CS55.11 JavaScript

Fall 2016 ~ Ethan Wilde

ewilde@santarosa.edu

SANTA ROSA
JUNIOR COLLEGE

Course Outline

1 Intro to Javascript, Part 1	10 Data Visualization with D3
2 Intro to Javascript, Part 2	11 Further Explorations with D3
3 *no class meeting*	12 Browser Games: Phaser
4 Exploring the jQuery Library	13 Further with Phaser
5 Exploring the jQuery UI Library	14 Extending Phaser with JSON
6 Exploring jQuery Plug-ins	15 Single Page Apps: Angular.js
7 Exploring Google Maps API	16 Server-side JS + Final Review
8 AJAX: Working with JSON	17 Final Exam
9 Midterm Review + Midterm	

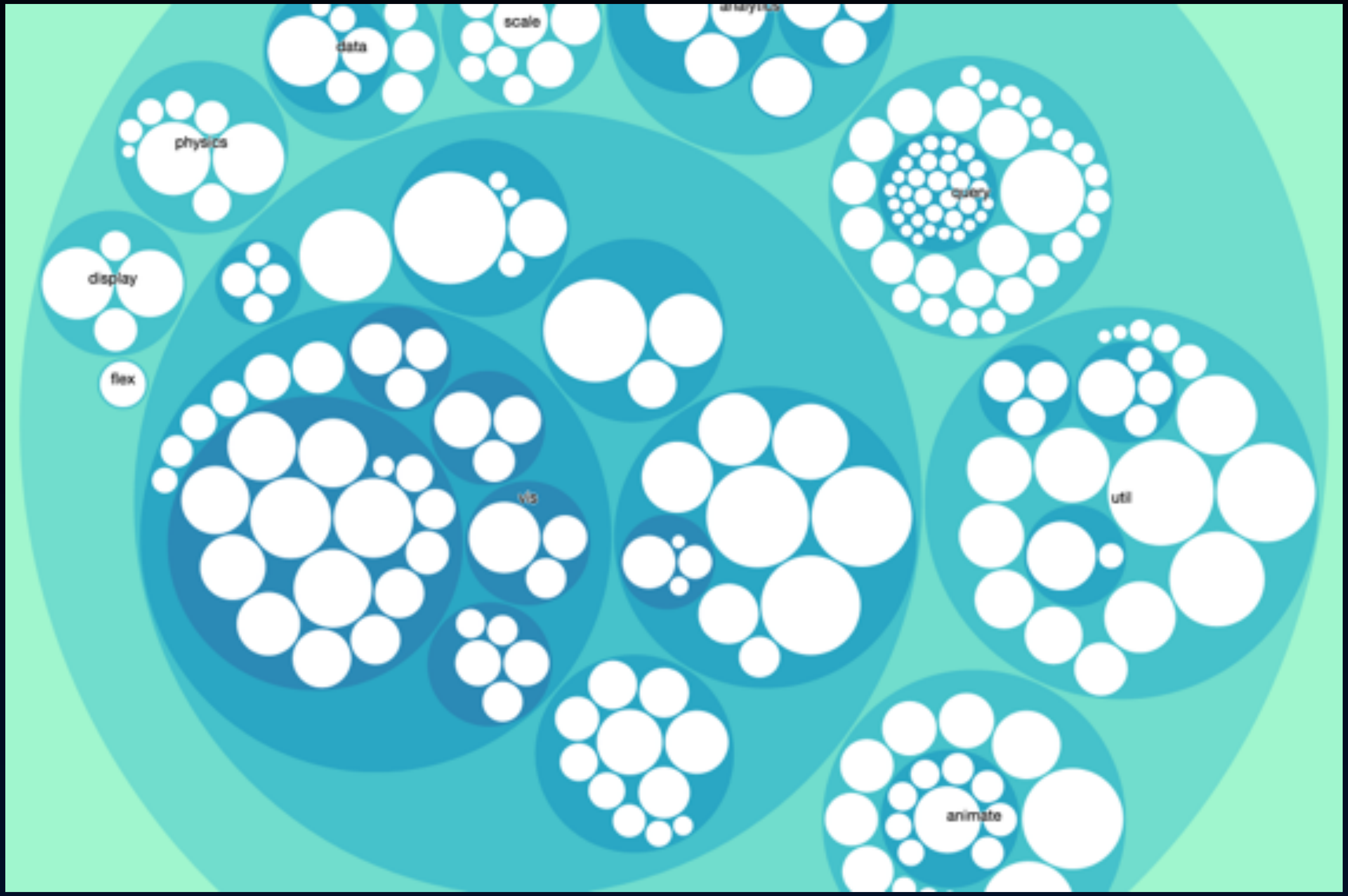
- Get all of the details in the complete syllabus on Canvas.

