CS193X: Web Programming Fundamentals

Spring 2017

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Today's schedule

- HTML and CSS
- Inline vs block
- Complex selectors
- Box model
- Homework 0 assigned and due this Friday 4/7

Check out the course website for all this and more:

https://cs193x.stanford.edu

HWO Reminders

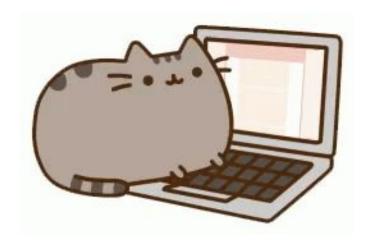
- Please don't make your repository public
 - If you do, I will just make it private again
- Don't forget to submit your homework via the <u>Google</u>
 <u>Form</u> linked at the bottom of the HW0 spec
- You can update your HW0 GitHub repository/published page without submitting the Google Form again ☺ ☐ (but multiple submissions are OK)

Waitlist??

- If you have an access code and have not enrolled:
 Please do so ASAP
- If you do not have an access code yet:
 Please email me!

Suggestion: Bring your laptop!

- Bring your laptop to lecture so you can follow along with the lecture slides and check out the live examples
- I will be using CodePen in lecture, which lets you livestream the code I write, which might be hard to see on the projector screen



(But, y'know, don't look ahead for the answers to lecture questions and then pretend like you knew them all along.)

HTML and CSS

HTML and CSS strategy

Assumption: Most people have cursory familiarity with HTML and CSS. Therefore we will:

- **Speed through** the obvious stuff
- **Skip** self-explanatory syntax
- **Skip** the parts you can look up easily through Google



Quick review

Recall: HTML

HTML (Hypertext Markup Language)

- Describes the content and structure of a web page; not a programming language.
- Made up of building blocks called elements.

```
HTML is <em>awesome!!!</em>
  <img src="puppy.png" />
```

Some HTML elements

Top-level heading: h1, h2, ... h6

```
<h1>Moby Dick</h1><h2>Or, the Whale</h2>
```

Moby Dick

Or, the Whale

Paragraph: p

Call me Ishmael.

Call me Ishmael.

Line break: br

since feeling is first

who pays any attention

to the syntax of things

since feeling is first who pays any attention to the syntax of things

Some HTML elements

Image: img

```
<img src="pusheen.gif" />
```

Link: a (note: not link)

click here!

click here!

Strong (bold): **strong** (note: don't use **b**)

Be BOLD

Be BOLD

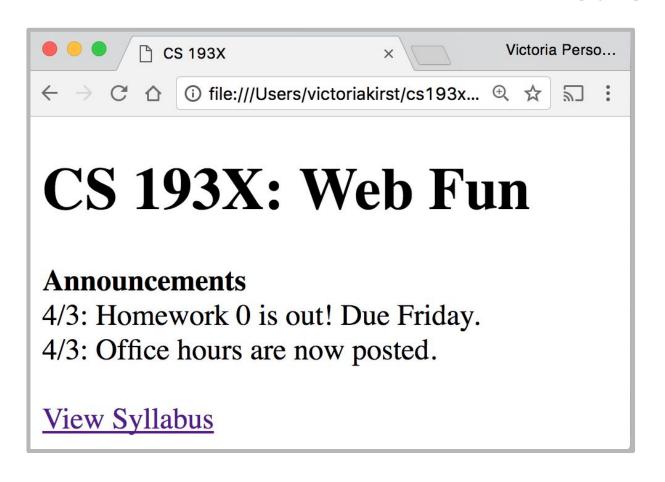
Emphasis (italic): em (note: don't use i)

He's my brother and all

He's my brother and all

Recall: Course web page

We wrote <u>some HTML</u> to make the following page:



That was weird

We saw that HTML whitespace collapses into one space...

```
<h1>CS 193X: Web Fun</h1>
<strong>Announcements</strong><br/>
4/3: Homework 0 is out!<br/>
br/>
```

 Except weirdly the <h1> heading was on a line of its own, and was not.

```
Hmmm... strange...
Oh well, it works! Let's move on!!!
```

CSS

Recall: CSS

CSS: Cascading Style Sheets

- Describes the appearance and layout of a web page
- Composed of CSS rules, which define sets of styles

```
selector {
  property: value;
}
```

Some CSS properties

Font face: **font-family**

```
h1 {
   font-family: Helvetica;
}

Moby Dick
```

Font color: color

```
h1 {
  color: green;
}

Moby Dick
```

Note that color always refers to **font** color, and there's no way to make it mean anything other than font color.

