CSC 240 Computer Graphics
Video 1B: HTML & Javascript

Nick Howe
Smith College

Portions based on slides & content courtesy Sara Mathieson
Intro to HTML
(mostly used as a wrapper for JavaScript)
Intro to HTML

Consider a sample HTML document:

```html
<html>
<head>
<title>Canvas Graphics</title>
<script>
    var canvas; // DOM object corresponding to the canvas
    var graphics; // 2D graphics context for drawing on the canvas
    function init() {
        canvas = document.getElementById("theCanvas");
        graphics = canvas.getContext("2d");
        graphics.fillText("Hello World", 10, 20);
    }
</script>
</head>
<body onload="init()">
    <p>The canvas appears below this line.</p>
    <canvas id="theCanvas" width="640" height="480"></canvas>
    <p>The canvas appears above this line.</p>
</body>
</html>
```
Intro to HTML

(Hyper Text Markup Language)

```html
<!DOCTYPE html>
<html>
<head>
<title>Canvas Graphics</title>
</head>
<body onload="init()">
<canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>
```

Indention: not required, but good style

HTML tags (start tag and end tag)

after webpage has loaded (text, images, etc), call this function

size of the window (you choose)

id: name the element, which we can refer to later
Intro to HTML

Consider a sample HTML document:

```html
<html>
<head>
<title>Canvas Graphics</title>
<script>
    var canvas;    // DOM object corresponding to the canvas
    var graphics;  // 2D graphics context for drawing on the canvas

    function init() {
        canvas = document.getElementById("theCanvas");
        graphics = canvas.getContext("2d");
        graphics.fillText("Hello World", 10, 20);
    }
</script>
</head>
<body onload="init()">
    <p>The canvas appears below this line.</p>
    <canvas id="theCanvas" width="640" height="480"></canvas>
    <p>The canvas appears above this line.</p>
</body>
</html>
```

In practice, we’ll use the same HTML every time.

Only the parts in red might change.
Intro to JavaScript
Intro to JavaScript

<!DOCTYPE html>
<html>
<head>
<title>Canvas Graphics</title>
</head>

<body onload="init()">
  <canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>
Intro to JavaScript

```html
<!DOCTYPE html>
<html>
<head>
    <title>Canvas Graphics</title>
    <script>
        var canvas; // DOM object corresponding to the canvas
        var graphics; // 2D graphics context for drawing on the canvas

        function draw() {
            // draw on the canvas, using the graphics context
            graphics.fillText("Hello World", 10, 20);
        }

        function init() {
            canvas = document.getElementById("theCanvas");
            graphics = canvas.getContext("2d");
            draw(); // draw something on the canvas
        }
    </script>
</head>
<body onload="init()">
    <canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>
```
Intro to JavaScript

Python:

```python
def init():
    pass
```

JavaScript:

```javascript
function init() {
    // code inside function
}
```

```html
<script>
    var canvas;  // DOM object corresponding to the canvas
    var graphics; // 2D graphics context for drawing on the canvas

    function draw() {
        // draw on the canvas, using the graphics context
        graphics.fillText("Hello World", 10, 20);
    }

    function init() {
        canvas = document.getElementById("theCanvas");
        graphics = canvas.getContext("2d");
        draw(); // draw something on the canvas
    }
</script>
</head>
<body onload="init()">
    <canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>

Previously defined here

Call to function init()
Intro to JavaScript

Note: neither “var” nor “;” are strictly necessary, but good practice!

Python:  
```
i = 1
```

JavaScript:  
```
var i = 1;
```

Create HTML canvas called `theCanvas`

```html
<script>
  var canvas; // DOM object corresponding to the canvas
  var graphics; // 2D graphics context for drawing on the canvas

  function draw() {
    // draw on the canvas, using the graphics context
    graphics.fillText("Hello World", 10, 20);
  }

  function init() {
    canvas = document.getElementById("theCanvas");
    graphics = canvas.getContext("2d");
    draw(); // draw something on the canvas
  }
</script>
</head>
<body onload="init()">
  <canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>
```

Declare a Javascript variable `canvas`

Associate variable `canvas` with the HTML object `theCanvas`

Create HTML canvas called `theCanvas`
Intro to JavaScript

We'll start by looking at 2D graphics

```html
<script>
  var canvas;  // DOM object corresponding to the canvas
  var graphics; // 2D graphics context for drawing on the canvas

  function draw() {
    // draw on the canvas, using the graphics context
    graphics.fillText("Hello World", 10, 20);
  }

  function init() {
    canvas = document.getElementById("theCanvas");
    graphics = canvas.getContext("2d");
    draw(); // draw something on the canvas
  }
</script>
```
Quick Quiz

- Name all the functions defined in the script: `init()`, `draw()`

- Name all the variables defined in the script: `canvas`, `graphics`

- What is the id of the HTML canvas element? `theCanvas`

```html
<!DOCTYPE html>
<html>
<head>
<title>Canvas Graphics</title>
<script>
var canvas; // DOM object corresponding to the canvas
var graphics; // 2D graphics context for drawing on the canvas

function draw() {
    // draw on the canvas, using the graphics context
    graphics.fillText("Hello World", 10, 20);
}

function init() {
    canvas = document.getElementById("theCanvas");
    graphics = canvas.getContext("2d");
    draw(); // draw something on the canvas
}
</script>
</head>
<body onload="init()">
    <canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>
```
Graphics functions

1) graphics.fillStyle = "red";  // pick up paintbrush

2) graphics.fillRect(x, y, w, h);  // paint

For now: graphics.fillRect(x, y, 1, 1);  // color the pixel at (x, y)
Syntax
For Loops

Python:

```python
for i in range(20, 40, 2):
    print(i)
```

JavaScript:

```javascript
for (var i = 20; i < 40; i += 2) {
    console.log(i);
}
```
Conditionals

**Python:**

```python
if x > 0:
    print(“positive”)
elif x < 0:
    print(“negative”)
else:
    print(“zero”)
```

**JavaScript:**

```javascript
if (x > 0) {
    console.log(“positive”);
} else if (x < 0) {
    console.log(“negative”);
} else {
    console.log(“zero”);
}
```
Other Syntax

- Mod: %
- And: &&
- Or: ||
- Comment: //
- Always double check:
  - curly braces {}
  - indent based on {}
  - parenthesis ( )
Review

After this video, you should know how to:

- Build a basic HTML page that incorporates a graphics canvas
- Identify open/close tag pairs in HTML & check proper nesting
- Define functions and variables in Javascript
- Write simple loops and conditions in Javascript
- Color individual pixels of the graphics canvas in arbitrary colors