D3.js

Data Visualization Library

https://d3js.org/

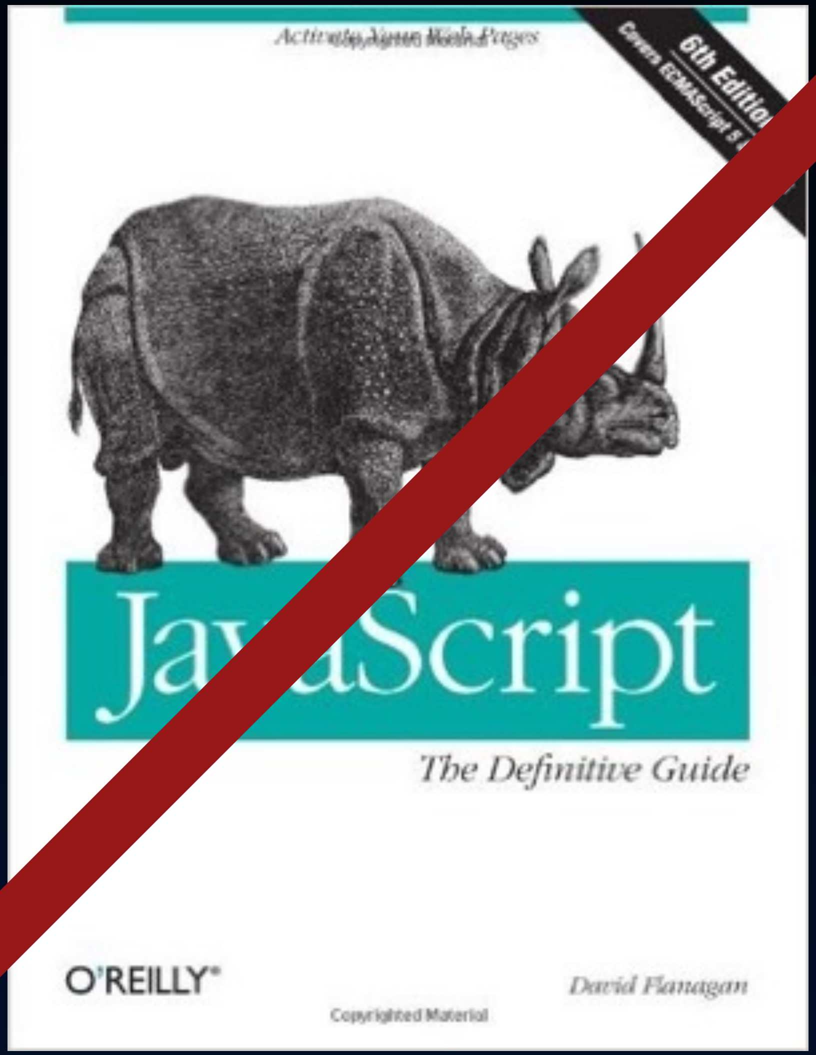
D3.js
Data Visualization Library



Created by Mike Bostock in 2011 – now in v4 release.