Background color: background-color

```
body {
  background-color: pink;
}

Moby Dick
```

Assign a background-color to body to make the page a different color.

Some CSS properties

Border: border (border shorthand syntax)

```
img {
  border: 3px solid red;
}
```

Text alignment: text-align (note: don't use <center>)

```
P {
    text-align: center;
}
Welcome to CS193X: Web Programming
Fundamentals! In this class, you will learn
modern full-stack web development
techniques.
```

CSS colors

140 predefined names (<u>list</u>)

color: black;

Hex values

color: #00ff00;

color: #0f0;

color: #00ff0080;

 The "a" in rgba stands for alpha channel and is a transparency value

- Prefer more descriptive:
 - 1. Predefined name
 - 2. rgb/rgba
 - 3. Hex

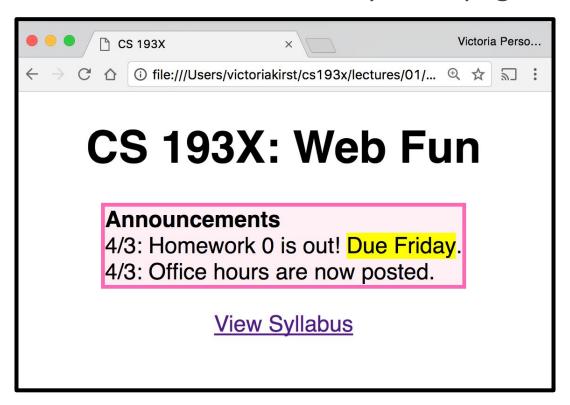
```
rgb() and rgba()
```

```
color: rgb(34, 12, 64);
```

color: rgba(0, 0, 0, 0.5);

Exercise: Course web page

Let's write some CSS to style our page:



Exercise: Course web page

Let's write some CSS to style our page:

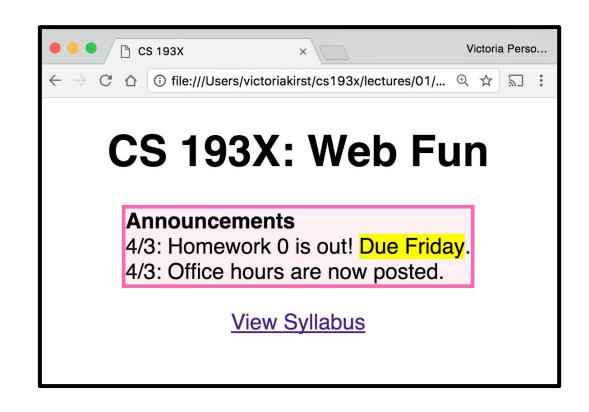
Font face: Helvetica

Border: hotpink 3px Background color: lavenderblush Highlight: yellow

- Box is **centered**
- Header and link are

centered

Box contents are left-aligned





Solution?!

```
body {
  font-family: Helvetica;
h1 {
  text-align: center;
a
  text-align: center;
  border: 3px solid hotpink;
  background-color: lavenderblush;
```

Produces:

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CSS exercise debrief

Some key techniques:

- Add invisible containers in HTML to select groups of elements in CSS.
- Apply styles to parent / ancestor element to style parent and all its children. (Will talk more about this later.)

But we encountered more weirdness...

- Couldn't set text-align: center; to the <a> or tags directly, but could center and <h1>
- Had to set a width on the box to make it hug the text ... any other way to do this?
- How to center the box?! How do you highlight?!

CSS exercise debrief

But we encountered **more weirdness**...

- text-align: center; didn't work on the <a> tag
- The box was reaaaaaally wide!
- How to center the box?!
- How do you highlight?!

How do we get from this...

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... to this?

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Q: Why is HTML/CSS so bizarre??

A: There is one crucial set of rules we haven't learned yet...

block vs inline display

What is HTML?

HTML (Hypertext Markup Language)

- Describes the content and structure of a web page
- Made up of building blocks called elements.

```
HTML is <em>awesome!!!</em>
  <img src="puppy.png" />
```

And there are 3 basic types.

