

[1]MyTwokansu2Eng.java

/*

2 次関数のグラフの平行移動（上に凸） 英語版

Android 4.1 (Jelly Bean)

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*/

package jp.kiyo.wuena.mytwokansu2eng;

import android.content.Context;

import android.graphics.Canvas;

import android.graphics.Color;

import android.graphics.Paint;

import android.graphics.Rect;

import android.graphics.RectF;

import android.util.AttributeSet;

import android.view.MotionEvent;

import android.view.View;

public class MyTwokansu2Eng **extends** View {

int flag=0; //グラフの移動(1)、グラフの停止(2)、グラフの初期化(0) 初期化 識別子

double x,y; //グラフ描写に利用

int px,py,oldpx,oldpy; //グラフ描写に利用

int fg; //グラフ描写に利用

double a=0,b=0; //グラフ描写に利用

public MyTwokansu2Eng(Context context) {

super(context);

}

public MyTwokansu2Eng(Context context, AttributeSet attrs) {

super(context, attrs);

}

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public MyTwokansu2Eng(Context context, AttributeSet attrs, int defStyle) {
    super(context, attrs, defStyle);
}

//onDraw メソッド-----
-----

@Override
protected void onDraw(Canvas canvas) {

    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<2;i++) { //額縁を付ける
        canvas.drawLine((getWidth()/2-360)+20+i, (getHeight()/2-600)+10+i, (getWidth()/2-
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);
    }

    paint.setColor(Color.BLACK); //実験枠の描画
    canvas.drawRect((getWidth()/2-360)+70, (getHeight()/2-600)+100, (getWidth()/2-
360)+650, (getHeight()/2-600)+680, paint);
    paint.setColor(Color.WHITE);
    canvas.drawRect((getWidth()/2-360)+71, (getHeight()/2-600)+101, (getWidth()/2-

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360)+649, (getHeight()/2-600)+679, paint);

    paint.setColor(Color.BLACK);    //座標軸の描画
    canvas.drawLine((getWidth()/2-360)+80, (getHeight()/2-600)+390, (getWidth()/2-
360)+640, (getHeight()/2-600)+390, paint);
    canvas.drawLine((getWidth()/2-360)+640, (getHeight()/2-600)+390, (getWidth()/2-
360)+640-5, (getHeight()/2-600)+390-5, paint);
    canvas.drawLine((getWidth()/2-360)+640, (getHeight()/2-600)+390, (getWidth()/2-
360)+640-5, (getHeight()/2-600)+390+5, paint);
    canvas.drawLine((getWidth()/2-360)+360, (getHeight()/2-600)+110, (getWidth()/2-
360)+360, (getHeight()/2-600)+670, paint);
    canvas.drawLine((getWidth()/2-360)+360, (getHeight()/2-600)+110, (getWidth()/2-
360)+360+5, (getHeight()/2-600)+110+5, paint);
    canvas.drawLine((getWidth()/2-360)+360, (getHeight()/2-600)+110, (getWidth()/2-
360)+360-5, (getHeight()/2-600)+110+5, paint);

    for (int xx=100;xx<640;xx=xx+20) { //x軸メモリの描写
        canvas.drawLine((getWidth()/2-360)+xx, (getHeight()/2-600)+390-3, (getWidth()/2-
360)+xx, (getHeight()/2-600)+390+3, paint);
    }
    for (int yy=130;yy<670;yy=yy+20) { //y軸メモリの描写
        canvas.drawLine((getWidth()/2-360)+360-3, (getHeight()/2-600)+yy, (getWidth()/2-
360)+360+3, (getHeight()/2-600)+yy, paint);
    }

    paint.setTextSize(23.0f);
    //x軸メモリの描写
    canvas.drawText("5", (getWidth()/2-360)+460-3, (getHeight()/2-600)+410+5, paint);
    canvas.drawText("10", (getWidth()/2-360)+560-6, (getHeight()/2-600)+410+5, paint);
    canvas.drawText("x", (getWidth()/2-360)+630-10, (getHeight()/2-600)+410+5, paint);
    canvas.drawText("0", (getWidth()/2-360)+350-3, (getHeight()/2-600)+410+5, paint);
    canvas.drawText("-5", (getWidth()/2-360)+260-3, (getHeight()/2-600)+410+5, paint);
    canvas.drawText("-10", (getWidth()/2-360)+160-6, (getHeight()/2-600)+410+5, paint);