Many Examples: http://bl.ocks.org/mbostock/7607535

Reading This Week



Activate Your Web Pages

6th Edition

Covers ECMAScript 5

JavaScript

The Definitive Guide

O'REILLY®

David Flanagan

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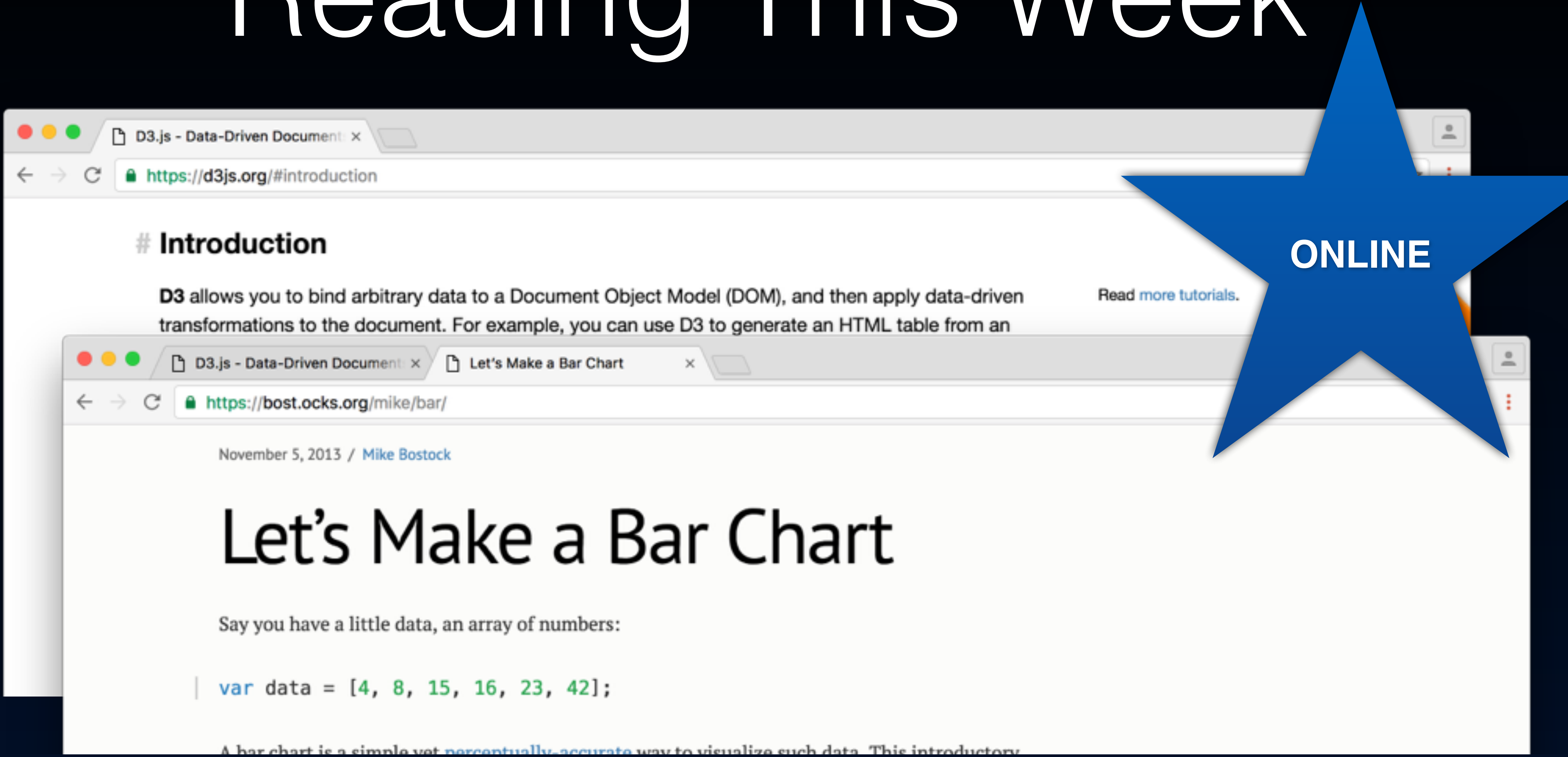
JavaScript: The Definitive Guide (6th)
David Flanagan
ISBN 0596805527

Reading This Week



D3.js - Data-Driven Document ×
https://d3js.org/#introduction
D3.js - Data-Driven Document ×
Let's Make a Bar Chart ×
https://bost.ocks.org/mike/bar/
ONLINE

Introduction

D3 allows you to bind arbitrary data to a Document Object Model (DOM), and then apply data-driven transformations to the document. For example, you can use D3 to generate an HTML table from an

Read more tutorials.