Types of HTML elements

Each HTML element is categorized by the HTML spec into one of three-ish categories:

- 3. metadata: information about the page, usually not visible <title>, <meta>

Block elements

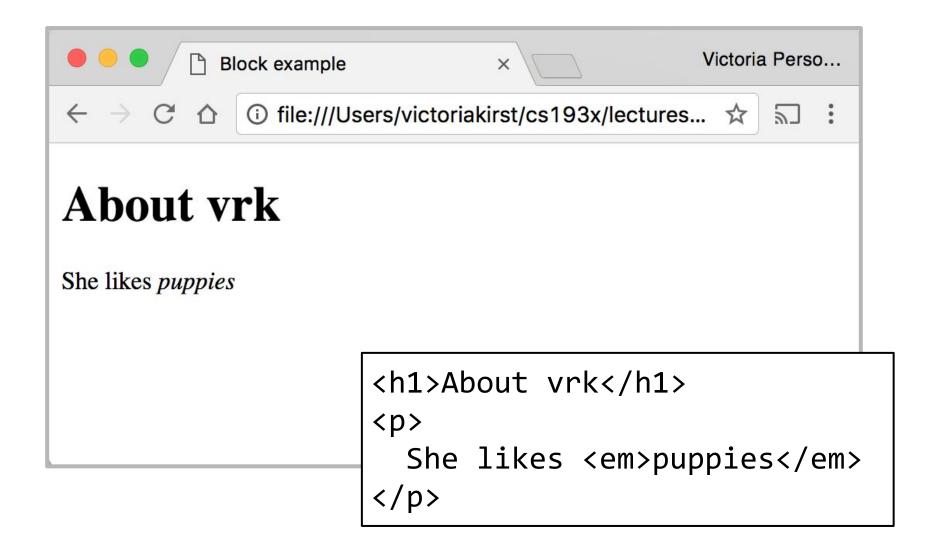
Examples:

, <h1>, <blockquote>, , ,

- Take up the full width of the page (flows top to bottom)
- Have a height and width
- Can have block or inline elements as children

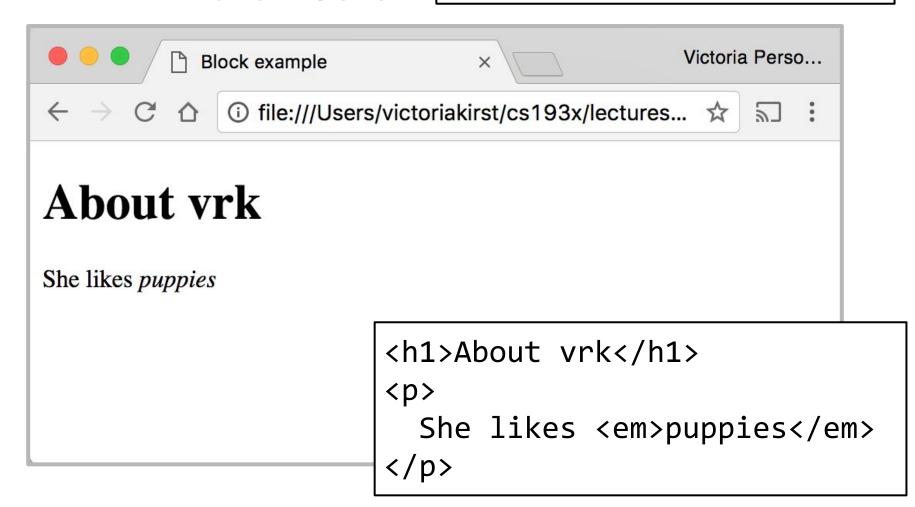


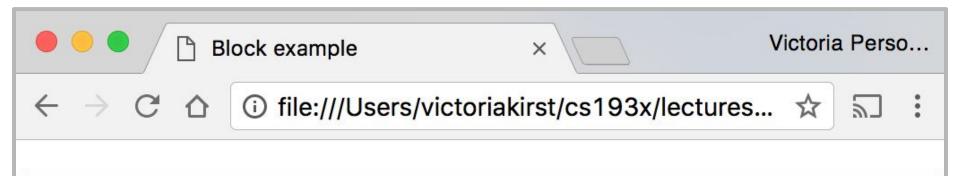
Example: Block



Q: What does this look like in the browser?

```
h1 {
  border: 5px solid red;
}
```





About vrk

She likes puppies

Block-level:

extends the full width of the page

```
<h1>About vrk</h1>

    She likes <em>puppies</em>
```

