

Canvas

慈濟大學暑期工作坊

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大綱

1

什麼是Canvas?

2

Canvas畫布基礎介紹

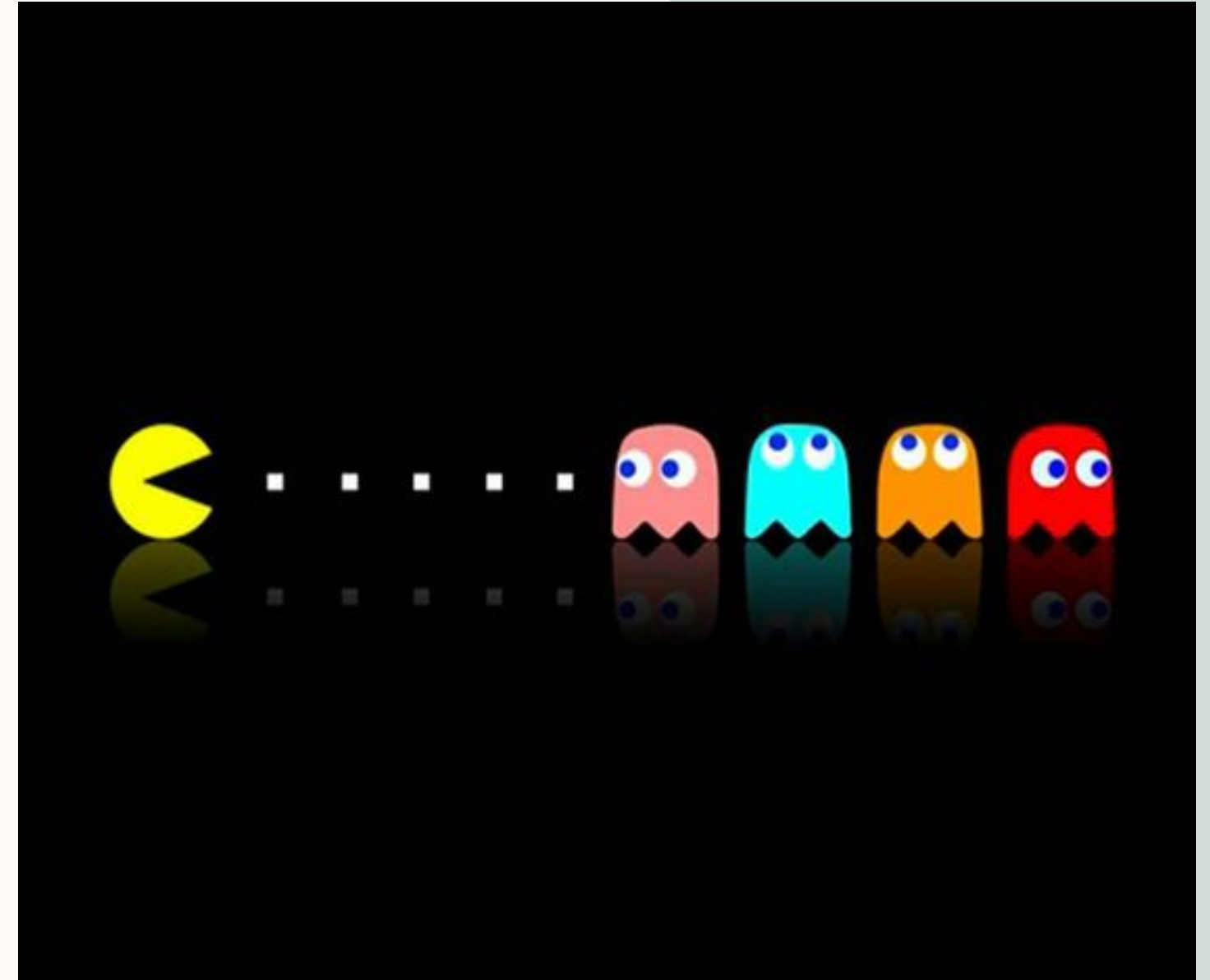
3

Canvas基礎語法

4

Canvas畫圖time

什麼是Canvas?



檔案

檢視



剪貼簿



影像



A



工具



筆刷



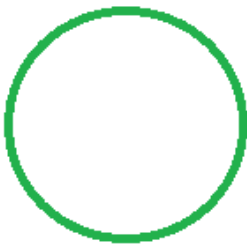
形狀



大小



色彩



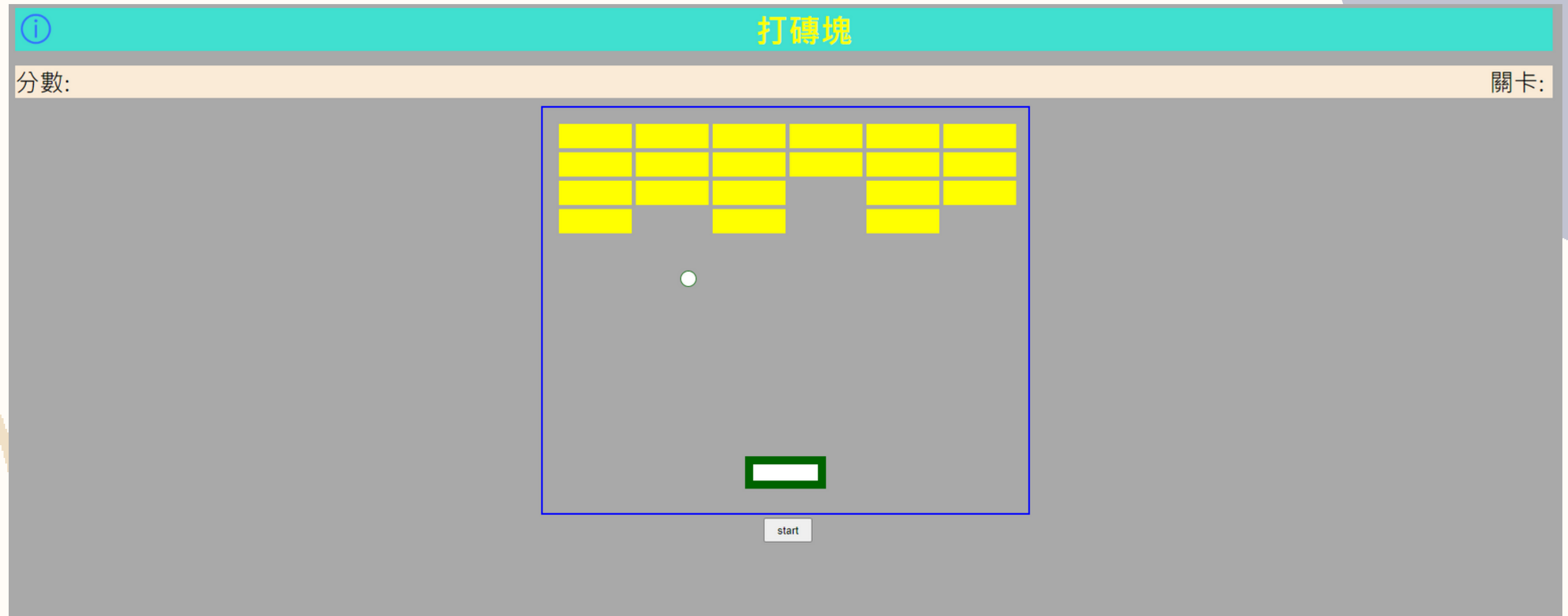
什麼是 HTML 畫布？

HTML<canvas>標籤用於透過
JavaScript 來動態繪製圖形。

標籤<canvas>只是圖形的容器(版面)。
需要使用 JavaScript 來實際繪製圖形。

Canvas 有多種方法用於繪製路徑、方
框、圓形、文本和添加圖像。

這邊放個我網頁設計課做的簡陋打磚塊遊戲



廢話不多說
直接進入正題!

Canvas畫布基礎介紹



首先，我們要現在Html上面建立一個
canvas的標籤產生畫布。
之後我們所畫的東西都繪成現在這個畫布上

HTMLPage2.html

```
1  <!DOCTYPE html>
2
3  <html lang="en" xmlns="http://www.w3.org/1999/xhtml">
4  <head>
5      <meta charset="utf-8" />
6      <title></title>
7
8  </head>
9  <body>
10     <canvas id="myCanvas" width="200" height="100" style="border:2px solid;border-color:red"></canvas>
11 </body>
12 </html>
13
```

```
<canvas id="myCanvas" width="200"  
height="100" style="border:2px solid;border-  
color:red"></canvas>
```

我們要先給這個Canvas畫布一個id
這樣等等JavaScript才可以找到要畫的地方

```
<canvas id="myCanvas" width="200"  
height="100" style="border:2px solid;border-  
color:red"></canvas>
```

再來設定畫布的大小
如果畫的東西超過這個大小就不會呈現在畫面上

```
<canvas id="myCanvas" width="200"  
height="100" style="border:2px solid;border-  
color:red"></canvas>
```

