

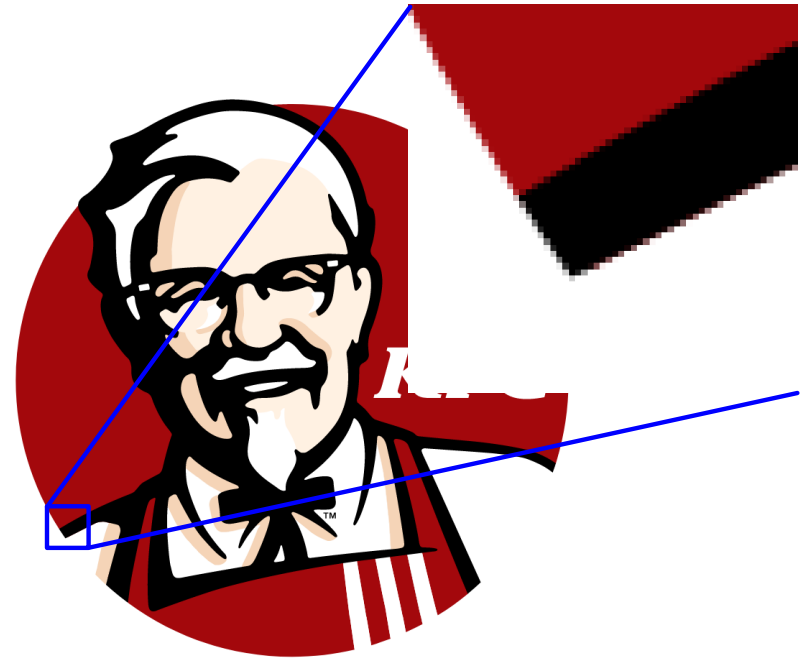
COMP4021  
Internet Computing

# Images in Browsers

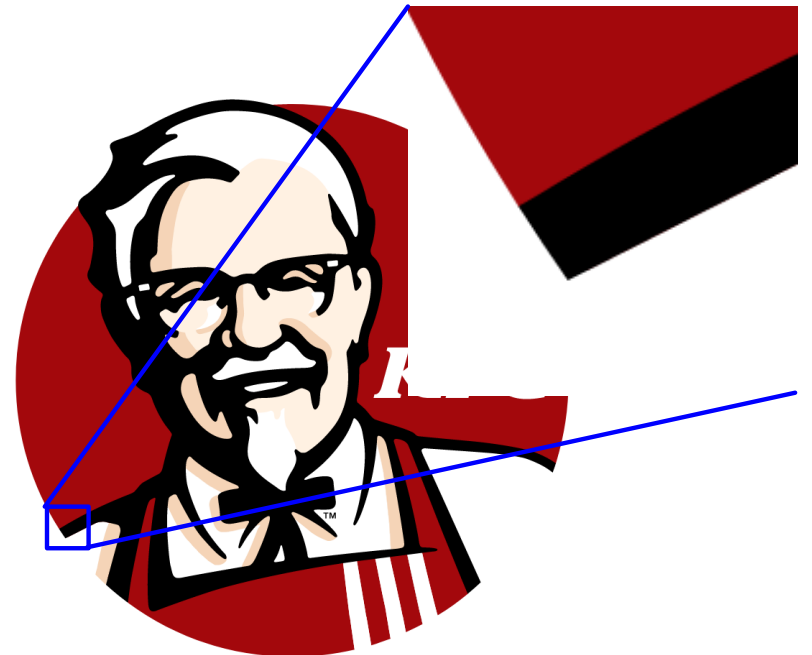
David Rossiter and Gibson Lam

# Types of Image

- If you want to display an image in a browser, there are two general approaches:
  1. Bitmap images
  2. Vector graphics