<h1> is block-level, so it extends the full width of the page by default

Note how block-level elements (**h1**, **p**) flow top to bottom

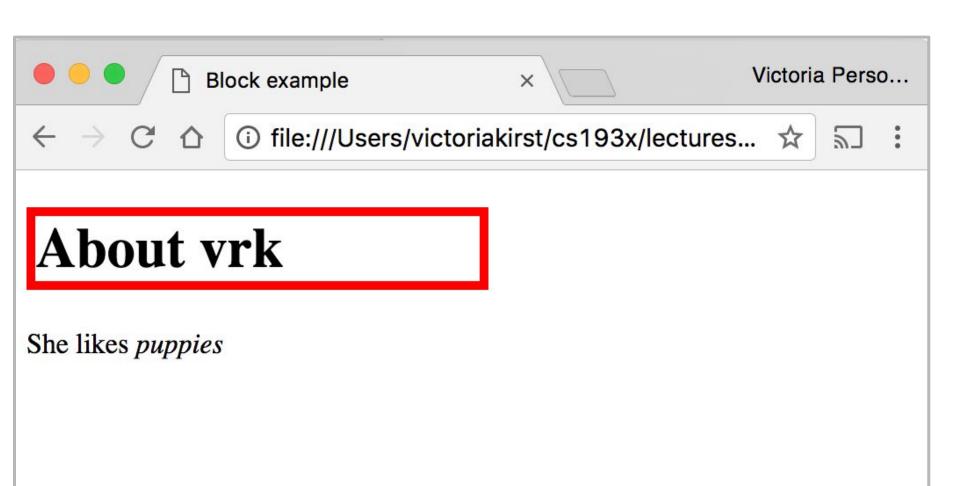
See: JSBin



Q: What does this look like in the browser?

```
h1 {
  border: 5px solid red;
  width: 50%;
}
```





(Codepen)

Block-level

width can be modified

```
h1 {
  border: 5px solid red;
  width: 50%;
}
```

```
<h1>About vrk</h1>

    She likes <em>puppies</em>
```

<h1> is block-level, so its width can be modified

Block-level elements still flow top to bottom

See: JSBin



Inline elements

Examples:

<a>, , ,

- Take up only as much width as needed (flows left to right)
- Cannot have height and width
- Cannot have a block element child
- Cannot be positioned (i.e. CSS properties like float and position do not apply to inline elements)
 - Must position its containing block element instead

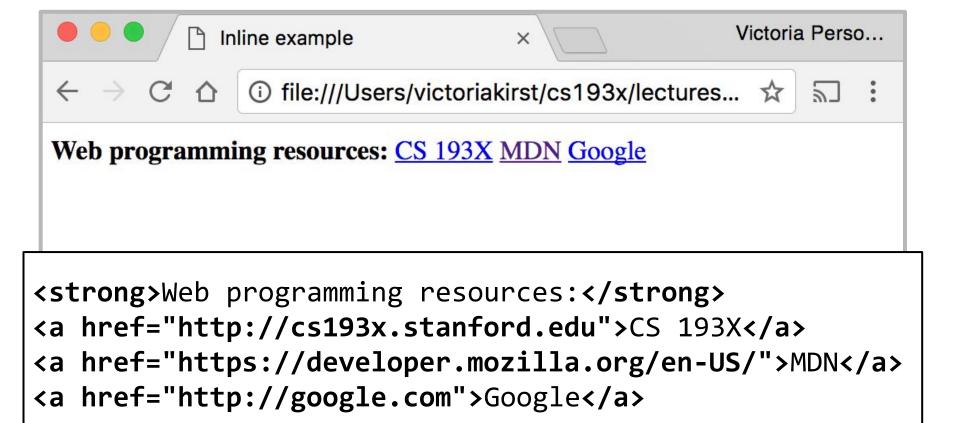


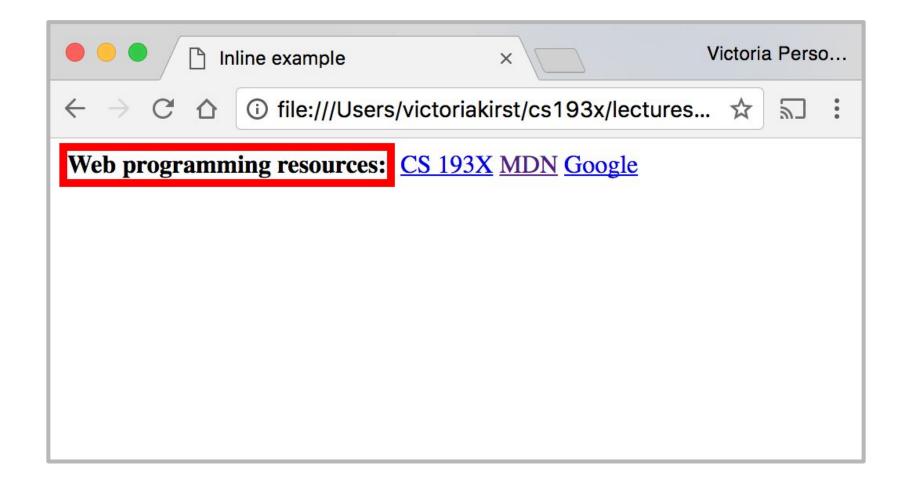
Example: Inline

```
<strong>Web programming resources:</strong>
<a href="http://cs193x.stanford.edu">CS 193X</a>
<a href="https://developer.mozilla.org/en-US/">MDN</a>
<a href="http://google.com">Google</a>
```

