聽說綠代也要寫程式

所以我又出現了

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什麼

你說你不知道有程式作業？

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Mandelbrot came across the Latin adjective *fractus*, from the verb *frangere*, to break, in his son's Latin book. The resonance of the main English cognates fracture and fraction seemed appropriate and he coined the word fractal!

We now discuss methods that have been developed by a research team at the Georgia Institute of Technology for forming images of natural objects using fractals. These fractal images of nature are generated using affine transformations. Figure 2.24 shows a fractal image of a fern being gradually generated. Let us see how this is done.

Figure 2.24

Consider the following four affine transformations $T_1, \ldots, T_4$. Associate probabilities $p_1, \ldots, p_4$ with these transformations.

$$T_1\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} 0.86 & 0.03 \\ -0.03 & 0.86 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} 0 \\ 1.5 \end{bmatrix}, \; p_1 = 0.83$$

$$T_2\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} 0.2 & -0.25 \\ 0.21 & 0.23 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} 0 \\ 1.5 \end{bmatrix}, \; p_2 = 0.08$$

$$T_3\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} -0.15 & 0.27 \\ 0.25 & 0.26 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} 0 \\ 0.45 \end{bmatrix}, \; p_3 = 0.08$$

$$T_4\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} 0 & 0 \\ 0 & 0.17 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \; p_4 = 0.01$$

The following algorithm is used on a computer to produce the image of the fern.

1. Let $x = 0, y = 0$.
2. Use a random generator to select one of the affine transformations T_i according to given probabilities.
3. Let $(x', y') = T_i(x, y)$.
4. Plot (x', y').
5. Let $(x, y) = (x', y')$.
6. Repeat Steps 2, 3, 4, and 5 twenty thousand times.

As Step 4 is executed, each of twenty thousand times, the image of the fern gradually appears.

Each affine transformation T_i involves six parameters a, b, c, d, e, f, and a probability p_i, as follows

$$T_i\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} a & b \end{bmatrix}\begin{bmatrix} x \\ \end{bmatrix} + \begin{bmatrix} e \end{bmatrix}$$

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現在你知道了

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所以

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你需要這個東西 先去安裝好他吧!!

OPENGL

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OPENGL是啥？可以吃嗎？

簡單來說就是一個可以讓你用C畫圖的工具

找安裝？GOOGLE

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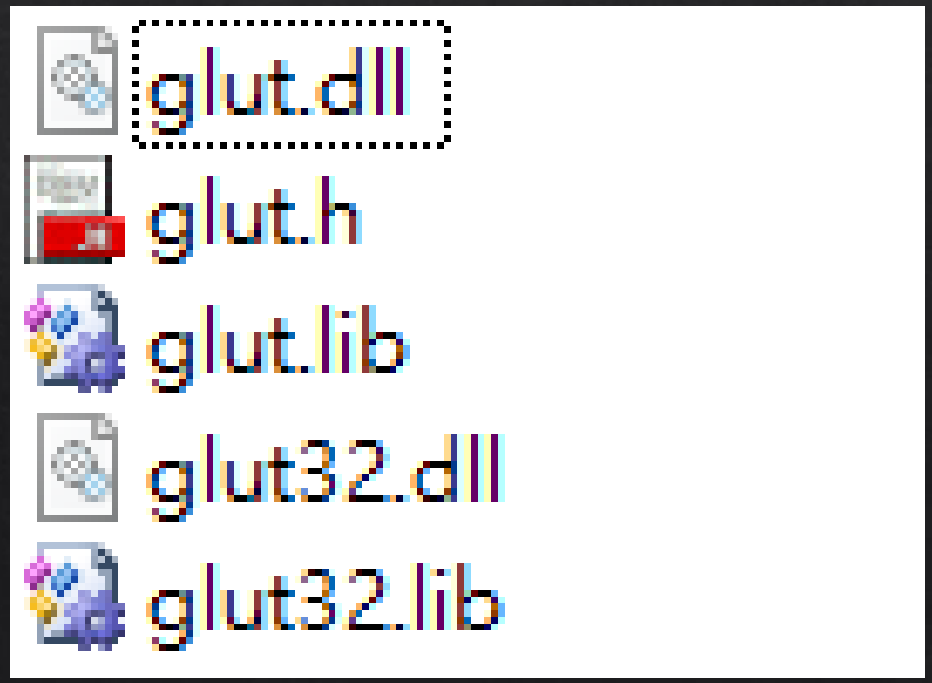
安裝的步驟大概是：

把這些東西(你可以在網路上找的到載點)放到對應的資料夾下面

(不同版本的VS放的地方不太一樣唷)