A bitmap image



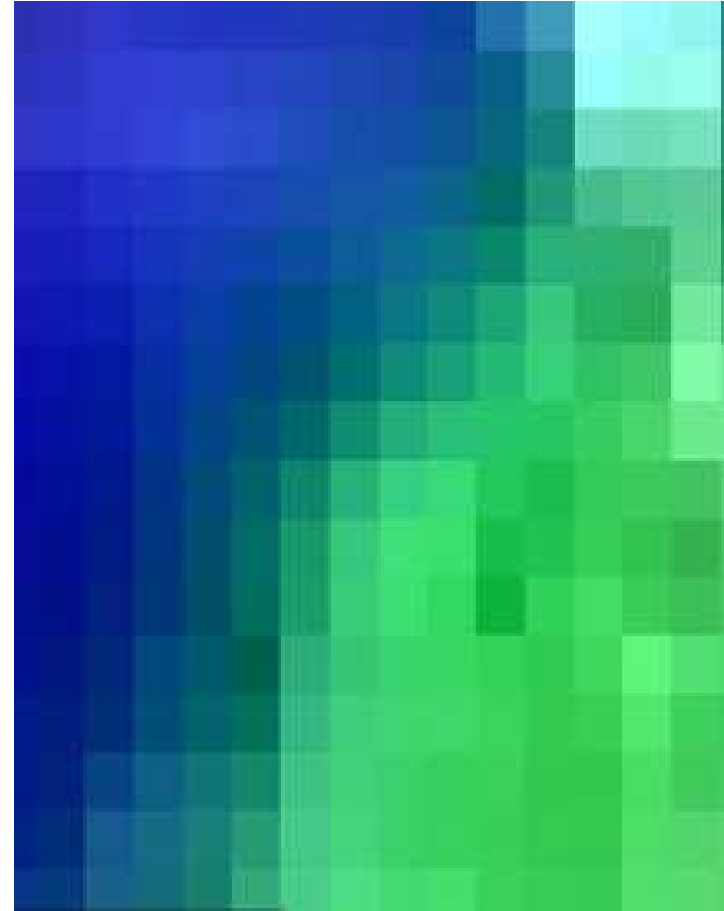
A vector image

# Bitmap Image Formats

- Some common bitmap image formats for the web are:
  - GIF – old format for images with  $\leq 256$  colours
  - JPEG – best for images of ‘natural’ things (such as photographs of people, places)
  - PNG – high compression file format which does not change the pixels; this is the main web format for bitmap images
- These are all pixel based systems (=bitmap formats)

# Bitmap Images

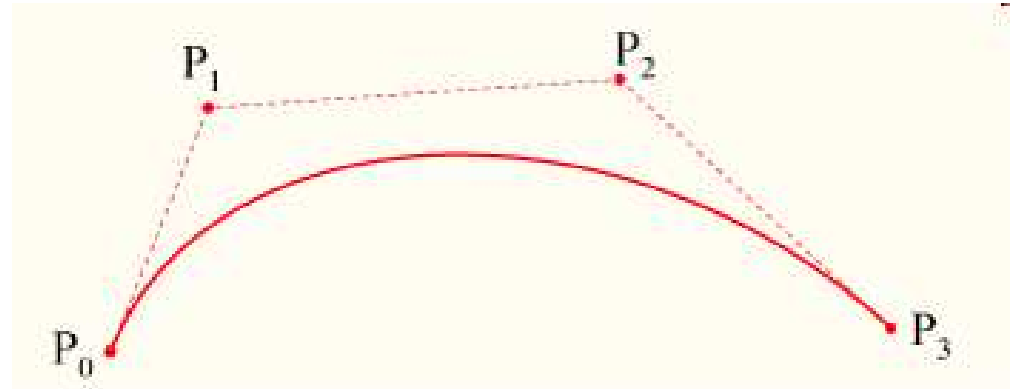
- With bitmap images
  - Looks poor when you zoom in/print it (if not enough pixels)
  - They are static (=non-moving), or sometimes can do very simple animation by looping (such as animated GIF files)
  - File size can be large



