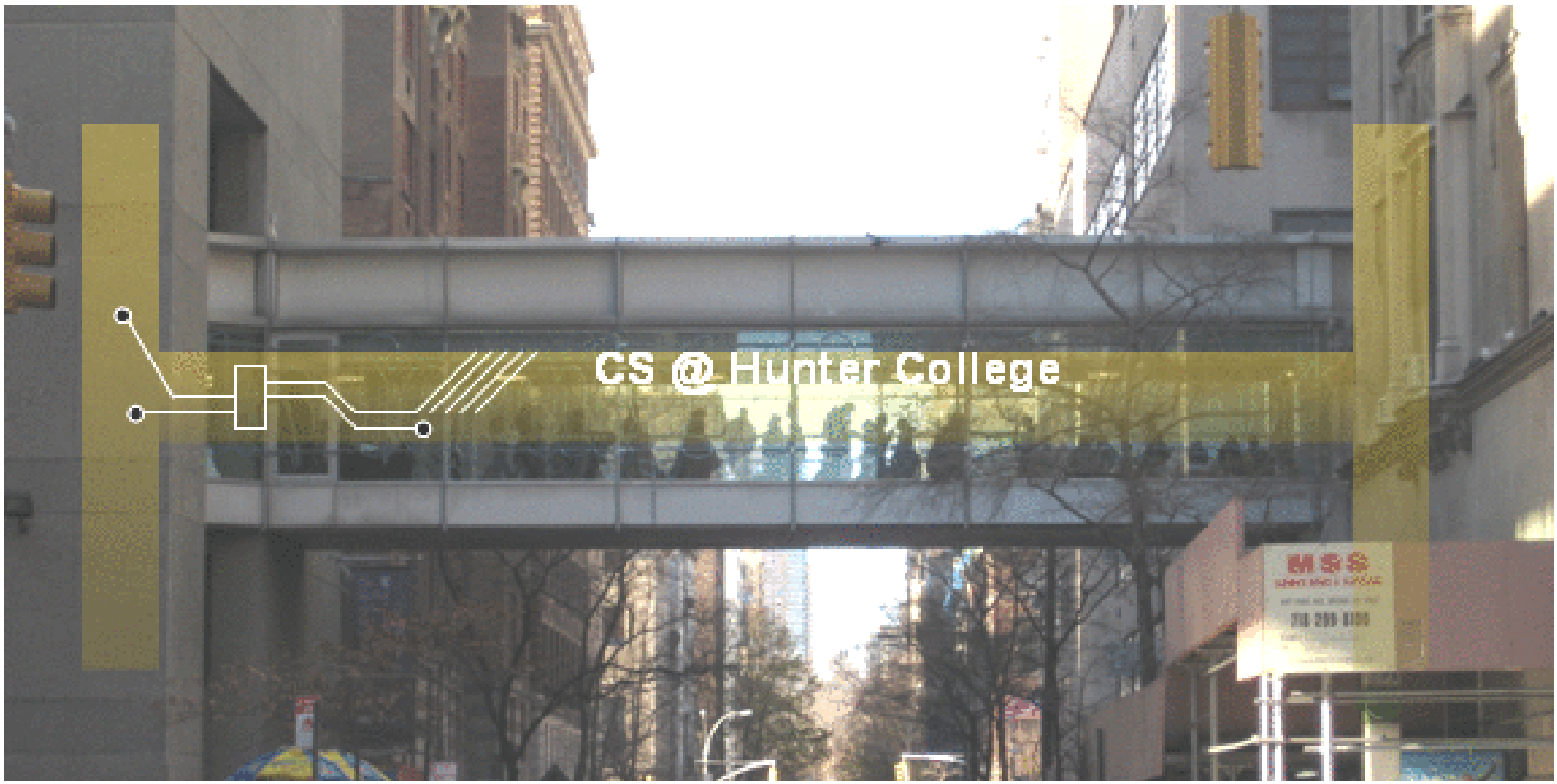
CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

Announcements

- Each lecture includes a survey of computing research and tech in NYC.

  Today: Keith Okrosy
  Career Development Services

Frequently Asked Questions

From lecture slips & recitation sections.

- Can you go through the OpenData challenge from last week?