Q: What does this look like in the browser?

```
strong {
  border: 5px solid red;
  width: 1000px;
}
```



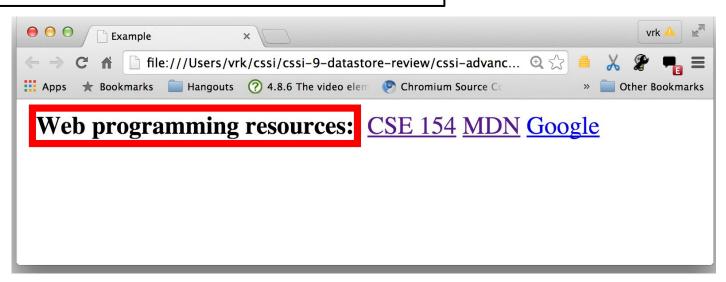


Inline elements ignore width

width cannot be modified

```
strong {
  border: 5px solid red;
  width: 1000px;
  /* Will not work; strong is
    inline! */
}
```

```
<strong>Web programming reso
<a href="http://cs193x.stanf
<a href="https://developer.m
<a href="http://google.com">
```

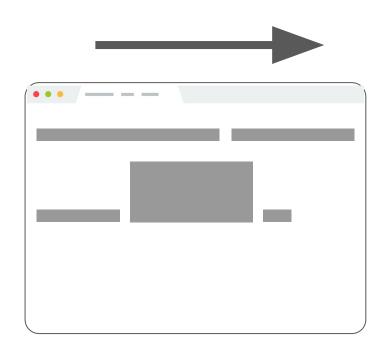


Cannot set width on inline element, so it is ignored (Codepen)

inline-block

Examples: , any element with
display: inline-block;

- Width is the size of the content, i.e. it takes only as much space as needed (flows left to right)
- Can have height and width
- Can have a block element as a child
- Can be positioned (i.e. CSS properties like float and position apply)



Example: Inline-block

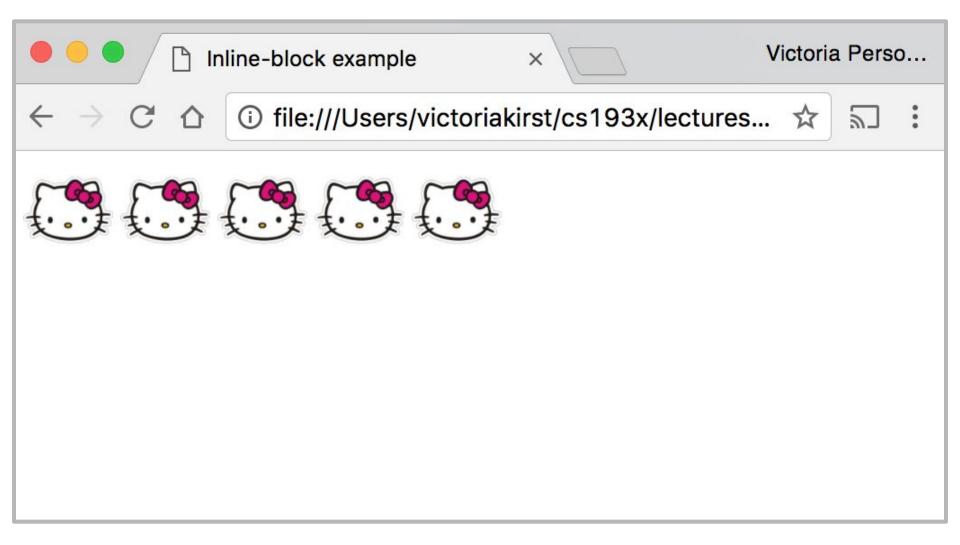
```
img {
  width: 50px;
}
```

Q: What does this look like in the browser?

```
<img src="http://i.imgur.com/WJToVGv.jpg" />
```

http://i.imgur.com/WJToVGv.jpg =





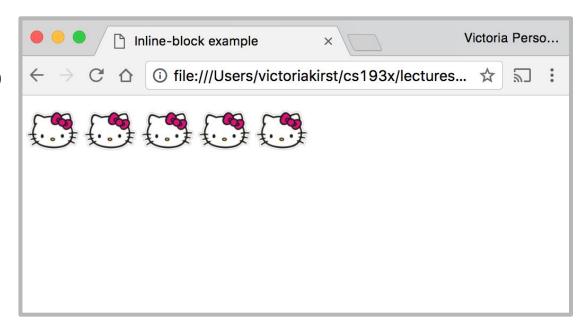
(Codepen)