    //y軸メモリの描写
    canvas.drawText("5", (getWidth()/2-360)+220+5+120-10, (getHeight()/2-600)+290+5,

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paint);
    canvas.drawText("10", (getWidth()/2-360)+220+120-10, (getHeight()/2-600)+190+5,
paint);
    canvas.drawText("y", (getWidth()/2-360)+220+120-10, (getHeight()/2-600)+130, paint);
    canvas.drawText("-5", (getWidth()/2-360)+220+120-10, (getHeight()/2-600)+490+5,
paint);
    canvas.drawText("-10", (getWidth()/2-360)+220-5+120-10, (getHeight()/2-600)+590+5,
paint);

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//y=-2x^2 のグラフの描画
paint.setTextSize(25.0f);
paint.setColor(Color.BLUE);
canvas.drawText("y=-2x^2", (getWidth()/2-360)+160+30, (getHeight()/2-600)+600,
paint);
canvas.drawText("2", (getWidth()/2-360)+160+90+30, (getHeight()/2-600)+600-5-10,
paint);

fg=0;
for (x=-2.6+a;x<=2.6+a;x=x+0.1) {
    y=-2*(x-a)*(x-a)+b;
    px=(int)(360+20*x);
    py=(int)(390-20*y);
    if (fg==0) {
        canvas.drawLine((int)(getWidth()/2-360)+px, (int)(getHeight()/2-
600)+py, (int)(getWidth()/2-360)+px, (int)(getHeight()/2-600)+py, paint);
    }
    else {
        canvas.drawLine((int)(getWidth()/2-360)+oldpx, (int)(getHeight()/2-
600)+oldpy, (int)(getWidth()/2-360)+px, (int)(getHeight()/2-600)+py, paint);
    }
    oldpx=px;oldpy=py;
    fg++;
}

```

//y=-2(x-6)^2+10 のグラフの描画

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paint.setColor(Color.BLUE);
canvas.drawText("y=-2(x-6)^2+10", (getWidth()/2-360)+250-13+120+30, (getHeight()/2-

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600)+140+25, paint);
    canvas.drawText("2", (getWidth()/2-360)+320-20+1+120+200-100, (getHeight()/2-600)+140-
5+10, paint);
    fg=0;
    for (x=-2.6+6.0;x<=2.6+6.0;x=x+0.1) {
        y=-2*(x-6)*(x-6)+10;
        px=(int) (360+20*x);
        py=(int) (390-20*y);
        if (fg==0) {
            canvas.drawLine((int) (getWidth()/2-360)+px, (int) (getHeight()/2-
600)+py, (int) (getWidth()/2-360)+px, (int) (getHeight()/2-600)+py, paint);
        }
        else {
            canvas.drawLine((int) (getWidth()/2-360)+oldpx, (int) (getHeight()/2-
600)+oldpy, (int) (getWidth()/2-360)+px, (int) (getHeight()/2-600)+py, paint);
        }
        oldpx=px;oldpy=py;
        fg++;
    }

    //paint.setColor(Color.BLACK); //実験枠の描画
    //canvas.drawLine((getWidth()/2-360)+90+120, (getHeight()/2-600)+100, (getWidth()/2-
360)+90+120, (getHeight()/2-600)+400, paint);
    //canvas.drawLine((getWidth()/2-360)+90+120, (getHeight()/2-600)+100, (getWidth()/2-
360)+390+120, (getHeight()/2-600)+100, paint);

    paint.setColor(Color.BLUE); //表題の表示
    paint.setTextSize(30.0f);
    canvas.drawText("", (getWidth()/2-360)+60, (getHeight()/2-600)+65, paint);
    canvas.drawText("【Parallel Translation", (getWidth()/2-360)+90, (getHeight()/2-
600)+55, paint);
    canvas.drawText("of Graph of Quadratic Function", (getWidth()/2-360)+200,
(getHeight()/2-600)+85, paint);
    //canvas.drawText("2", (getWidth()/2-360)+170+5+3-3+1+60+35+55, (getHeight()/2-
600)+50, paint);

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        paint.setColor(Color.BLACK);    //目標の提示
        paint.setTextSize(30.0f);
        canvas.drawText("■Let's observe the graph of  $y=-2(x-6)^2+10$ ", (getWidth()/2-360)+50,
(getHeight()/2-600)+740+30, paint);
        //canvas.drawText("2", (getWidth()/2-240)+140+53-5, (getHeight()/2-343)+440-10,
paint);
        //canvas.drawText("2", (getWidth()/2-240)+300+143-18, (getHeight()/2-343)+440-10,
paint);
        canvas.drawText(" is a translation of the graph of  $y=-2x^2$ ", (getWidth()/2-360)+50,
(getHeight()/2-600)+770+30, paint);
        canvas.drawText(" by +6 in the x-axis direction and +10 in the", (getWidth()/2-
360)+50, (getHeight()/2-600)+800+30, paint);
        canvas.drawText(" y-axis direction.", (getWidth()/2-360)+50, (getHeight()/2-
600)+830+30, paint);

        paint.setColor(Color.BLACK);    //説明の表示
        paint.setTextSize(30.0f);
        canvas.drawText("Touch the screen to move the graph of  $y=-2x^2$  ", (getWidth()/2-
360)+50, (getHeight()/2-600)+950, paint);
        //canvas.drawText("2", (getWidth()/2-240)+290-40-17, (getHeight()/2-343)+545-5,
paint);
        canvas.drawText("Touch the screen again to stop the graph.", (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);
        paint.setColor(Color.BLUE);
        paint.setTextSize(30.0f);
        canvas.drawText("Copyright(C) Sohun 2021. 9. 20", (getWidth()/2-360)+150+10,
(getHeight()/2-600)+1130, paint);    //作者・作成年月の表示

        if (flag==1) { //識別子が1のとき、グラフが平行移動する
            if (a<=5.9) {
                a=a+0.1;
            }
        }