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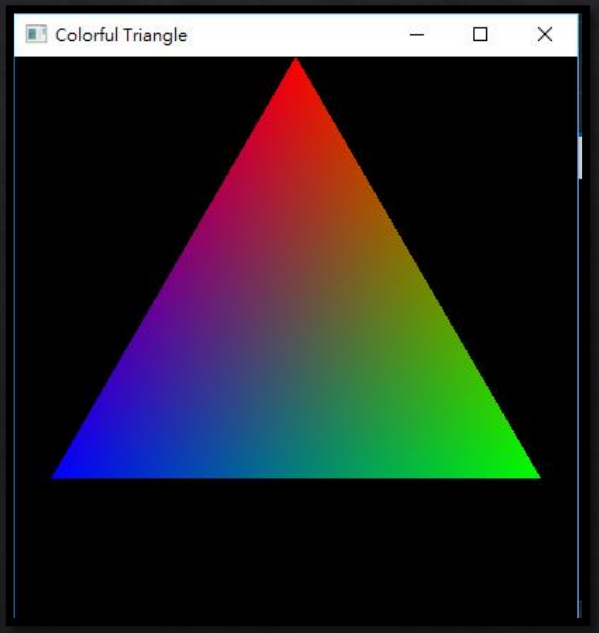
然後執行下面程式碼看看能不能
正常執行
沒意外的話會長這個樣子->