# Vector Graphics

- With vector systems

- Everything is mathematically represented
- Get perfect quality, looks great even when you zoom in/print
- Everything in the image is 'separate'
- This means e.g. dynamic change can be easily applied to some specific things in the image (=animation)
- Often much smaller file size than bitmap images, so less disk space & less time needed for download



# Vector Graphics on the Web

- There are two main ways to display vector graphics in a browser:
  - Canvas      `<canvas>...</canvas>`
    - This is a bitmap system,  
which has some vector graphics commands
  - SVG      `<svg>...</svg>`
    - This is a markup language (i.e. a language using tags, similar to HTML) for vector graphics

# Possible Uses of Canvas

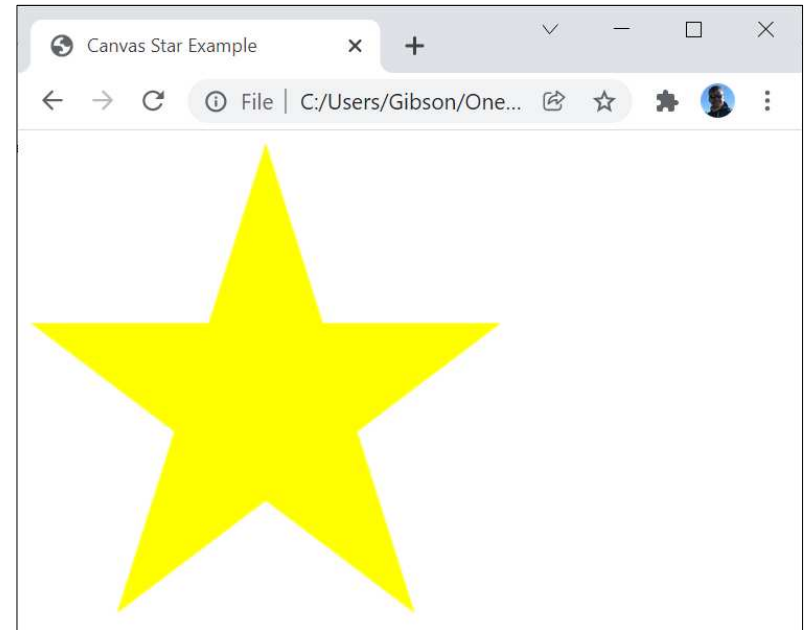
1. An image where nothing moves
2. An image which is controlled by JavaScript
  - JavaScript can react to user input and change anything at any time

# An Example Canvas Image

```
<!DOCTYPE html>
<html>
<head>
  <title>Canvas Star Example</title>
</head>
<body>
  <canvas id="myCanvas"
    width="300" height="300"></canvas>
  <script>
    let e = document.getElementById("myCanvas");
    let ctx = e.getContext("2d");
    ctx.beginPath();
    ctx.moveTo(150, 0);
    ctx.lineTo(245, 300);
    ctx.lineTo(0, 115);
    ctx.lineTo(300, 115);
    ctx.lineTo(55, 300);
    ctx.closePath();
    ctx.fillStyle = "yellow";
    ctx.fill();
  </script>
</body>
</html>
```

*Code to draw  
the star*

- You don't need to worry about the code
- You will know what it is doing later in the course





