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Elementary concepts

1.0: The Canvas

The canvas is an html5 tag introduced by (no it's not a typo) in 2004 and then *quickly* adopted and available in every browser as standard core feature (2008).

It provides a bitmap-based area on the browser allowing to draw programmatically shapes, graphics and more. This was the demise of macromedia Flash.

Start from a canvas tag in a html document <canvas id="myCanvas"></canvas>. That's all the markup we need in that book.

```

var FOREGROUND = "#FF0000",
    BACKGROUND = "#000000",
    W = 600,
    H = 600,
    c = window.myCanvas, // or document.getElementById("canvas")[0]
        // if we set no id attribute and there is only one canvas
    ctx = c.getContext("2d");

c.width = W;
c.height = H;

function clear () {
    ctx.fillStyle = BACKGROUND;
    ctx.fillRect(0, 0, c.width, c.height);
}

function draw(x, y, color) {
    const PSIZE = 50;
    ctx.fillStyle = color || FOREGROUND;
    ctx.fillRect(x-PSIZE/2, y-PSIZE/2, PSIZE, PSIZE);
}

clear();

draw(0, 0);    draw(W/2, 0, "green");   draw(W, 0, 'blue');

draw(0, H/2, 'yellow');   draw(W/2, H/2, 'cyan');  draw(W, H/2, 'magenta');

draw(0, H, '#ddd');    draw(W/2, H, '#888');   draw(W, H, '#555');

```

1.1: Coordinates and logical coordinates

In *math* almost all the numerical results will be similar to rational numbers (indeed a computer can only have finite decimal digits). The native methods available for us to draw on the canvas though accepts only integers; those parameters are exactly the coordinates of our points in the coordinates system of the canvas. This system has the origin in the top left of the screen, the x-axis is horizontal pointing toward the right and they-axis is vertical pointing toward the bottom.

This means to draw a line we have to that this coordinate system into account

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`drawLine(6,2, 10,6).` // watch the canvas does NOT provide that, we will in our simple library

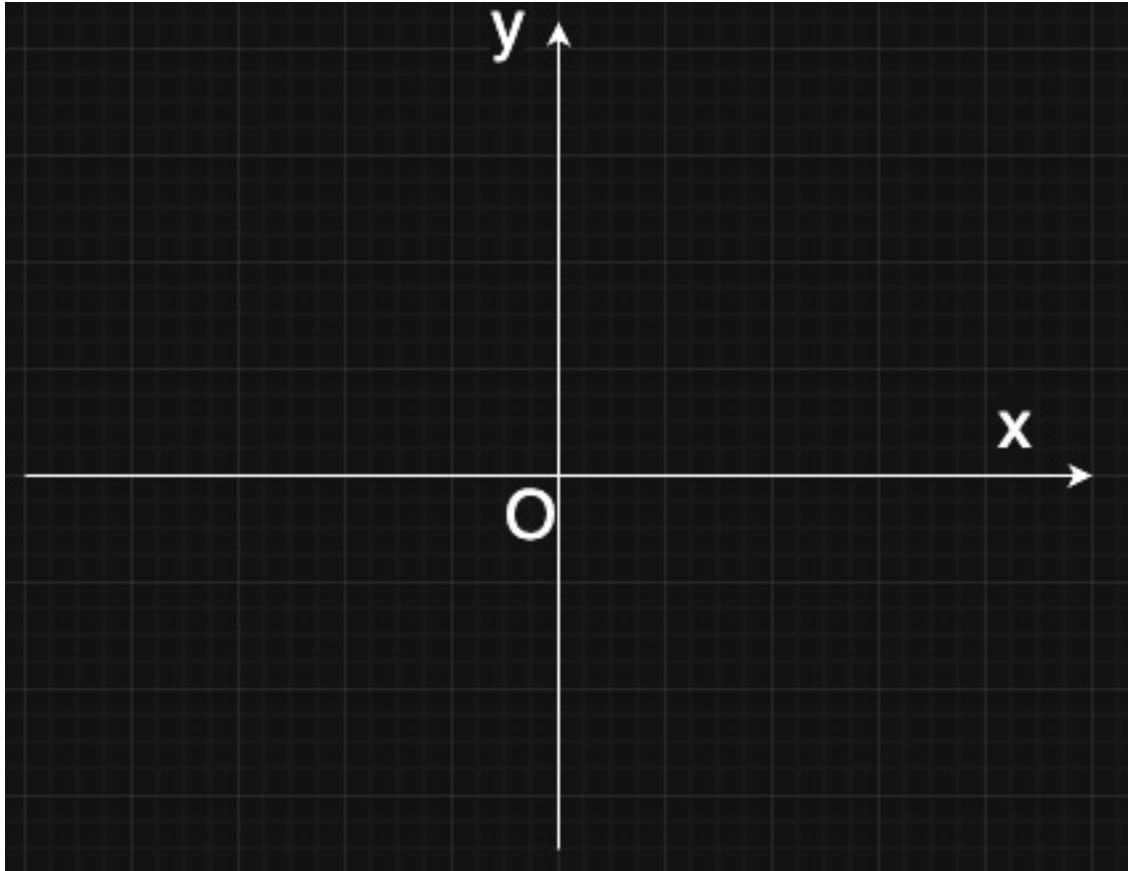


the truth is that to draw a line in the canvas we have to write something like:

```
ctx.beginPath(); // Start a path  
ctx.moveTo(6, 2); // Move to initial point  
ctx.lineTo(10, 6); // Draw a line to (10, 6)  
ctx.stroke(); // Render
```

but we can create our own `drawLine` function to do that.

Another more important thing is to change the coordinate system into one we all feel more comfortable to draw in.



```
var width = 800,  
height = 600;  
renderable = ({x, y}) => ({  
  x: x - width/2,  
  y: height/2 - y  
});
```