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  - *More lecture slips & quizzes help: 10 lectures slips (5%) and 5 quizzes (10%) leave 50% for the final. Passing final with 60% would need 46 programs for credit. 80% on final, need 28 programs...*

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  - *More lecture slips & quizzes help: 10 lectures slips (5%) and 5 quizzes (10%) leave 50% for the final. Passing final with 60% would need 46 programs for credit. 80% on final, need 28 programs...*
  - *Always good to aim a bit higher!*

Today's Topics

- More on Functions
- Recap: Open Data
- Top Down Design
- Github
- CS Survey: Career Services

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- Top Down Design
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Input Parameters & Return Values

- Functions can have **input parameters**.

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def totalWithTax(food,tip):
    total = 0
    tax = 0.0875
    total = food + food * tax
    total = total + tip
    return(total)

lunch = float(input('Enter lunch total: '))
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lTotal = totalWithTax(lunch, lTip)
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- The "placeholders" in the function definition: **formal parameters**.

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- Functions can also **return values** to where it was called.

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Formal Parameters

Actual Parameters

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- Functions can also **return values** to where it was called.

In Pairs or Triples:

- What are the formal parameters? What is returned?

```
def enigma1(x,y,z):
    if x == len(y):
        return(z)
    elif x < len(y):
        return(y[0:x])
    else:
        s = cont1(z)
        return(s+y)
```

```
def cont1(st):
    r = ""
    for i in range(len(st)-1,-1,-1):
        r = r + st[i]
    return(r)
```

(a) `enigma1(7,"caramel","dulce de leche")`

Return: _____

(b) `enigma1(3,"cupcake","vanilla")`

Return: _____

(c) `enigma1(10,"pie","nomel")`

Return: _____

Python Tutor

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(Demo with `pythonTutor`)

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- The actual parameters do not change.

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- The time a variable exists is called its **scope**.

Input Parameters: What about Lists?

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#Fall 2013 Final Exam, 5

def kuwae( inLst ):
    tot = 1
    for item in inLst:
        tot = tot * item
    return tot

def foo( inLst ):
    if ( inLst[-1] > inLst[0] ):
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foo( [2, 4, 6, 8] )

foo( [4002, 328, 457, 1] )
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- Easier to see with a demo.

Python Tutor

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(Demo with pythonTutor)

In Pairs or Triples:

```
def bar(n):
    if n <= 8:
        return 1
    else:
        return 0

def foo(l):
    n = bar(l[-1])
    return l[n]
```

- What are the formal parameters for the functions?
- What is the output of:

```
r = foo([1,2,3,4])
print("Return:  ", r)
```

- What is the output of:

```
r = foo([1024,512,256,128])
print("Return:  ", r)
```

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def bar(n):
    if n <= 8:
        return 1
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def foo(l):
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(Demo with pythonTutor)

In Pairs or Triples:

Predict what the code will do:

```
#CSci 127 Teaching Staff
#Triangles two ways...
import turtle

def setUp(t, dist, col):
     t.penup()
     t.forward(dist)
     t.pendown()
     t.color(col)

def nestedTriangle(t, side):
     if side > 10:
          for i in range(3):
               t.forward(side)
               t.left(120)
          nestedTriangle(t, side/2)

def fractalTriangle(t, side):
     if side > 10:
          for i in range(3):
               t.forward(side)
               t.left(120)
               fractalTriangle(t, side/2)
```

```
def main():
     nessa = turtle.Turtle()
     setUp(nessa, 100, "violet")
     nestedTriangle(nessa, 160)

     frank = turtle.Turtle()
     setUp(frank, -100, "red")
     fractalTriangle(frank, 160)

if __name__ == "__main__":
     main()
```