為了方便知道我們的畫布到底有多大
所以我們用style的border框出畫布
這邊的參數分別是線條粗細 線條樣式 線條顏色

← → ↻ ⓘ 檔案 | C:/Users/user/Desktop/HTMLPage2.html

 YT  github  新分頁  2023臺灣能-永續...  Canva  e-Peer



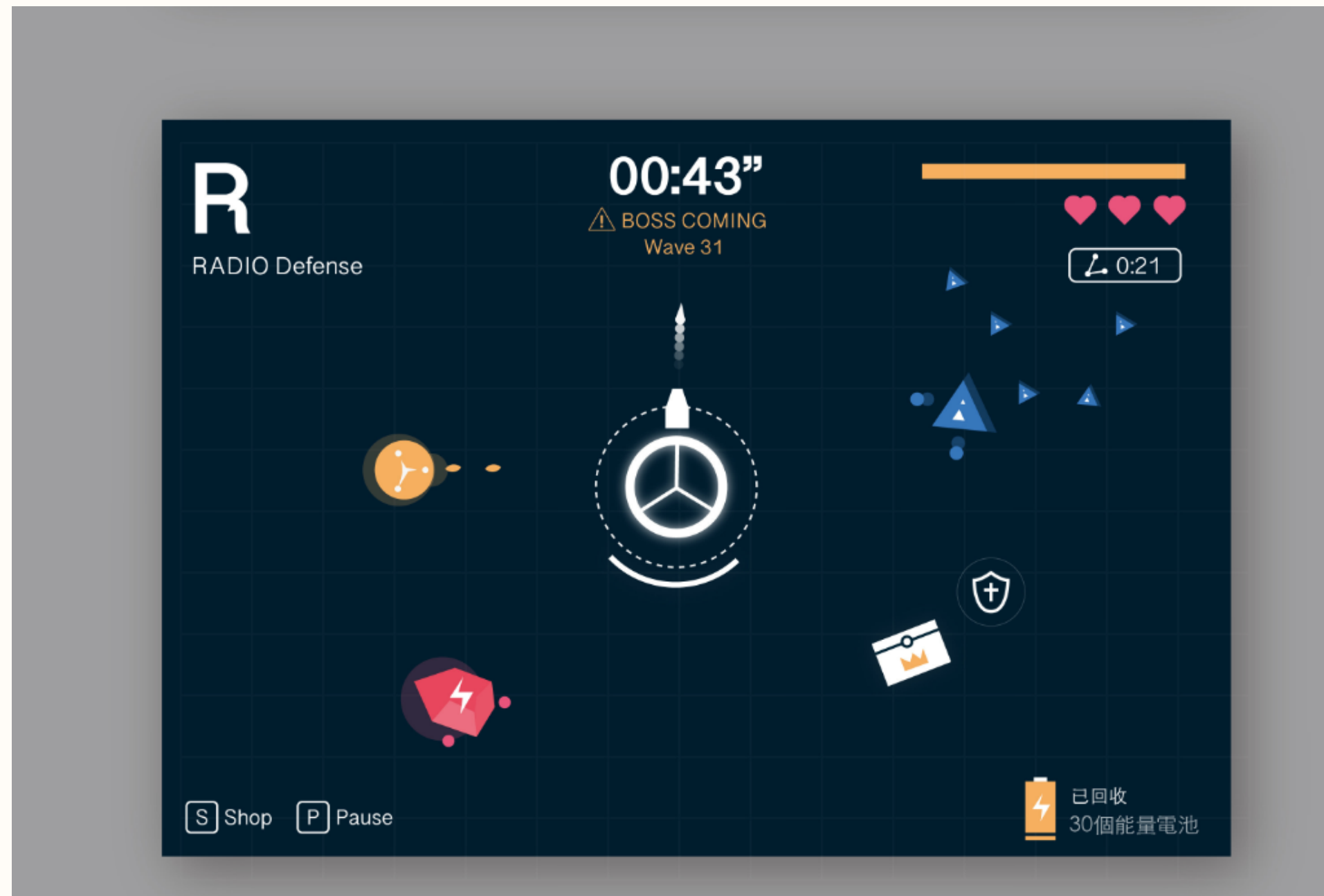
畫布創建好了，接下來我們要拿起筆在畫布上作
畫囉



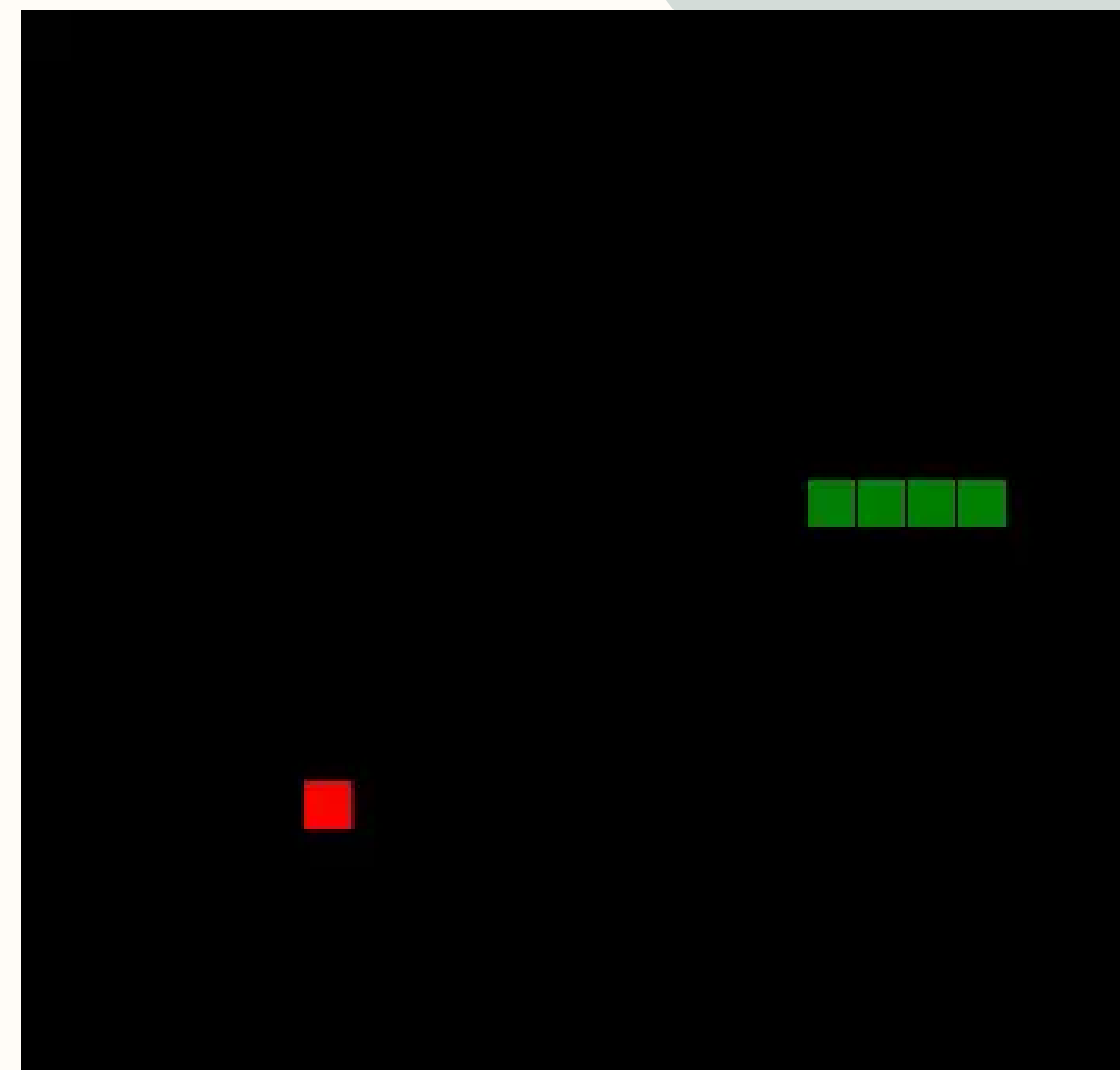
我們的神奇之筆就是JavaScript!