Inline-block

Has width and height; flows left to right

Can set width on inline-block element, so image width is set to 50px. (Codepen)

inline-block flows left to right, so images are right next to each other.



```
img {
  width: 50px;
}
```

```
<img src="http://i.imgur.com/WJToVGv.jpg" />
```

The display CSS property

You can change an element's default rendering type by changing the **display** property. Examples:

```
p {
  display: inline;
}
```

```
a {
  display: block;
}
```

Possible values for display:

- block
- inline
- inline-block
- some others: link

Review

- - a. inline block: flows left-to-right; has height and width

Questions?

Moral of the story:

If your CSS isn't working, see if you're trying to apply block-level properties to inline elements

h1 vs strong mystery

Recall: Weirdly the <h1> heading was on a line of its own, and was not. -- Why?

<h1>CS 193X: Web Fun</h1>
Announcements
4/3: Homework 0 is out!

CS 193X: Web Fun

Announcements 4/3: Homework 0 is out!

<h1>CS 193X: Web Fun</h1>
Announcements</strong</pre>

4/3: Homework 0 is out!

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Announcements 4/3: Homework 0 is out!

h1 vs strong demystified!

Recall: Weirdly the <h1> heading was on a line of its own, and was not. -- Why?

<h1>CS 193X: Web Fun</h1>
Announcements
4/3: Homework 0 is out!

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Announcements 4/3: Homework 0 is out!

<h1>CS 193X: Web Fun</h1>
Announcements</strong</br>

4/3: Homework 0 is out!

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Announcements 4/3: Homework 0 is out!

Because h1 is a block-level element, and strong is an inline-level element

text-align mystery

Recall: We couldn't set text-align: center; on the <a> tag directly, but we could center <h1>. Why?

```
h1 { /* works! */
  text-align: center;
}

a { /* fails :( */
  text-align: center;
}
```

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Let's try looking at the MDN description of text-align...

text-align mystery

Summary

The **text-align** CSS property describes how inline content like text is aligned in its parent block element. text-align does not control the alignment of block elements, only their inline content.

Initial value start, or a nameless value that acts as left if

direction is ltr, right if direction is rtl if

start is not supported by the browser.

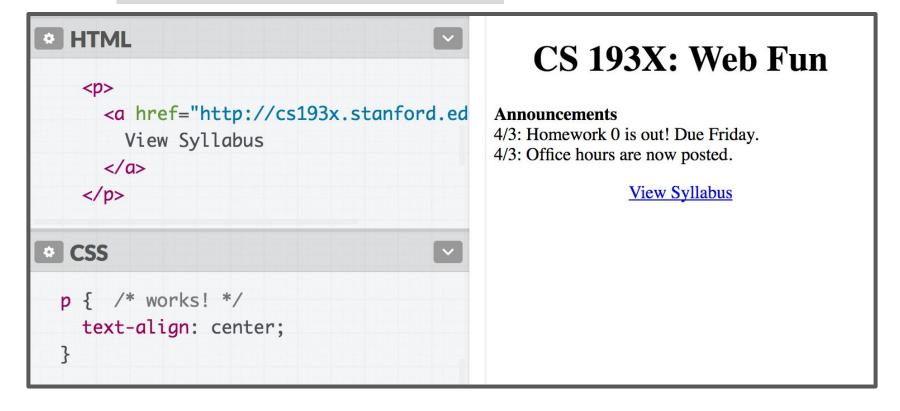
Applies to

block containers



text-align demystified!

From the spec, can't apply text-align to an inline
element; must apply text-align to its block container, or
set a { display : block; }



Box size mystery

Recall: The pink box we put around the announcements extended the entirety of the page.

```
p {
  border: 3px solid hotpink;
  background-color: lavenderblush;
}
```

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Why?

How do we fix this?

Box size mystery

Recall: The pink box we put around the announcements extended the entirety of the page.

```
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border: 3px solid hotpink;
background-color: lavenderblush;

Announcements
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```

Why? Because p is block-level, so width == width of the page How do we fix this?

Box size mystery: demystified!

Recall: The pink box we put around the announcements extended the entirety of the page.