IDLE

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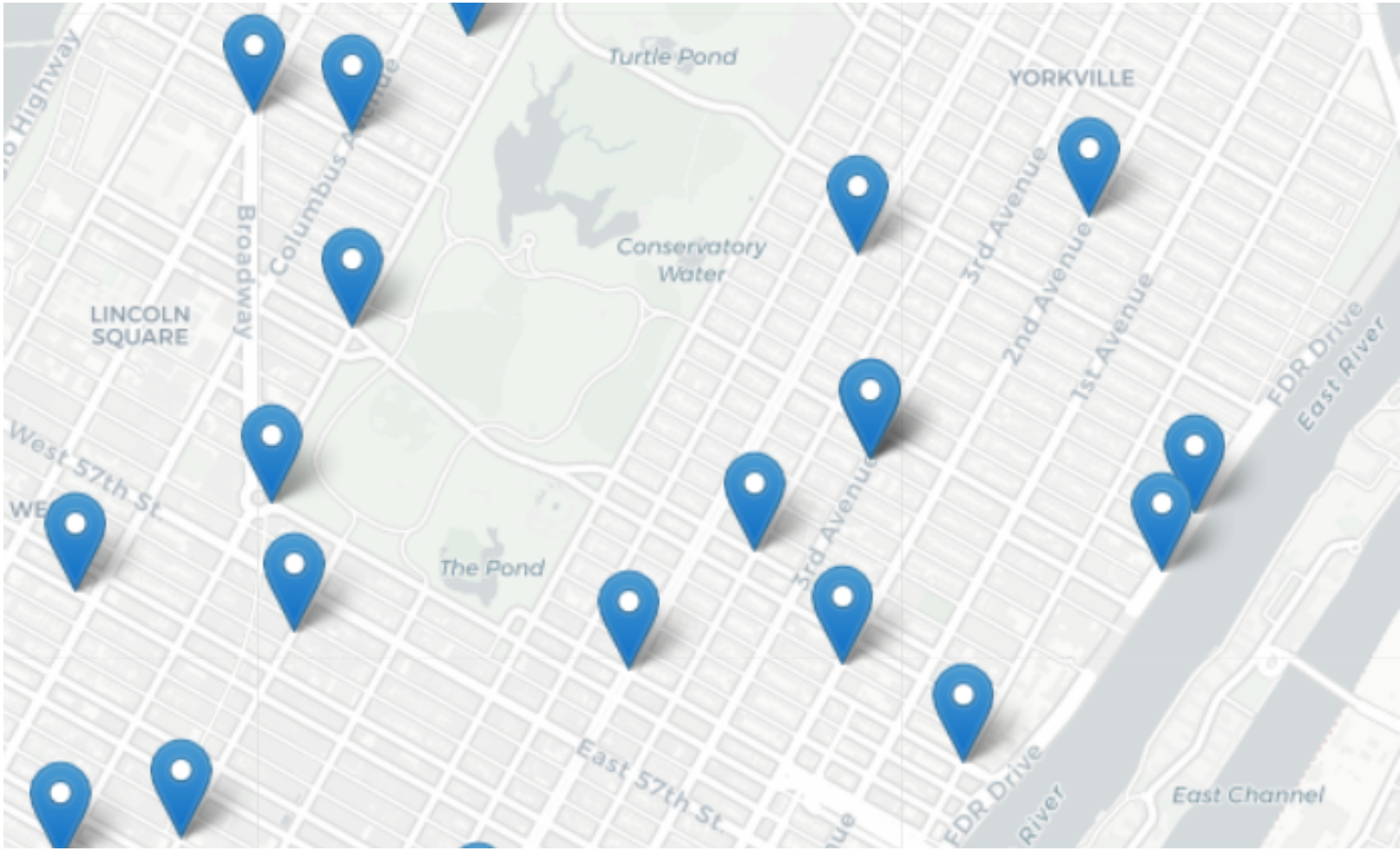
- **Recap: Open Data**
- Top Down Design
- Github
- CS Survey: Career Services

OpenData Design Question



Design an algorithm that finds the closest collision.

(Sample NYC OpenData collision data file on back of lecture slip.)

OpenData Design Question

Design an algorithm that uses NYC OpenData collision data and computes the closest collision to the location the user provides.

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- Example:

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- Example:
  1. Find data set (great place to look: NYC OpenData).
  2. Ask user for current location.
  3. Open up the CSV file.

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- Don't worry if you don't know how to do all the items you write down.
- Example:
  1. Find data set (great place to look: NYC OpenData).
  2. Ask user for current location.
  3. Open up the CSV file.
  4. Check distance to each to user's location.

OpenData Design Question

Design an algorithm that uses NYC OpenData collision data and computes the closest collision to the location the user provides.

How to approach this:

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- Let's use function names as placeholders for the ones we're unsure...