利用JavaScript的語法打出一行一行的程式
整合起來就可以在網頁上看到成果囉

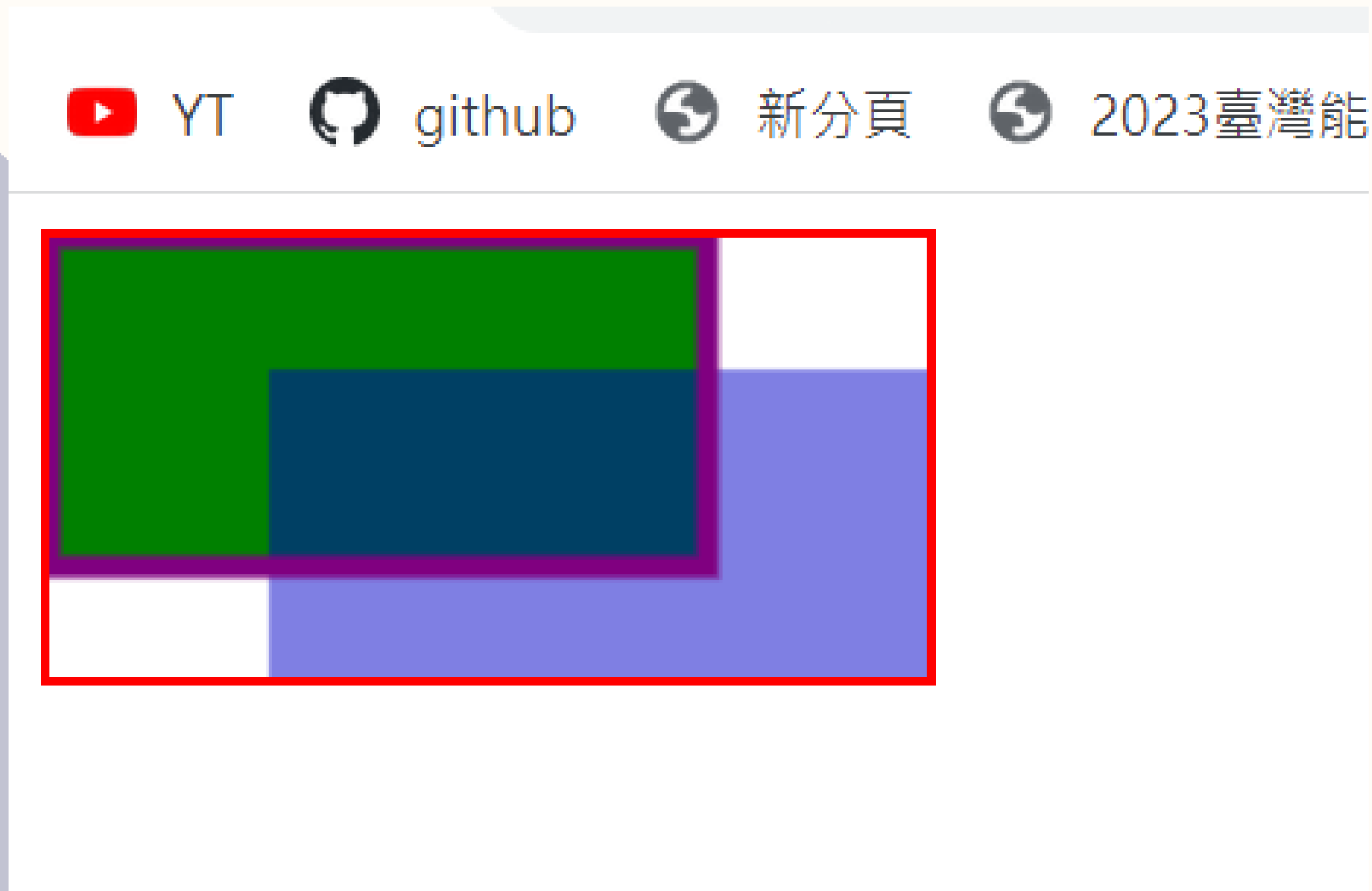
就像前面非常陽春的打磚塊遊戲，如果對 JavaScript 有一定熟練，也可以做出好玩且畫面豐富的遊戲喔



Canvas基礎語法 趴萬



矩形繪製(不需要路徑)



```
1  <!DOCTYPE html>
2
3  <html lang="en" xmlns="http://www.w3.org/1999/xhtml">
4  <head>
5      <meta charset="utf-8" />
6      <title></title>
7
8  </head>
9  <body>
10     <canvas id="myCanvas" width="200" height="100" style="border:2px solid;border-color:red"></canvas>
11     <script>
12         var c = document.getElementById("myCanvas");
13         var ctx = c.getContext("2d");
14         ctx.fillStyle = "green";
15         ctx.fillRect(0, 0, 150, 75);
16
17         ctx.fillStyle = "rgba(0,0,200,0.5)";
18         ctx.fillRect(50, 30, 150, 75);
19
20         ctx.lineWidth = 5;
21         ctx.strokeStyle = "purple";
22         ctx.strokeRect(0, 0, 150, 75);
23
24     </script>
25 </body>
26 </html>
27
```

```
<canvas id="myCanvas" width="200" height="100" style="border:2px  
solid;border-color:red"></canvas>
```

```
<script>
```

```
var c = document.getElementById("myCanvas");  
var ctx = c.getContext("2d");  
ctx.fillStyle = "green";  
ctx.fillRect(0, 0, 150, 75);
```

```
ctx.fillStyle = "rgba(0,0,200,0.5)";  
ctx.fillRect(50, 30, 150, 75);
```

```
ctx.lineWidth = 5;  
ctx.strokeStyle = "purple";  
ctx.strokeRect(0, 0, 150, 75);
```

```
</script>
```

A decorative graphic in the bottom right corner consisting of a light purple filled area and a dark purple outline of a shape resembling a stylized 'S' or a drop.

```
var c = document.getElementById("myCanvas");  
var ctx = c.getContext("2d");  
ctx.fillStyle = "green";  
ctx.fillRect(0, 0, 150, 75);  
  
ctx.fillStyle = "rgba(0,0,200,0.5)";  
ctx.fillRect(50, 30, 150, 75);
```

我們利用document.getElementById來抓到
canvas的id
想像成把筆放到畫布上

```
var c = document.getElementById("myCanvas");  
var ctx = c.getContext("2d");  
ctx.fillStyle = "green";  
ctx.fillRect(0, 0, 150, 75);  
  
ctx.fillStyle = "rgba(0,0,200,0.5)";  
ctx.fillRect(50, 30, 150, 75);
```

getContext("2d")獲取了<canvas>的2D渲染上下文
這樣我們就可以畫布上進行繪圖操作

渲染是一種將圖形、文本和圖像等元素繪製在平面上
以創建二維圖像的技術

```
var c = document.getElementById("myCanvas");  
var ctx = c.getContext("2d");  
ctx.fillStyle = "green";  
ctx.fillRect(0, 0, 150, 75);
```

```
ctx.fillStyle = "rgba(0,0,200,0.5)";  
ctx.fillRect(50, 30, 150, 75);
```

fill的意思是填滿

所以就是將圖形填滿顏色

fillStyle是選擇圖形的顏色(如果沒打這句，就是填充黑色)

fillRect則是設定起始x、起始y、長、寬

```
var c = document.getElementById("myCanvas");  
var ctx = c.getContext("2d");  
ctx.fillStyle = "green";  
ctx.fillRect(0, 0, 150, 75);
```

```
ctx.fillStyle = "rgba(0,0,200,0.5)";  
ctx.fillRect(50, 30, 150, 75);
```