```
p {
  border: 3px solid hotpink;
  background-color: lavenderblush;
  display: inline-block;
}
```

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Why? Because p is block-level, so width == width of the page

How do we fix this? Change display to inline-block (though now the space above the box has increased... will address later!)

Box size mystery: demystified!

Recall: The pink box we put around the announcements extended the entirety of the page.

```
p {
  border: 3px solid hotpink;
  background-color: lavenderblush;
  display: inline-block;
}
```

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Why? Because p is block-level, so width == width of the page

How do we fix this? Change display to inline-block (though now the space above the box has increased... will address later!)

Centering the box

We can also center the box by centering the body tag, since p is now inline-block.

```
body {
  text-align: center;
}

p {
  border: 3px solid hotpink;
  background-color: lavenderblush;
  display: inline-block;
}
```

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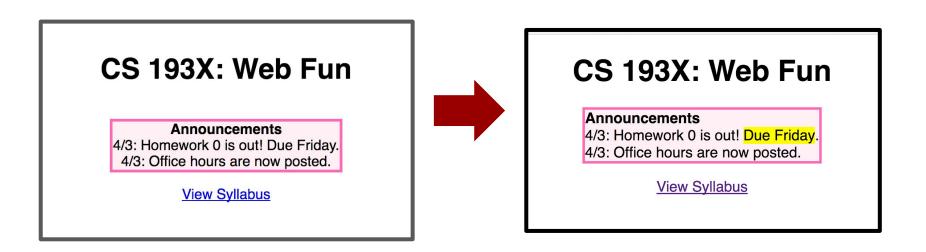
Announcements

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Highlight mystery

Recall: We didn't know how to select a random snippet of text to change its background.



How do we fix this?

Highlight: demystified!

We can select a random segment of text by wrapping it in an inline element:



Hmmm... but wouldn't it be better to have a "highlight" element?

Highlight: demystified!

We can select a random segment of text by wrapping it in an inline element:



Hmmm... but wouldn't it be better to have a "highlight" element?

Have you heard of <div> and ?

What are they?

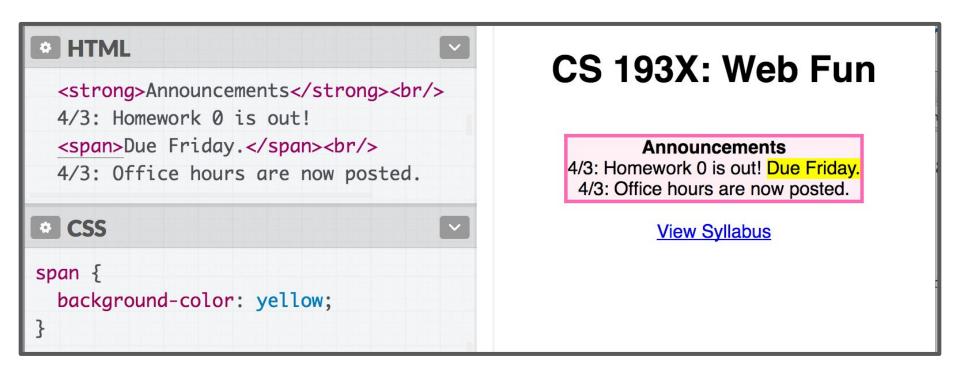
<div> and

Two generic tags with no intended purpose or style:

- <div>: a generic **block** element
- : a generic inline element

 in action

We can use as a generic inline HTML container:



Multiple generic containers?

But won't we often want multiple generic containers?

How do we distinguish two generic containers?

In other words, how do we select a subset of elements instead of **all** elements on the page?

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CSS Selectors: Classes and Ids

Classes and ids

There are 3 basic types of CSS selectors:

Element selector (this is the one we've been using)	р	All > elements
 \$ ID selector \$	#abc	element with id="abc"
	.abc	elements with class="abc"

```
<h1 id="title">Homework</h1>
<em class="hw">HW0</em> is due Friday.<br/><em class="hw">HW1</em> goes out Monday.<br/><em>All homework due at 11:59pm.</em>
```

Classes and ids

```
<h1 id="title">Homework</h1>
<em class="hw">HW0</em> is due Friday.<br/><em class="hw">HW1</em> goes out Monday.<br/><em>All homework due at 11:59pm.</em>
```