November 5, 2013 / Mike Bostock

Let's Make a Bar Chart

Say you have a little data, an array of numbers:

```
var data = [4, 8, 15, 16, 23, 42];
```

A bar chart is a simple yet perceptually-accurate way to visualize such data. This introductory

https://d3js.org/#introduction

https://github.com/d3/d3/wiki/Tutorials

Reading This Week

- **Reading for Week 10**
  D3 JavaScript Library

  - **D3 Project Site: Introduction to D3**
    - ***https://d3js.org/#introduction***
  - **D3 GitHub Repo: D3 Tutorials: Bar Chart I, II, III**
    - ***https://github.com/d3/d3/wiki/Tutorials***

Preparing for D3

1. **We have already seen data structured in external JavaScript Object Notation (JSON) files. *D3 supports JSON.***

2. **We already know much HTML5 and CSS. *D3 supports CSS-style selectors just like jQuery does.***

3. **Scalable Vector Graphics (SVG) might be a new technology for you today. *D3 supports vector-based graphics with SVG – directly inside your HTML page.***

Scalable Vector Graphics
SVG

1. The W3C originally proposed the SVG standard for encoding vector graphics in 2001.
2. SVG is an open standard supported by current web browsers, last updated in 2011.
3. HTML5 supports a native <svg> element tag.

```
<svg width="50" height="50">
    <circle cx="25" cy="25" r="22"
       fill="blue" stroke="gray" stroke-width="2">
</svg>
```

Code Example

"Scalable Vector Graphics"

A quick experiment with some basic SVG shapes

Getting Ready
to Use the D3 Library

1. **Download D3.**
2. **Create a folder structure for your project.**
3. **Reference the D3 library JavaScript file.**
4. **Create your JavaScript code to use the D3 library.**

Working with D3
Adding Elements

1. **Adding HTML elements to the DOM.**

```
d3.select("body").append("p").text("Hello!");
```

Working with D3

Chaining Methods

2. **D3 supports chaining methods with dot notation, much like jQuery.**

```
d3.select("body")
    .append("p")
    .text("Hello!");
```

← Select the body HTML element.

Most D3 methods return a reference to a selection.

Working with D3
Chaining Methods

2. **D3 supports chaining methods with dot notation, much like jQuery.**

```
d3.select("body")
    .append("p")
    .text("Hello!");
```

← Add a paragraph HTML element to the end of the selection.

Working with D3

Chaining Methods

2. **D3 supports chaining methods with dot notation, much like jQuery.**

```
d3.select("body")
    .append("p")
    .text("Hello!");
```

← Insert content into the paragraph element just created in method before.

Working with D3

Chaining Methods

2. D3 supports chaining methods with dot notation, much like jQuery.

```
var b = d3.select("body");
var p = b.append("p");
p.text("Hello!");
```

Chaining is not required

Working with D3
Binding Data

3. **Data visualization with D3 is the process of *mapping* data to visual elements in the page.**

```
var d = [ 5, 10, 15, 20, 25 ];
```

← Define dataset.

```
d3.select("body")
    .selectAll("p")
    .data(d)
    .enter()
    .append("p")
    .text("Hey");
```

Working with D3
Binding Data

3. **Data visualization with D3 is the process of *mapping* data to visual elements in the page.**

```
var d = [ 5, 10, 15, 20, 25 ];
d3.select("body")
    .selectAll("p")
    .data(d)
    .enter()
    .append("p")
    .text("Hey");
```

← Select the body element.