fillStyle的別種寫法

rgba是英文紅、綠、藍、透明(alpha)的縮寫

rgb的取值範圍是0~255

而透明度是0~1



YT



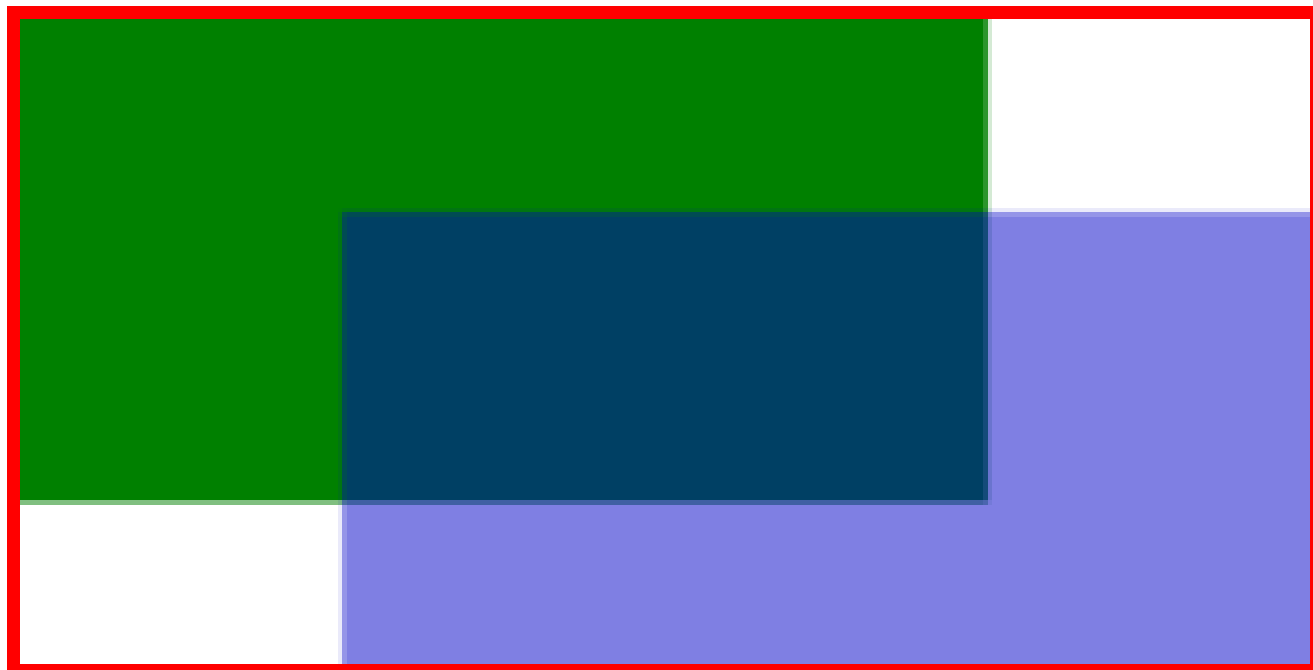
github



新分頁

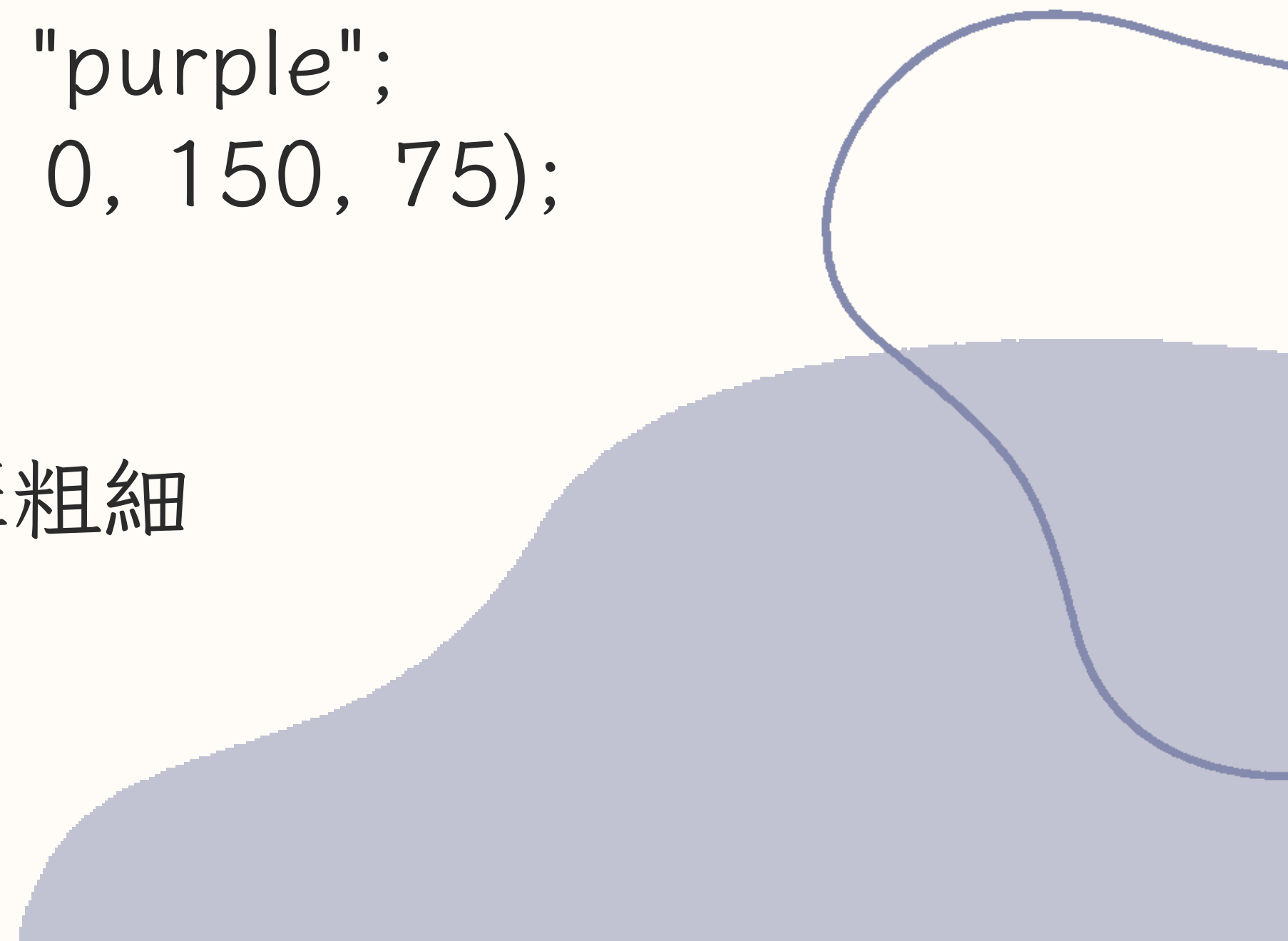


2023臺灣能-永續



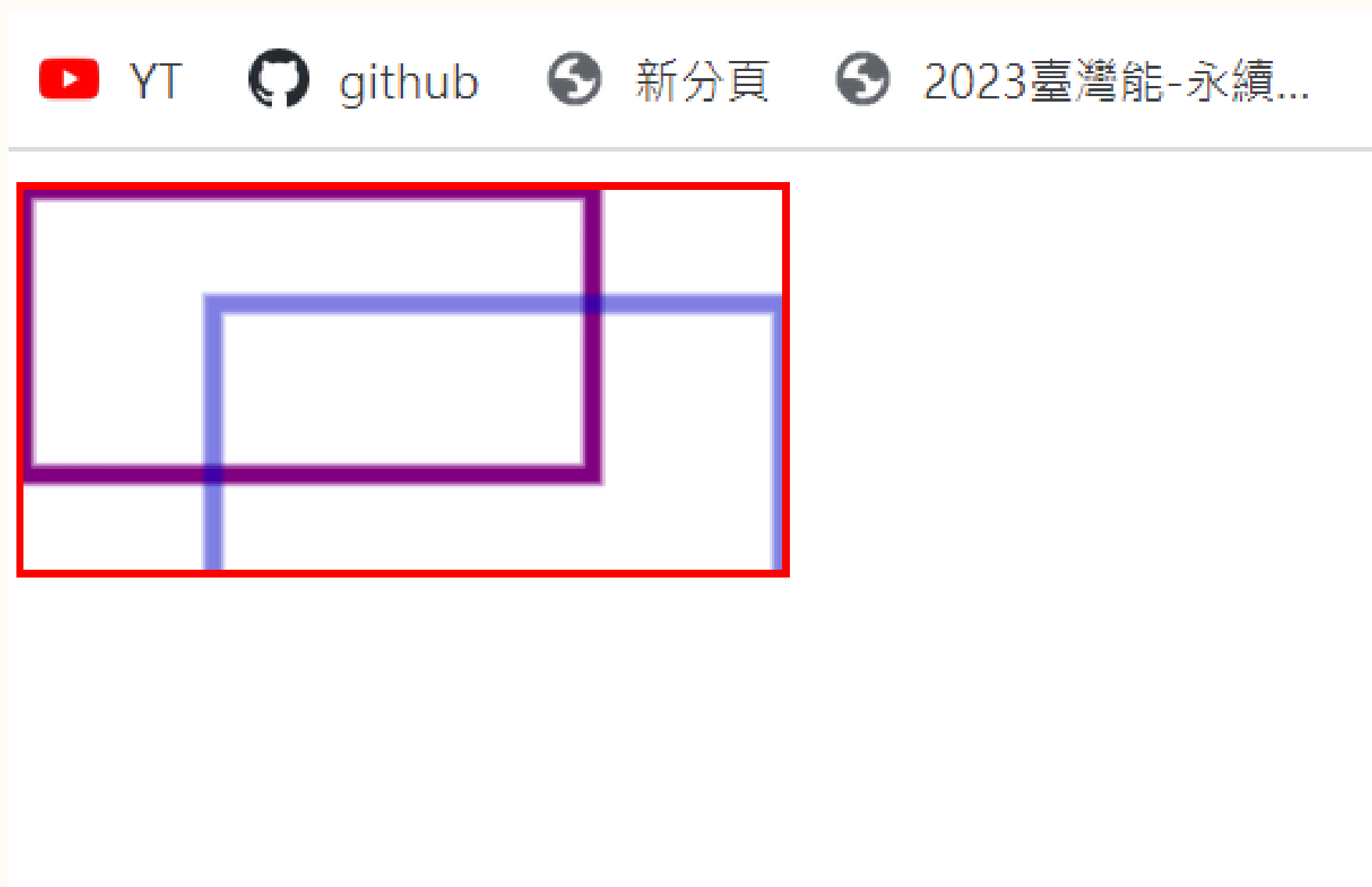
```
ctx.lineWidth = 5;  
ctx.strokeStyle = "purple";  
ctx.strokeRect(0, 0, 150, 75);
```

設定畫筆粗細



```
ctx.lineWidth = 5;  
ctx.strokeStyle = "purple";  
ctx.strokeRect(0, 0, 150, 75);
```

Canvas中stroke是描邊的意思
strokeStyle一樣是選擇顏色
strokeRect一樣是起點x、起點y、長、寬
而stroke跟fill不一樣就是stroke只畫出圖形的框
中間不補色