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```
//測試程式碼
#include <GL/glut.h>
void Display(void)
{
   glPushMatrix();
   glBegin (GL_TRIANGLES);          // 開始劃三角形
      glColor3f (1.0f, 0.0f, 0.0f);        // 設定輸出色為紅色
      glVertex2f (0.0f, 1.0f);           //(x1,y1)=(0, 1)
      glColor3f (0.0f, 1.0f, 0.0f);        // 設定輸出色為綠色
      glVertex2f (0.87f, -0.5f);           //(x2,y2)=(0.87,-0.5)
      glColor3f (0.0f, 0.0f, 1.0f);        // 設定輸出色為藍色
      glVertex2f (-0.87f, -0.5f);          //(x3,y3)=(-0.87,-0.5)
   glEnd ();                          // 結束劃三角形
   glPopMatrix();
   glutSwapBuffers();
}
int main(int argc, char *argv[])
{
   glutInit(&argc, argv);
   glutInitDisplayMode(GLUT_RGB | GLUT_DOUBLE);
   glutInitWindowPosition(100, 100); // 設定視窗位置
   glutInitWindowSize(400, 400); // 設定視窗大小
   glutCreateWindow("Colorful Triangle "); // 設定視窗標題
   glutDisplayFunc(Display);  // 呼叫函數
   glutMainLoop();
   return 0;
}
```

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如果你可以正常執行了

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那我們就來寫作業吧！

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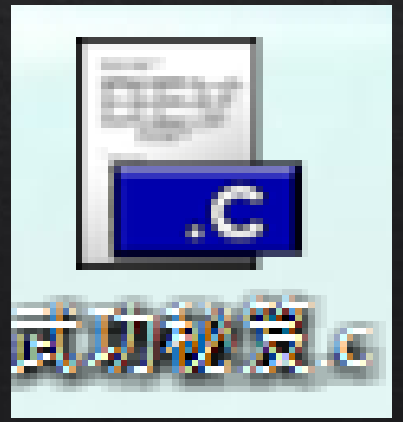
打開武功秘笈.c

裡面幫你寫好了畫點的Code



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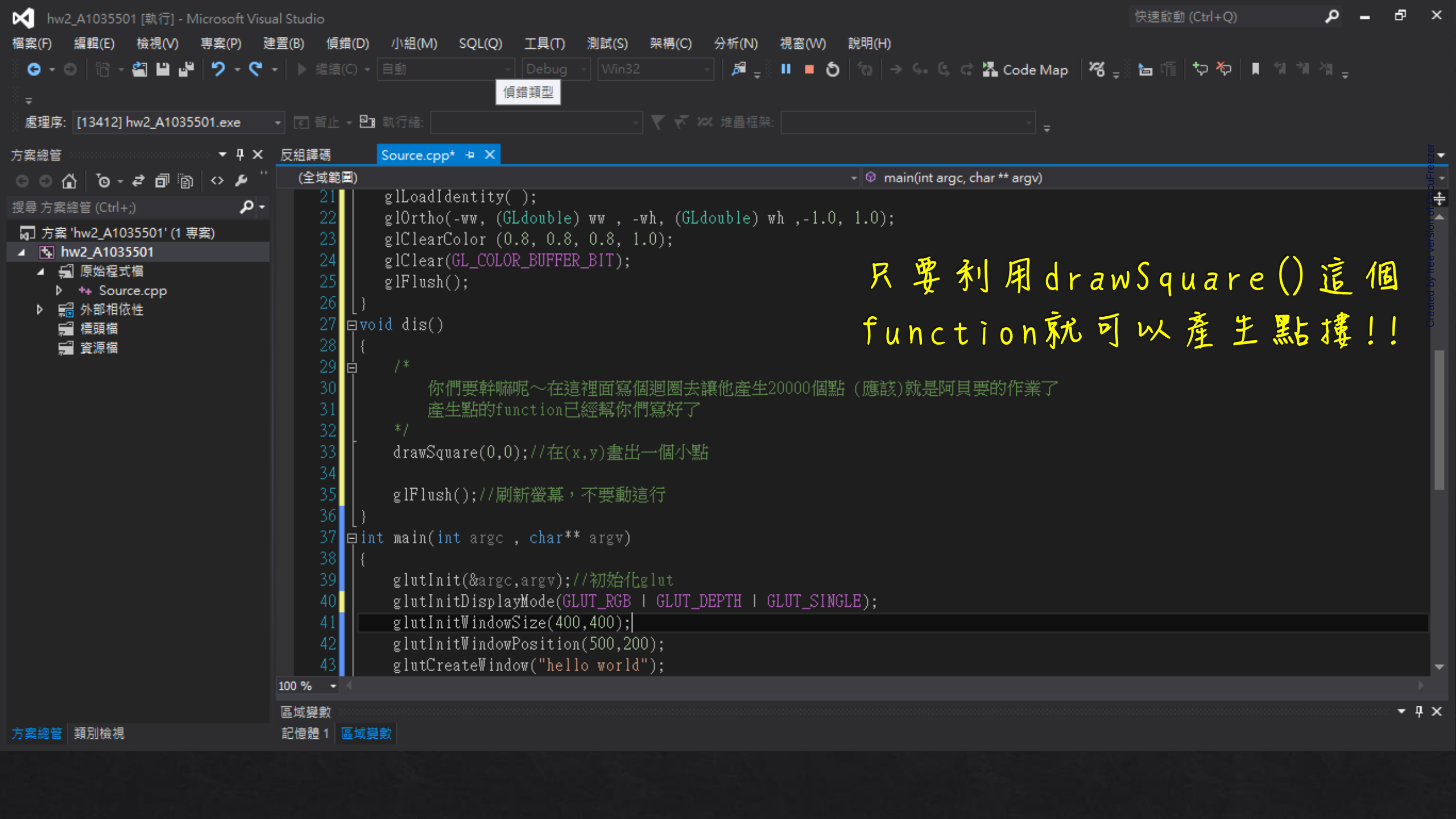
hw2_A1035501 [執行] - Microsoft Visual Studio
快速啟動 (Ctrl+Q)
檔案(F) 編輯(E) 檢視(V) 專案(P) 建置(B) 偵錯(D) 小組(M) SQL(Q) 工具(T) 測試(S) 架構(C) 分析(N) 視窗(W) 說明(H)
Debug
Win32
Code Map
偵錯類型
處理序: [13412] hw2_A1035501.exe
方案總管
搜尋 方案總管 (Ctrl+;)