Working with D3
Binding Data

3. **Data visualization with D3 is the process of *mapping* data to visual elements in the page.**

```
var d = [ 5, 10, 15, 20, 25 ];
d3.select("body")
    .selectAll("p")
    .data(d)
    .enter()
    .append("p")
    .text("Hey");
```

← Select all paragraphs. None exist *yet*…

Working with D3

Binding Data

3. **Data visualization with D3 is the process of *mapping* data to visual elements in the page.**

```
var d = [ 5, 10, 15, 20, 25 ];
d3.select("body")
    .selectAll("p")
    .data(d)
    .enter()
    .append("p")
    .text("Hey");
```

← Bind the data in variable **d** to the empty selection above.

Working with D3
Binding Data

3. **Data visualization with D3 is the process of *mapping* data to visual elements in the page.**

```
var d = [ 5, 10, 15, 20, 25 ];
d3.select("body")
    .selectAll("p")
    .data(d)
    .enter()
    .append("p")
    .text("Hey");
```

The D3 **enter()** method creates new data-bound elements.

Working with D3
Binding Data

3. **Data visualization with D3 is the process of *mapping* data to visual elements in the page.**

```
var d = [ 5, 10, 15, 20, 25 ];
d3.select("body")
    .selectAll("p")
    .data(d)
    .enter()
    .append("p")
    .text("Hey");
```

Finally we add data-bound paragraphs.

Working with D3
Binding Data

3. **Data visualization with D3 is the process of *mapping* data to visual elements in the page.**

```
var d = [ 5, 10, 15, 20, 25 ];
d3.select("body")
    .selectAll("p")
    .data(d)
    .enter()
    .append("p")
    .text("Hey");
```

← Set each element’s content.

Working with D3

Using Bound Data Values

4. (One of) the most amazing abilities of D3 is the use of a function to set a method’s value.

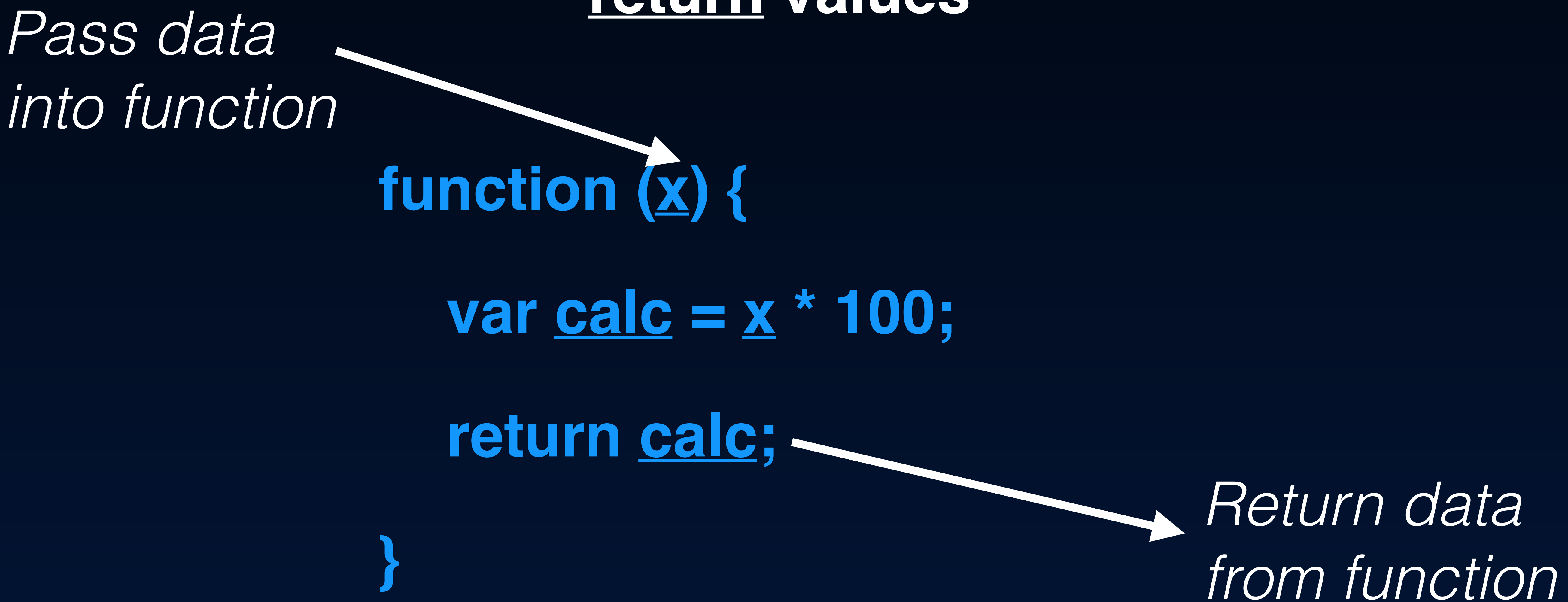
```
var d = [ 5, 10, 15, 20, 25 ];
d3.select("body")
    .selectAll("p")
    .data(d)
    .enter()
    .append("p")
    .text(
        function(d) { return d; }
    );
```