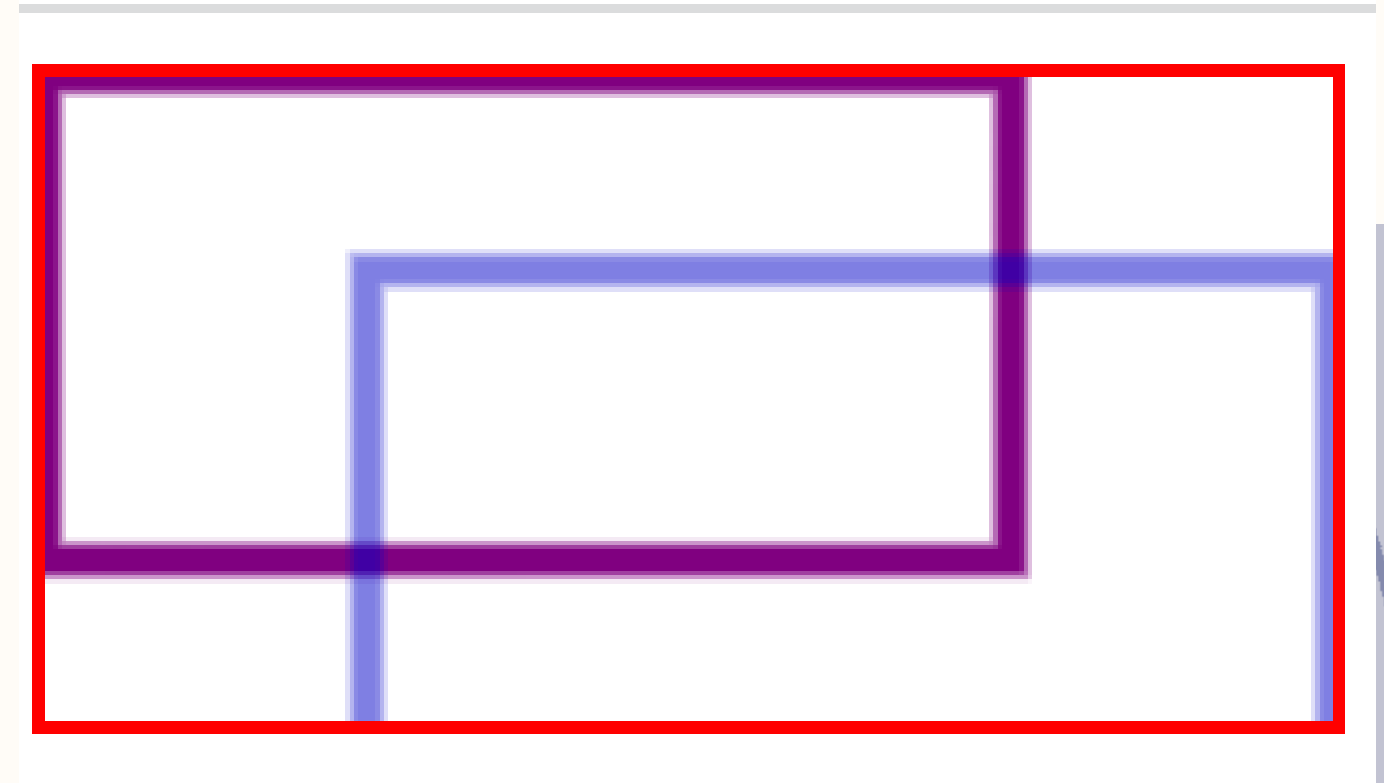


當然stroke也可以用rgba的方法畫圖

```
ctx.fillStyle = "green";  
ctx.fillRect(0, 0, 150, 75);
```



```
ctx.strokeStyle = "purple";  
ctx.strokeRect(0, 0, 150, 75);
```

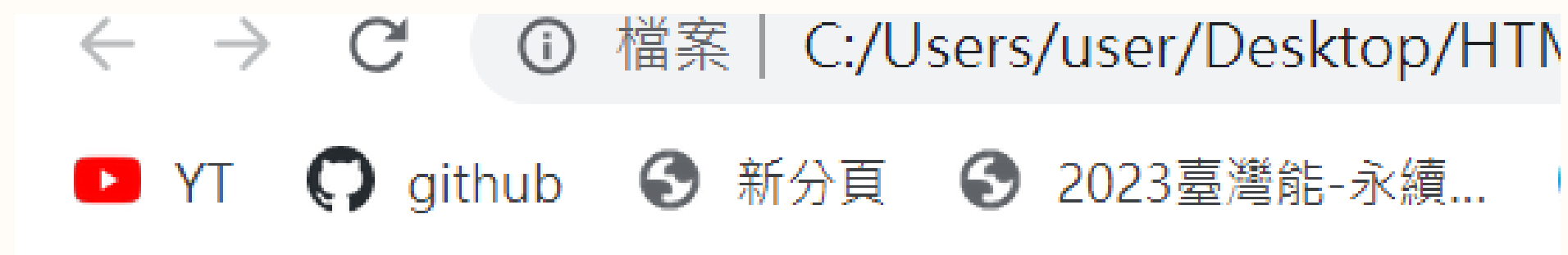


來介紹一個橡皮擦功能

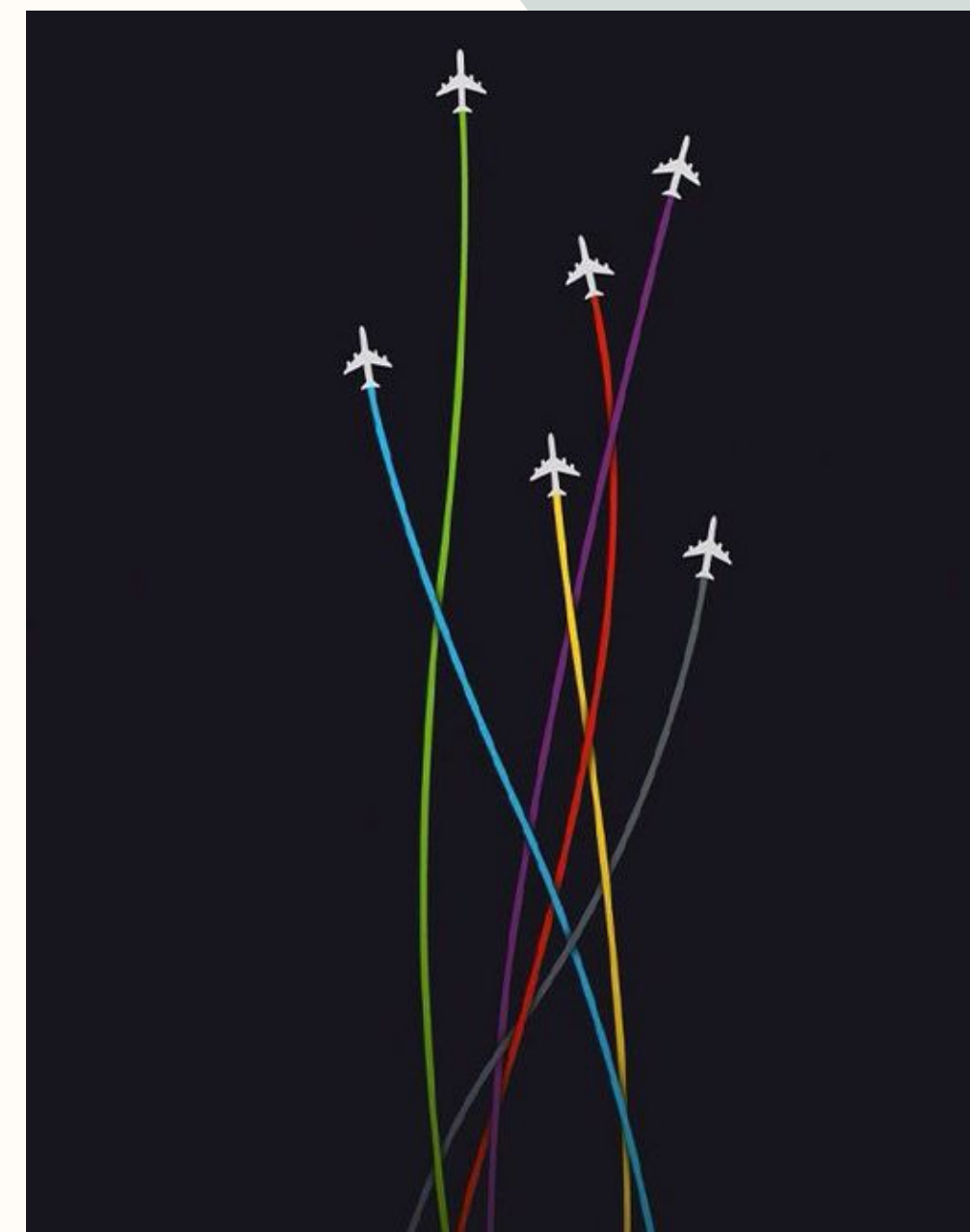
```
1  <!DOCTYPE html>
2
3  <html lang="en" xmlns="http://www.w3.org/1999/xhtml">
4  <head>
5      <meta charset="utf-8" />
6      <title></title>
7
8  </head>
9  <body>
10     <canvas id="myCanvas" width="200" height="100" style="border:2px solid;border-color:red"></canvas>
11     <script>
12         var c = document.getElementById("myCanvas");
13         var ctx = c.getContext("2d");
14         ctx.fillStyle = "green";
15         ctx.fillRect(0, 0, 150, 75);
16
17         ctx.fillStyle = "rgba(0,0,200,0.5)";
18         ctx.fillRect(50, 30, 150, 75);
19
20         ctx.lineWidth = 5;
21         ctx.strokeStyle = "purple";
22         ctx.strokeRect(0, 0, 150, 75);
23
24         ctx.strokeStyle = "rgba(0,0,200,0.5)";
25         ctx.strokeRect(50, 30, 150, 75);
26
27         ctx.clearRect(20,20,100,100);
28     </script>
29 </body>
30 </html>
31
```

```
ctx.clearRect(20,20,100,100);
```

clearRect可以清除選定範圍的圖形
很好理解的範例的範圍起點x、y為20
長寬為100的範圍內圖形繪被清除



Canvas基礎語法 趴兔



矩形繪製(有路徑)



HTMLPage2.html* ✖

```
1  <!DOCTYPE html>
2
3  <html lang="en" xmlns="http://www.w3.org/1999/xhtml">
4  <head>
5      <meta charset="utf-8" />
6      <title></title>
7
8  </head>
9  <body>
10     <canvas id="myCanvas" width="200" height="100" style="border:2px solid;border-color:red"></canvas>
11     <script>
12         var c = document.getElementById("myCanvas");
13         var ctx = c.getContext("2d");
14         ctx.beginPath();
15         ctx.moveTo(0, 0);
16         ctx.lineTo(200, 100);
17         ctx.stroke();
18     </script>
19 </body>
20 </html>
```

```
<script>
  var c = document.getElementById("myCanvas");
  var ctx = c.getContext("2d");
  ctx.beginPath();
  ctx.moveTo(0, 0);
  ctx.lineTo(200, 100);
  ctx.stroke();
</script>
```

```
<script>  
  var c = document.getElementById("myCanvas");  
  var ctx = c.getContext("2d");  
  ctx.beginPath();  
  ctx.moveTo(0, 0);  
  ctx.lineTo(200, 100);  
  ctx.stroke();  
</script>
```

beginPath就是告訴電腦你要開始繪製路徑了

```
<script>  
  var c = document.getElementById("myCanvas");  
  var ctx = c.getContext("2d");  
  ctx.beginPath();  
  ctx.moveTo(0, 0);  
  ctx.lineTo(200, 100);  
  ctx.stroke();  
</script>
```

