); //-----

    if (bitmap2 != null) {
        canvas.drawBitmap(bitmap2, (getWidth()/2-360)+250, (getHeight()/2-600)+150, paint);
    }

    paint.setTextSize(45.0f);
    canvas.drawText("【無限級数によるπの近似X】", (getWidth()/2-360)+90-20+5,

```

```

(getHeight()/2-600)+80, paint);
    paint.setTextSize(35.0f);
    canvas.drawText(" (πの近似値を求める) ", (getWidth()/2-360)+185, (getHeight()/2-
600)+130, paint);

    paint.setColor(Color. BLUE);
    paint.setTextSize(30.0f);
    canvas.drawText("Copyright(C) K.Niwa 2021.2.1", (getWidth()/2-360)+150+15,
(getHeight()/2-600)+1130, paint);

//----- 計算部始まり -----

    ct++;
    s=(double)((3*ct)*(3*ct))/((3*ct-1)*(3*ct+1));

    pai=(double)s*3*Math.sqrt(3)/2;

//----- 計算部終わり -----

    paint.setColor(Color. BLACK);
    paint.setTextSize(40.0f);
    canvas.drawText("項数 "+ct+" のとき", (getWidth()/2-360)+40, (getHeight()/2-600)+510-
50, paint);

    canvas.drawText("円周率πの近似値", (getWidth()/2-360)+40, (getHeight()/2-600)+590-50,
paint);
    canvas.drawText("= (3√3/2) - {(3·3)/(2·4)}", (getWidth()/2-360)+50, (getHeight()/2-
600)+650-10-50, paint);
    canvas.drawLine((getWidth()/2-360)+101+5+3+37+3, (getHeight()/2-600)+355+260-10-50,
(getWidth()/2-360)+110+5+60, (getHeight()/2-600)+355+260-10-50, paint);
    canvas.drawLine((getWidth()/2-360)+101+5+3+37+3, (getHeight()/2-600)+355+260+1-10-50,
(getWidth()/2-360)+110+5+60, (getHeight()/2-600)+355+260+1-10-50, paint);
    canvas.drawLine((getWidth()/2-360)+101+5+3+37+3, (getHeight()/2-600)+355+260-10-50,
(getWidth()/2-360)+98+7+37+3, (getHeight()/2-600)+363+260-10-50, paint);
    canvas.drawLine((getWidth()/2-360)+101+5+3+37+3+1, (getHeight()/2-600)+355+260-10-50,
(getWidth()/2-360)+98+7+37+3+1, (getHeight()/2-600)+363+260-10-50, paint);

```

```

        canvas.drawLine((getWidth()/2-360)+101+5+3+37+3+2, (getHeight()/2-600)+355+260-10-50,
(getWidth()/2-360)+98+7+37+3+2, (getHeight()/2-600)+363+260-10-50, paint);
        canvas.drawText("(6*6)/(5*7) * (9*9)/(8*10)", (getWidth()/2-360)+50+10+20-50,
(getHeight()/2-600)+710-20-50, paint);
        canvas.drawText("(12*12)/(11*13) ...", (getWidth()/2-360)+50+10+20-50,
(getHeight()/2-600)+770-30-50, paint);

        paint.setColor(Color.BLUE);
        canvas.drawText("=", (getWidth()/2-360)+50, (getHeight()/2-600)+790-50, paint);

        paint.setColor(Color.BLACK);
        canvas.drawText("円周率π", (getWidth()/2-360)+40, (getHeight()/2-600)+890-50, paint);
        canvas.drawText("=3.1415926535897932...", (getWidth()/2-360)+50, (getHeight()/2-
600)+940-50, paint);

        paint.setTextSize(30.0f);
        canvas.drawText("※ 画面をタッチすると自動になります。", (getWidth()/2-360)+50,
(getHeight()/2-600)+950, paint);
        canvas.drawText("※ 画面をタッチすると自動が止まります。", (getWidth()/2-360)+50,
(getHeight()/2-600)+990, paint);
        canvas.drawText("※ 更に画面をタッチすると初期化されます。", (getWidth()/2-360)+50,
(getHeight()/2-600)+1030, paint);
        canvas.drawText("※ 画面が暗くなったらタイトルバーをタッチ！", (getWidth()/2-360)+50,
(getHeight()/2-600)+1070, paint);

        if (flag==1) { //flag=1 で自動になる   flag=2 で自動が止まる   flag=0 で初期化する
            invalidate(); //表示を更新する
        }

    } //protected void onDraw(Canvas canvas)

    @Override
    public boolean onTouchEvent(MotionEvent event) {
        flag++;
        flag = flag % 3;
        if (flag==0) {

```

```

        ct=0;    //項数
        s=1;    //πを求める過程で使用
    }

    invalidate(); //表示を更新する
    return false;

} //public boolean onTouchEvent(MotionEvent event)

} //public class MyPai10 extends View

[2]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:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Hello World!"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintLeft_toLeftOf="parent"
    app:layout_constraintRight_toRightOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<jp.kiyo.wuena.mykinjiofp102.MyKinjiofp102
    android:id="@+id/myfview1"
    android:layout_height="match_parent"
    android:layout_width="match_parent"/>

```

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

```
[3]MainActivity.java
```

```
/*
```

```
-----  
    無限級数による $\pi$ の近似 10  
    Android 4.1 (Jelly Bean)  
    Copyright (C) K. Niwa 2021. 2. 1  
-----
```

```
*/
```

```
package jp.kiyo.wuena.mykinjiofp102;
```

```
import androidx.appcompat.app.AppCompatActivity;
```

```
import android.os.Bundle;
```

```
import android.util.DisplayMetrics;    //<画像の拡大・縮小に必要なライブラリ>
```

```
import android.app.Activity;
```

```
import android.view.Menu;
```

```
public class MainActivity extends AppCompatActivity {
```

```
    static int ritsu;
```

```
    @Override
```

```
    protected void onCreate(Bundle savedInstanceState) {
```

```
        super.onCreate(savedInstanceState);
```

```
        setContentView(R.layout.activity_main);
```

```
        DisplayMetrics metrics = new DisplayMetrics(); //<端末の情報を取得する>
```

```
        getWindowManager().getDefaultDisplay().getMetrics(metrics);
```

```
        StringBuilder buffer = new StringBuilder();
```

```
        buffer.append("densityDpi (ドット数/インチ) : " + String.valueOf(metrics.densityDpi)  
+ "\n");
```

```
        ritsu=metrics.densityDpi;
```