```
.hw {
  color: hotpink;
}

#title {
  color: purple;
}
```

Homework

HW0 is due Friday.
HW1 goes out Monday.
All homework due at 11:59pm.

More on class and id

- **class** and **id** are special HTML attributes that can be used on any HTML element
 - class: Used on 1 or more elements; identifies a collection of elements
 - id: Used on exactly 1 element per page; identifies
 one unique element
- Can apply multiple classes by space separating them:
 HW1
- Often used with span and div to create generic elements: e.g. is like creating a "highlight" element

Other selectors

p.abc	elements with abc class
p#abc	element with abc id (p is redundant)
div strong	 elements that are descendants of a <div></div>
h2, div	<h2> elements and <div>s</div></h2>

2 Common bugs:

```
li.important vs li .important
li .important vs li, .important
```

Grouping selectors

p.abc	elements with abc class
p#abc	element with abc id (p is redundant)
div strong	 elements that are descendants of a <div></div>
h2, div	<h2> elements and <div>s</div></h2>

```
Can combine selectors:
```

```
#main li.important strong {
  color: red;
}

Q: What does this select?
```

Grouping selectors

```
#main li.important strong {
  color: red;
}
```

Read from right to left:

 tags that are children of tags that have an "important" class that are children of the element with the "main" id.

Colliding styles

When styles collide, the most specific rule wins (specificity)

Colliding styles

When styles collide, the most specific rule wins (specificity)

Colliding styles

Specificity precedence rules (details):

- ids are more specific than classes
- classes are more specific than element names
- elements are more specific than children of those elements

Colliding styles

- If elements have the same specificity, the later rule wins.

Aside: The process of figuring out what rule applies to a given element is called the <u>cascade</u>. This is where the "C" in *Cascading* Style Sheets comes from.

Inheritance

We saw earlier that CSS styles are inherited from parent to child.

Instead of selecting all elements individually:

```
a, h1, p, strong {
  font-family: Helvetica;
}
```

font-family: Helvetica;

You can style the parent and the children will inherit the styles.

h1, h2 {
e this ficity: font-family: Consolas;

body {

You can override this style via specificity:

Inheritance

While many CSS styles are inherited from parent to child, not all CSS properties are inherited.

```
a {
  display: block;
  font-family: Arial;
}
```

```
<em> inherits the
font-family property,
but not display:
```

```
<a href="/home">
   Back to <em>Home</em>
</a>
```

Back to Home

Inheritance

While many CSS styles are inherited from parent to child, not all CSS properties are inherited.

- There's no rule for what properties are inherited or not; the inheritance behavior defined in the CSS spec.
- You can look it up via MDN, e.g.

```
font-family:Inheritedyesdisplay:Inheritedno
```

- Generally text-related properties are inherited and layout-related properties are not.
- (You can also change this via the <u>inherit</u> CSS property, which is somewhat esoteric and not often use)

Before we move on: A few style notes

Why not <div> everywhere?

Technically, you can define your entire web page using <div> and the class attribute.

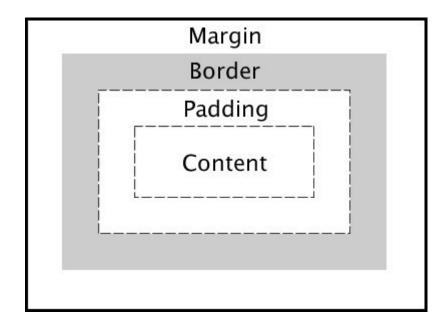
- Is this a good idea?
- Why does HTML have ids when you have classes?
- Why does HTML have , <h1>, , etc. when
 you have <div>, , class, and id?

CSS Box Model

The CSS Box Model

Every element is composed of 4 layers:

- the element's content
- the border around the element's content
- padding space between the content and border (inside)
- a margin clears the area around border (outside)



The CSS Box Model

Let's revisit our Course web page example:

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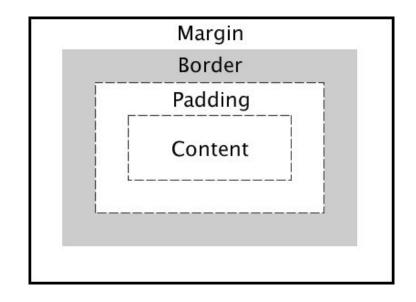
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The CSS Box Model

- width by default refers to content-width, which is almost never what you want
 - Use box-sizing: border-box; to calculate width based on the border size
- Margin collapsing is something to know about and consider
- When in doubt, use the browser's Page Inspector to see what's going on



Q: What does this look like in the browser?

```
div {
   display: inline-block;
   background-color: yellow;
}
```

```
<body>
     <div>
          Make the background color yellow!
          Surrounding these paragraphs
          </div>
          </body>
```

Make the background color yellow!

Surrounding these paragraphs

Q: Why is there a white space around the box?

We can use the browser's Page Inspector to help us figure it out!