moveTo就是移動到要開始的地方

```
<script>  
  var c = document.getElementById("myCanvas");  
  var ctx = c.getContext("2d");  
  ctx.beginPath();  
  ctx.moveTo(0, 0);  
  ctx.lineTo(200, 100);  
  ctx.stroke();  
</script>
```

lineTo就是繪製停止的地方


```
<script>  
  var c = document.getElementById("myCanvas");  
  var ctx = c.getContext("2d");  
  ctx.beginPath();  
  ctx.moveTo(0, 0);  
  ctx.lineTo(200, 100);  
  ctx.stroke();  
</script>
```

stroke()有點像是下筆的動作，如果沒有這句的話就不會繪製在畫面上了

Canvas繪製圓形

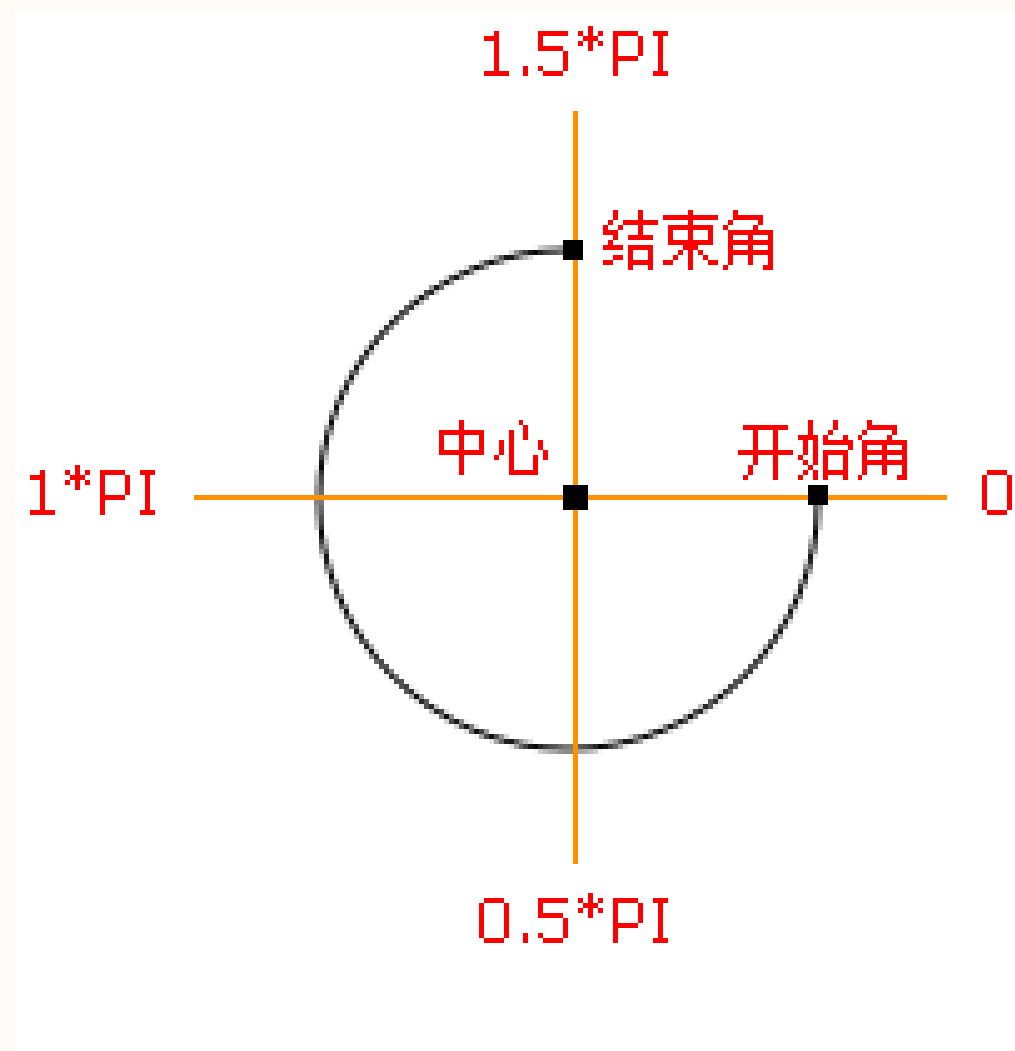
`Arc(x,y,radius,startAngle,endAngle,antiClockwise)`繪出圓形或圓弧

`x`、`y`是圓心位置，`radius`是半徑

`startAngle`、`endAngle`是弧形的起始和結束，是弧度不是角度(三點鐘方向是0度)

`antiClockwise`是順時針或逆時針，`true`是順時針，`false`是逆時針，可以不用打

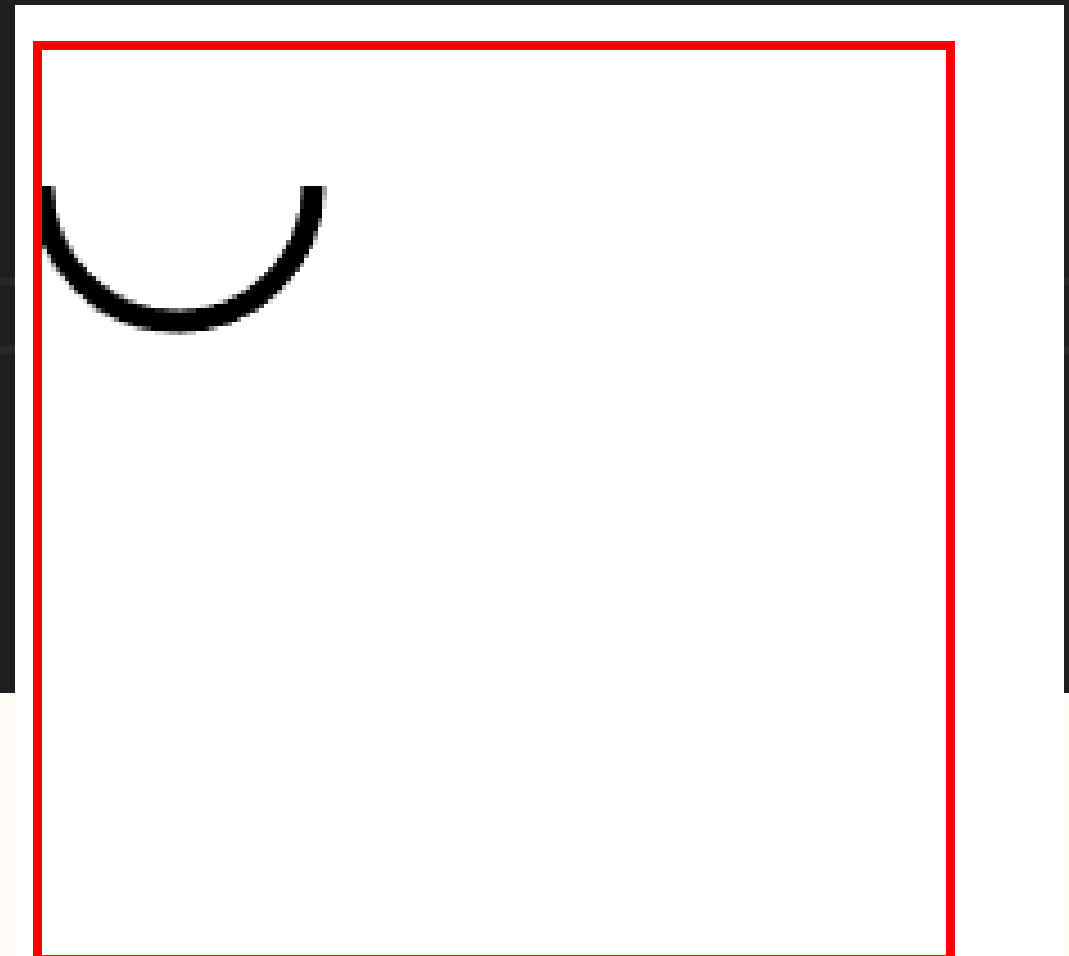
```
ctx.arc(100, 100, 50, 0, 2 * Math.PI);
```



圓心位置是100,100;半徑是50;起始角為0度，結束角是2個Math.PI
就是畫一個完整的圓

Desktop > <> arc.html > html > body > script

```
1  <!DOCTYPE html>
2
3  <html lang="en" xmlns="http://www.w3.org/1999/xhtml">
4  <head>
5      <meta charset="utf-8" />
6      <title></title>
7
8  </head>
9  <body>
10     <canvas id="myCanvas" width="200" height="200" style="border:2px solid;border-color: red"></canvas>
11     <script>
12         var c = document.getElementById("myCanvas");
13         var ctx = c.getContext("2d");
14         ctx.lineWidth=5;
15         ctx.beginPath();
16         ctx.arc(30,30,30,0,1 * Math.PI);
17         ctx.stroke();
18     </script>
19 </body>
20 </html>
```