# Possible Uses of SVG

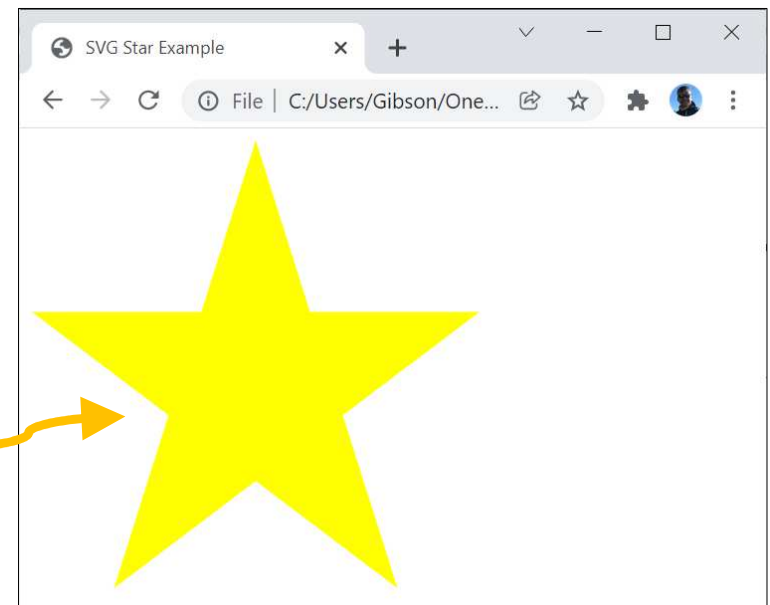
1. An image where nothing moves
2. An image where some things move (animation)
  - Animation commands are included in SVG
3. An image which is controlled by JavaScript
  - JavaScript can react to user input and change anything at any time

# An Example SVG Image

- SVG looks shorter than the canvas code
- You will also learn the details later

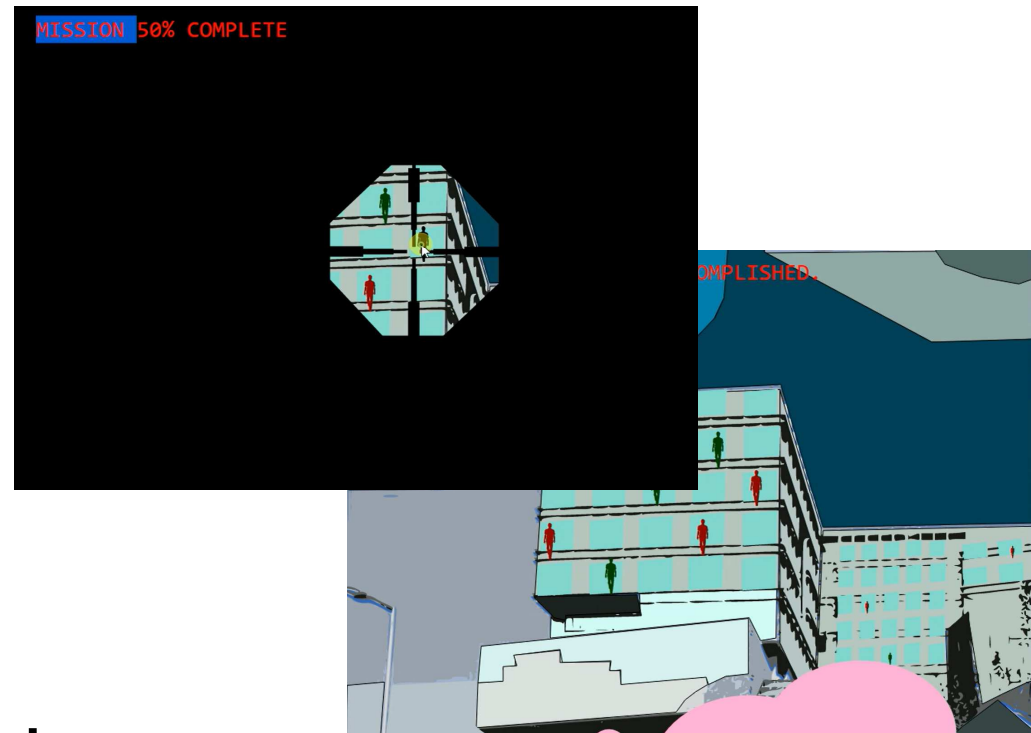
```
<!DOCTYPE html>
<html>
<head>
  <title>SVG Star Example</title>
</head>
<body>
  <svg width="300" height="300">
    <path d="M150 0L245 300L0 115
          L300 115L55 300"
          style="fill: yellow" />
  </svg>
</body>
</html>
```

*An SVG element  
drawing the star*



# Making Games

- Both canvas and SVG are great for making games in a browser!



- We will look into using each to make interesting things later