← Use a function to set value for **text()**

Working with D3

Using Bound Data Values

A JavaScript function can
<u>receive</u> values
and
<u>return</u> values



Pass data into function

```
function (x) {

    var calc = x * 100;

    return calc;

}
```

Return data from function

Working with D3

Working with CSS Styles

5. The *style()* method lets us assign CSS styling.

```
var d = [ 5, 10, 15, 20, 25 ];
d3.select("body")
    .selectAll("p")
    .data(d)
    .enter()
    .append("p")
    .text( function(d) { return d; } )
    .style("color", "red");
```

← **style()** sets CSS properties

Working with D3

Working with HTML Attributes

6. The *attr()* method lets us assign HTML attributes.

```
var d = [ 5, 10, 15, 20, 25 ];
d3.select("body")
    .selectAll("p")
    .data(d)
    .enter()
    .append("p")
    .text( function(d) { return d; } )
    .style("color", "red")
    .attr("class", "bar");
```

← **attr()** sets
HTML attributes

Working with D3

Basic D3 Methods

1. **select()** and **selectAll()**
2. **append()**
3. **text()**
4. **data()**
5. **enter()**
6. **style()**
7. **attr()**

Code Examples

“Simple D3 Example”

A tour through an example creating a bar chart with the D3 library.

BREAK

- 10 minute break
- **Please return by 7:00pm sharp**

Working with D3

D3 and SVG

7. D3 can generate Scalable Vector Graphic (SVG) elements

```
var s1 = d3.select("body")
    .append("svg")
    .attr("width", 500)
    .attr("height", 50);
```

Working with D3

D3 and SVG

7. D3 can generate Scalable Vector Graphic (SVG) elements

```
var s1 = d3.select("body")
    .append("svg")
    .attr("width", 500)
    .attr("height", 50);

var circles = s1.selectAll("circle")
    .data(d)
    .enter()
    .append("circle");
```

Code Examples

“SVG-Based D3 Example”

A tour through an example creating a bar chart that uses SVG elements.

What to Do Next

- **Reading**
  - For Week 10:
    D3 JavaScript Library
    - **D3 Project Site: Introduction to D3**
      https://d3js.org/#introduction
    - **D3 GitHub Repo: D3 Tutorials:**
      Bar Chart I, II, III
      https://github.com/d3/d3/wiki/Tutorials
- **Homework**
  - For Weeks 10 and 11:
    Assignment 8: Data Visualization with JavaScript and the D3 Library
    » a progressive two-week project
    » create an interactive data visualization such as a graph or chart
    » create HTML, CSS and JavaScript code – using D3 – to:
      1. load visualization data in an external JSON file
      2. render a D3-driven chart or graph that responds to events (clicks)
  - Homework due **uploaded** to Canvas by **11:59pm Wed 11/8**
  - ***canvas.santarosa.edu/courses/18079***

BREAK TO LAB

- 10 minute break
- **Please meet in lab at 8:00pm sharp**