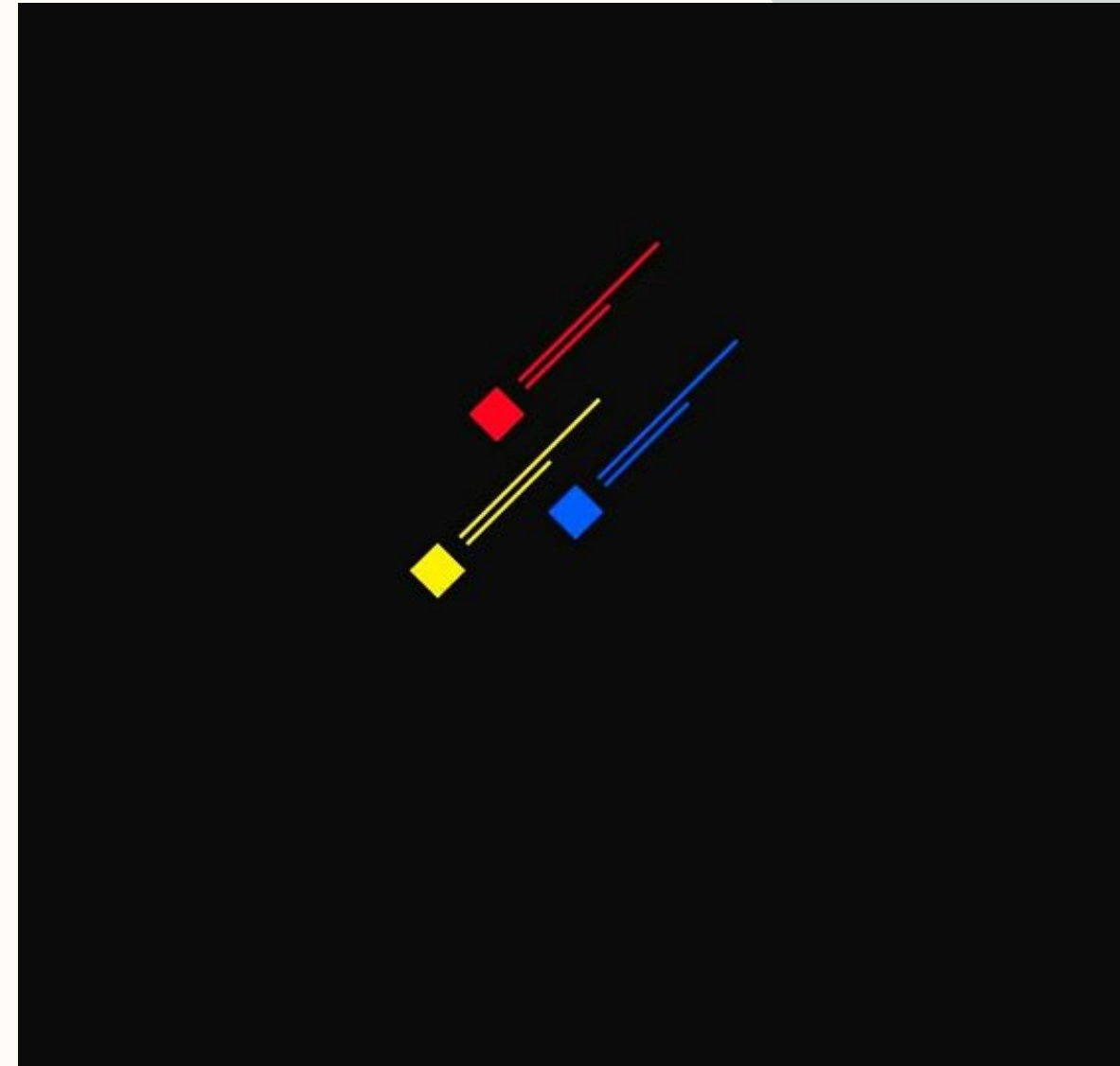
```
<script>
  var c = document.getElementById("myCanvas");
  var ctx = c.getContext("2d");
  ctx.lineWidth=5;
  ctx.beginPath();
  ctx.arc(30,30,30,0,1 * Math.PI,false);
  ctx.stroke();
</script>
```



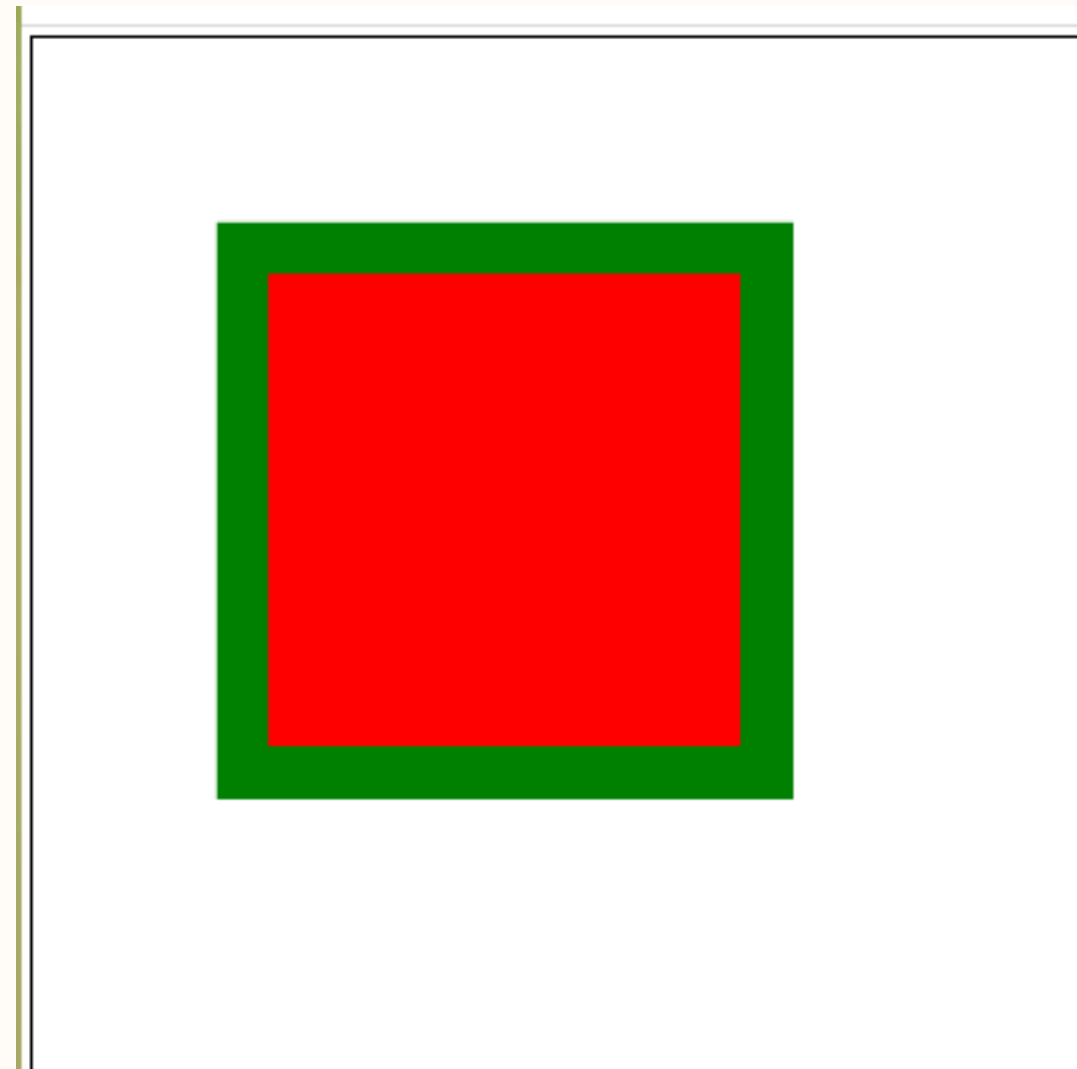
```
<script>
  var c = document.getElementById("myCanvas");
  var ctx = c.getContext("2d");
  ctx.lineWidth=5;
  ctx.beginPath();
  ctx.arc(30,30,30,0,1 * Math.PI,true);
  ctx.stroke();
</script>
```