```

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        else {
            if (b<=9.9) {
                b=b+0.1;
            }
        }

        invalidate(); //再描画する (clear & goto onDraw)   そして、この行へ戻ってくる。
        //invalidate() は、onDraw メソッドの中にも記述できる。
        //invalidate() は、繰り返し処理に利用できる。
        //もちろん、onTouchEvent ソッドの中にも記述できる。
    }

    else if (flag==2) {    //識別子が2のとき、グラフが停止する
        //何も変化を加えない
    }

    else if (flag==0) {    //識別子が0のとき、グラフを初期化する (元の位置に戻す)
        a=0;    //初期化する
        b=0;    //初期化する
        invalidate(); //再描画する (clear & goto onDraw)   そして、この行へ戻ってくる。
    }

} //protected void onDraw(Canvas canvas)

//画面にタッチしたときのイベント処理-----
-----

@Override
public boolean onTouchEvent(MotionEvent event) {

    flag=flag+1;    //flag に 1 を加える
    flag=flag % 3; //flag に 1、2、0 を代入する

    invalidate();    //再描画する (clear & goto onDraw)
    return false;

}
}

```

[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.mytwokansu2eng.MyTwokansu2Eng
        android:id="@+id/myfview1"
        android:layout_height="match_parent"
        android:layout_width="match_parent"/>

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

[3]MainActivity.java

```
/*
```

2 次関数のグラフの平行移動（上に凸） 英語版
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```
*/
```

```
package jp.kiyo.wuena.mytwokansu2eng;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;

public class MainActivity extends AppCompatActivity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
}
```