[1]MyMatsunagaf1Eng.java

```
/*
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        松永良弼の公式１(英語版)
         Android 4.1 (Jelly Bean)
      Copyright(C) K.Niwa 2021.9.8
-------------------------------------
*/

package jp.kiyo.wuena.mymatsunagaf1eng;

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 MyMatsunagaf1Eng extends View {

    private Bitmap bitmap1 = null;

    int flag=0;       //自動識別子
    int ct=0;     //項数
    int count;    //ループカウンター
    double pai=0;     //πの近似値
    double sa=1;      //πの近似値を求める過程で〝使用
    double sb=1;      //πの近似値を求める過程で〝使用

    public MyMatsunagaf1Eng(Context context) {
        super(context);
        init(context);
```

```
    }

    public MyMatsunagaf1Eng(Context context, AttributeSet attrs) {
        super(context,attrs);
        init(context);
    }

    public MyMatsunagaf1Eng(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.seki);  //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)+10,(getHeight()/2-600)+10,(getWidth()/2-
360)+710,(getHeight()/2-600)+1190, paint);

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

        for (int i=0;i<3;i++) {
```

```
            canvas.drawLine((getWidth()/2-360)+10+i,(getHeight()/2-600)+10+i,(getWidth()/2-
360)+10+i,(getHeight()/2-600)+1190-i, paint);
            canvas.drawLine((getWidth()/2-360)+10+i,(getHeight()/2-600)+1190-i,(getWidth()/2-
360)+710-i,(getHeight()/2-600)+1190-i, paint);
            canvas.drawLine((getWidth()/2-360)+710-i,(getHeight()/2-600)+1190-i,(getWidth()/2-
360)+710-i,(getHeight()/2-600)+10+i, paint);
            canvas.drawLine((getWidth()/2-360)+710-i,(getHeight()/2-600)+10+i,(getWidth()/2-
360)+10+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)+255,(getHeight()/2-600)+150, paint);
        }

        paint.setTextSize(38.0f);
```

```
        canvas.drawText(" 【Yoshisuke Matsunaga`s Formula 1】 ", (getWidth()/2-360)+30,
(getHeight()/2-600)+80, paint);
        paint.setTextSize(35.0f);
        canvas.drawText(" (Find an approximaion of pi) ", (getWidth()/2-360)+185-65,
(getHeight()/2-600)+130, paint);
        paint.setColor(Color.BLACK);
        paint.setTextSize(30.0f);
        canvas.drawText("＜Convergence is fast＞", (getWidth()/2-360)+255-70, (getHeight()/2-
600)+415, paint);

        paint.setColor(Color.BLUE);
        paint.setTextSize(30.0f);
        canvas.drawText("Copyright(C) Sohun 2021.9.8", (getWidth()/2-360)+165, (getHeight()/2-
600)+1130, paint);

//---------- 計算部始まり ----------

        ct++;

        sb=sb*(double)(ct*ct)/(double)((2*ct+1)*(2*ct+2));
        sa=sa+sb;

        pai=(double)Math.sqrt((double)9*sa);

//---------- 計算部終わり ----------

        paint.setColor(Color.BLACK);
        paint.setTextSize(35.0f);
        canvas.drawText("Number of terms =  "+(ct+1)+"" ,(getWidth()/2-360)+30,
(getHeight()/2-600)+510, paint);

        canvas.drawText("Approximation of pi", (getWidth()/2-360)+30, (getHeight()/2-600)+590,
paint);

        canvas.drawLine((getWidth()/2-360)+60+18-15,(getHeight()/2-600)+365+250-1-
10,(getWidth()/2-360)+460+18+200+10,(getHeight()/2-600)+365+250-1-10,paint);
```

```
        canvas.drawLine((getWidth()/2-360)+60+18-15,(getHeight()/2-600)+365+250-
10,(getWidth()/2-360)+460+18+200+10,(getHeight()/2-600)+365+250-10,paint);
        canvas.drawLine((getWidth()/2-360)+60+18-15,(getHeight()/2-600)+365+250-
10,(getWidth()/2-360)+55+18-15,(getHeight()/2-600)+375+250-10,paint);
        canvas.drawLine((getWidth()/2-360)+60+18-1-15,(getHeight()/2-600)+365+250-
10,(getWidth()/2-360)+55+18-1-15,(getHeight()/2-600)+375+250-10,paint);
        canvas.drawLine((getWidth()/2-360)+60+18-2-15,(getHeight()/2-600)+365+250-
10,(getWidth()/2-360)+55+18-2-15,(getHeight()/2-600)+375+250-10,paint);
        canvas.drawText("=√9{1+1^2/(3･4)+(1^2･2^2)/(3･4･5･6)+･･}", (getWidth()/2-360)+20,
(getHeight()/2-600)+650-10, paint);

        paint.setColor(Color.BLUE);
        canvas.drawText("="+pai ,(getWidth()/2-360)+20, (getHeight()/2-600)+710-20, paint);
        //canvas.drawText("＝"+Math.PI ,100-20, 380+20, paint);
        paint.setColor(Color.BLACK);

        canvas.drawText("Pi π", (getWidth()/2-360)+30, (getHeight()/2-600)+790, paint);
        canvas.drawText("=3.1415926535897932･･･", (getWidth()/2-360)+20, (getHeight()/2-
600)+840, paint);

        paint.setTextSize(30.0f);
        canvas.drawText("Touch the screen to activate." ,(getWidth()/2-360)+50,
(getHeight()/2-600)+950, paint);
        canvas.drawText("Touch the screen again to stop the auto." ,(getWidth()/2-360)+50,
(getHeight()/2-600)+990, paint);
        canvas.drawText("If you touch it further,it will be initialized." ,(getWidth()/2-
360)+50, (getHeight()/2-600)+1030, paint);
        canvas.drawText("When the screen goes dark,touch the title bar !" ,(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
            sa=1;     //πを求める過程で使用
            sb=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 MyMatsunaga 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.mymatsunagaf1eng.MyMatsunagaf1Eng
        android:id="@+id/myfview1"
        android:layout_height="match_parent"
        android:layout_width="match_parent"/>

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

[3]MainActivity.java

```
/*
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-------------------------------------
*/

package jp.kiyo.wuena.mymatsunagaf1eng;

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;
    }
}
```