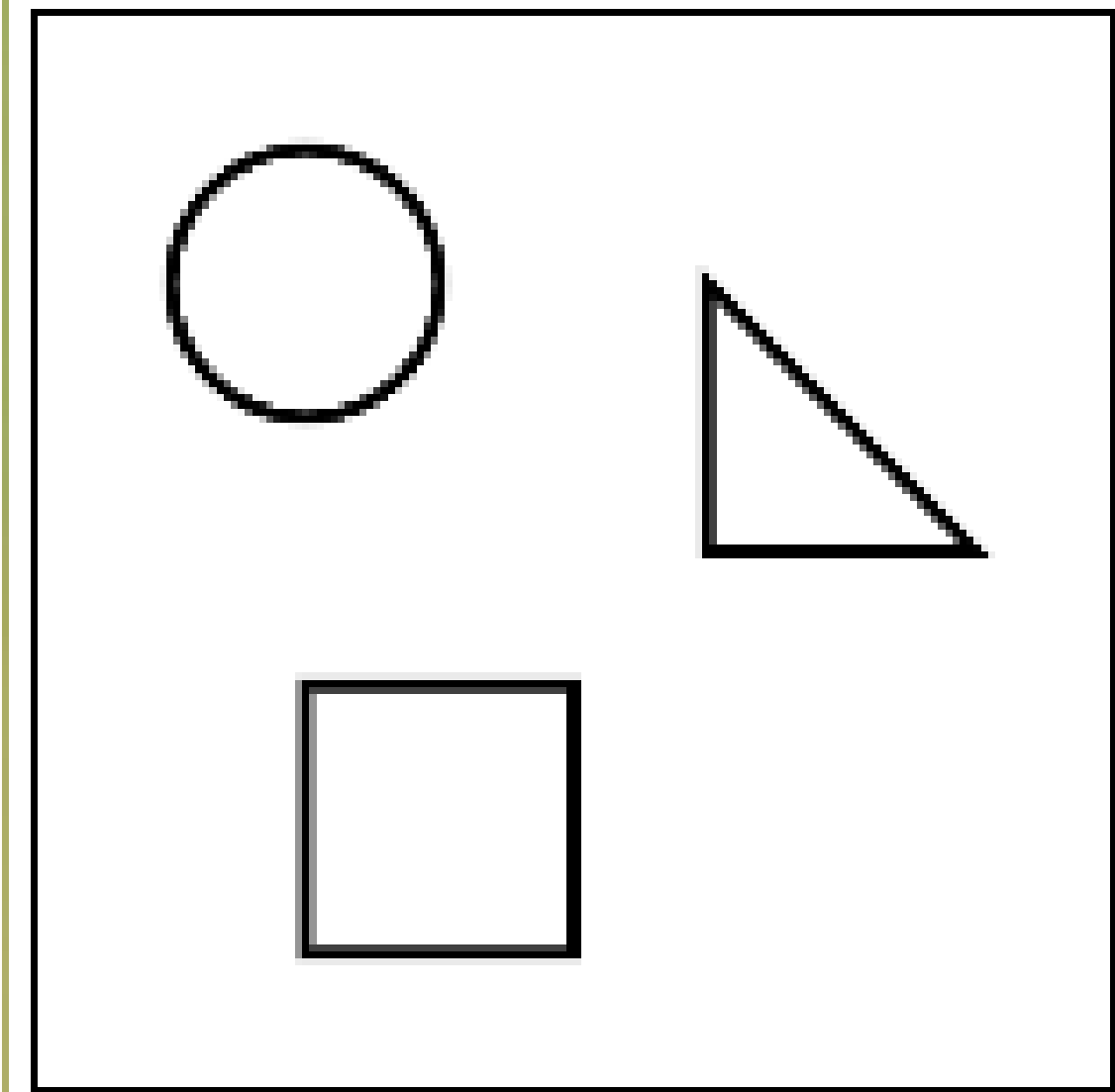
Canvas畫圖time



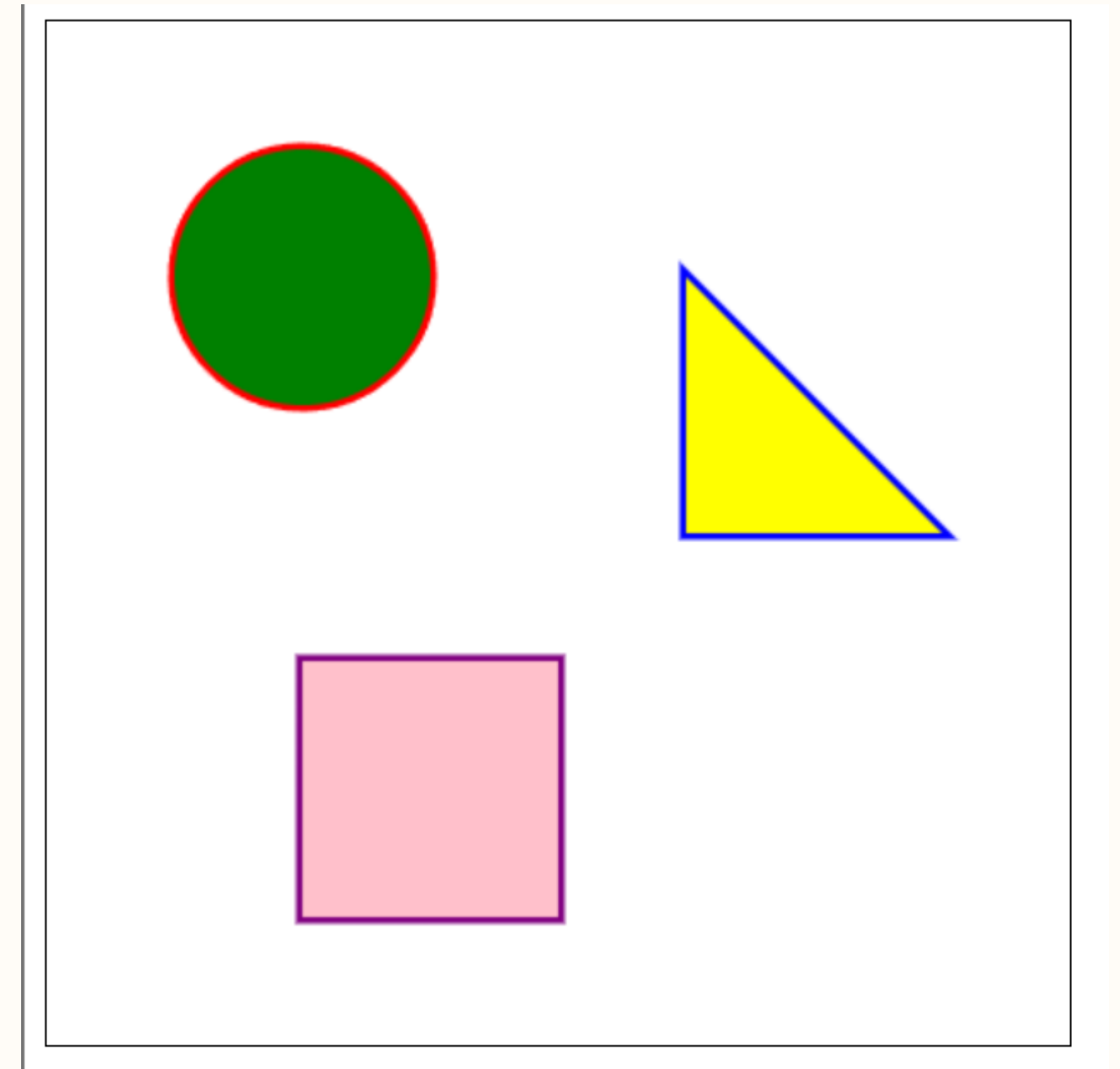
1.繪出紅色正方形
形，外框為綠色



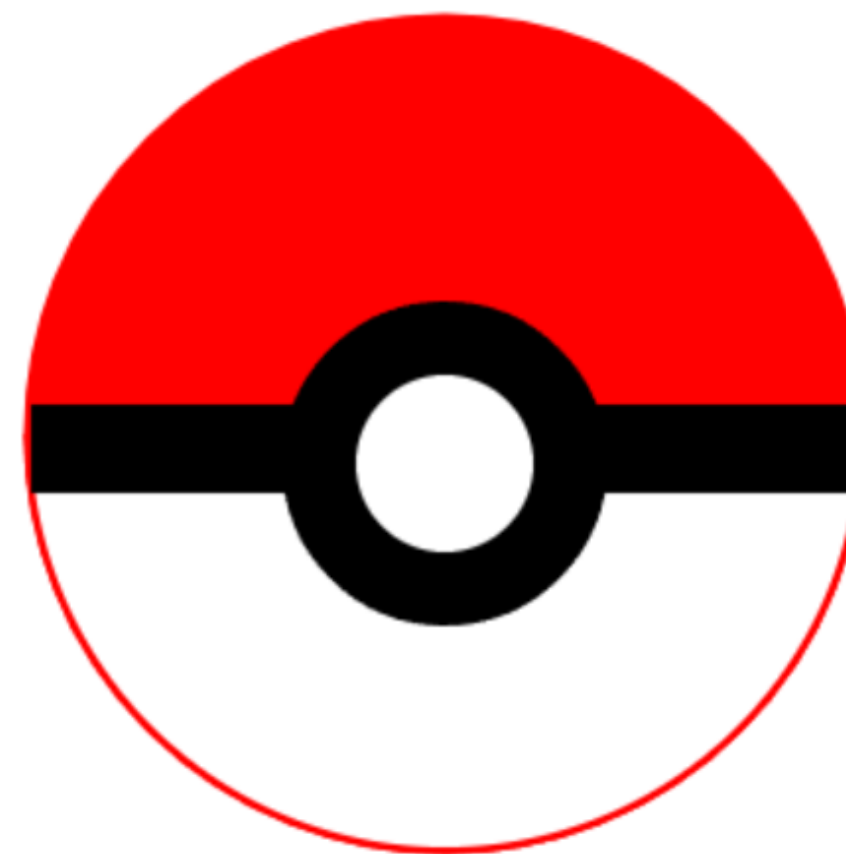
2.繪出正方形、圓形、直角三角形
(空心即可)



3. 承上題
填上顏色，框及填
充需不同色



4.繪出寶可夢球



參考來源

<https://hackmd.io/N5yEjm2vSx6D41qAbJGDmw>

<https://www.cnblogs.com/youyoui/p/8523530.html#:~:text=void%20ctx.arc%20%28x%2C%20y%2C%20radius%2C%20startAngle%2C%20endAngle%2C%20anticlockwise%29%3B,%E4%BD%8D%E7%BD%AE%EF%BC%8C%E5%8D%8A%E5%BE%84%E4%B8%BA%20r%20%EF%BC%8C%E6%A0%B9%E6%8D%AEanticlockwise%20%EF%BC%88%E9%BB%98%E8%AE%A4%E4%B8%BA%E9%A1%BA%E6%97%B6%E9%92%88%EF%BC%89%E6%8C%87%E5%AE%9A%E7%9A%84%E6%96%B9%E5%90%91%E4%BB%8E%20startAngle%20%E5%BC%80%E5%A7%8B%E7%BB%98%E5%88%B6%EF%BC%8C%E5%88%B0%20endAngle%20%E7%BB%93%E6%9D%9F%E3%80%82>

tcumi ppt

getContext():<https://blog.csdn.net/acoolgiser/article/details/85800799>

圓形弧度:https://www.w3school.com.cn/tags/canvas_arc.asp