方案 'hw2_A1035501' (1 專案)
hw2_A1035501
原始程式檔
Source.cpp
外部相依性
標頭檔
資源檔
反組譯碼
Source.cpp*
(全域範圍)
main(int argc, char ** argv)
glLoadIdentity( );
glOrtho(-ww, (GLdouble) ww , -wh, (GLdouble) wh ,-1.0, 1.0);
glClearColor (0.8, 0.8, 0.8, 1.0);
glClear(GL_COLOR_BUFFER_BIT);
glFlush();
}
void dis()
{
/*
你們要幹嘛呢~在這裡面寫個迴圈去讓他產生20000個點（應該)就是阿貝要的作業了
產生點的function已經幫你們寫好了
*/
drawSquare(0,0);//在(x,y)畫出一個小點
glFlush();//刷新螢幕，不要動這行
}
int main(int argc , char** argv)
{
glutInit(&argc,argv);//初始化glut
glutInitDisplayMode(GLUT_RGB | GLUT_DEPTH | GLUT_SINGLE);
glutInitWindowSize(400,400);
glutInitWindowPosition(500,200);
glutCreateWindow("hello world");
只要利用drawSquare()這個function就可以產生點撒!!
100 %
區域變數
記憶體 1
區域變數
方案總管
類別檢視

你說你很好奇這怎麼畫出來的？

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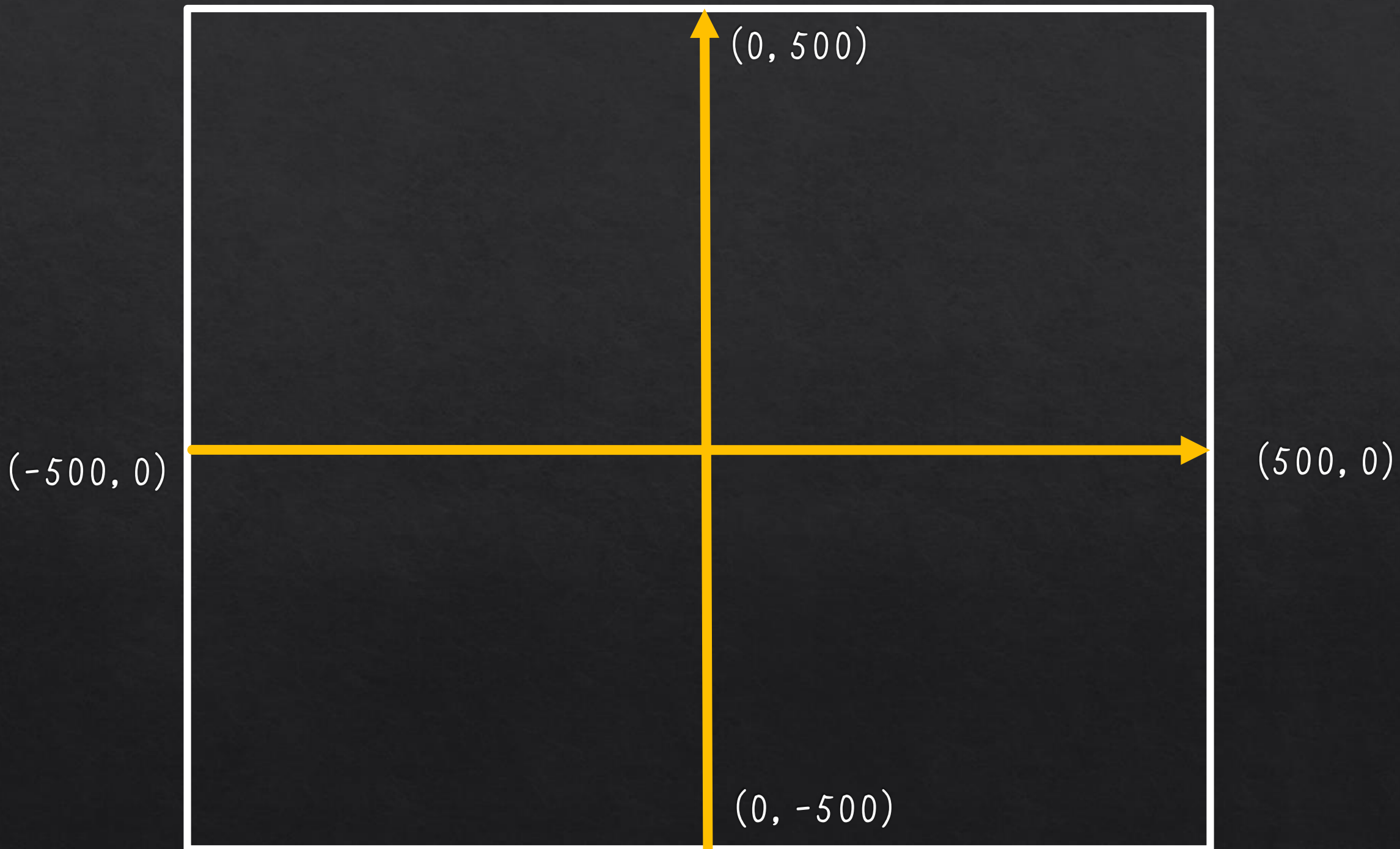

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在500*500(大小你可以透過ww跟wh調整)的正方形中畫點

怎麼畫?

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這看起來像一個正方形

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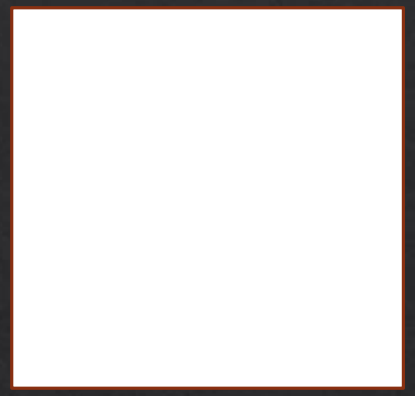

這看起來像一個正方形

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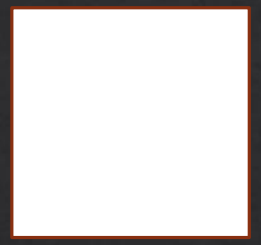

這看起來像一個正方形

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這看起來像一個正方形

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這看起來像一個點

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沒錯!!!

所以畫點就是要畫一個很小的

正方形

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好啦各位會畫點了
剩下就是你們的事了

GO！！

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