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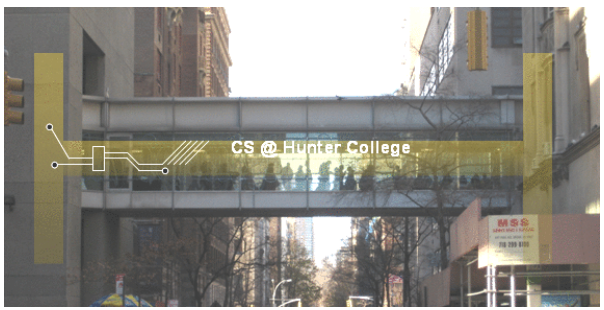
Today's Topics

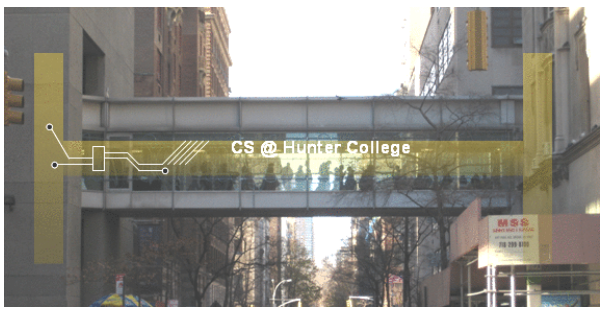
- More on Functions
- Recap: Open Data
- **Top Down Design**
- Github
- CS Survey: Career Services

Top-Down Design



- The last example demonstrates **top-down design**: breaking into subproblems, and implementing each part separately.

Top-Down Design



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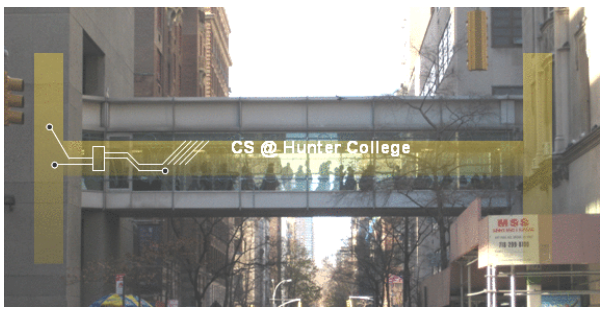

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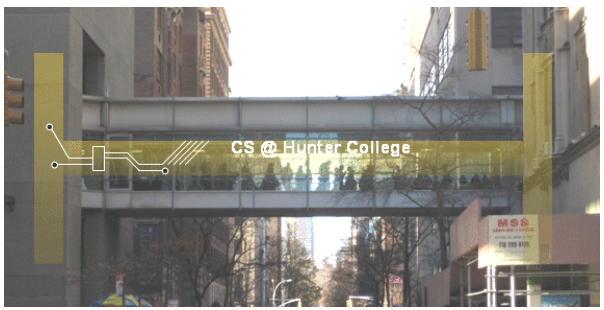

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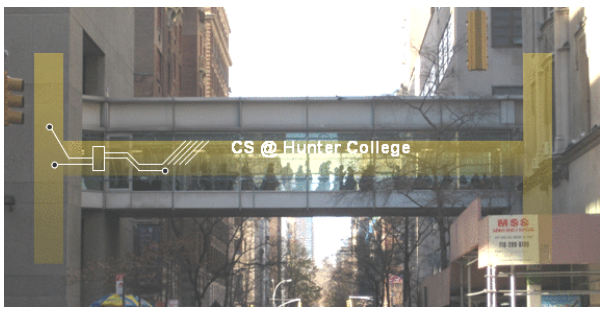

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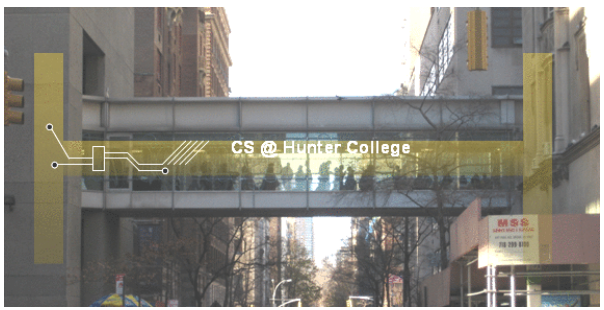

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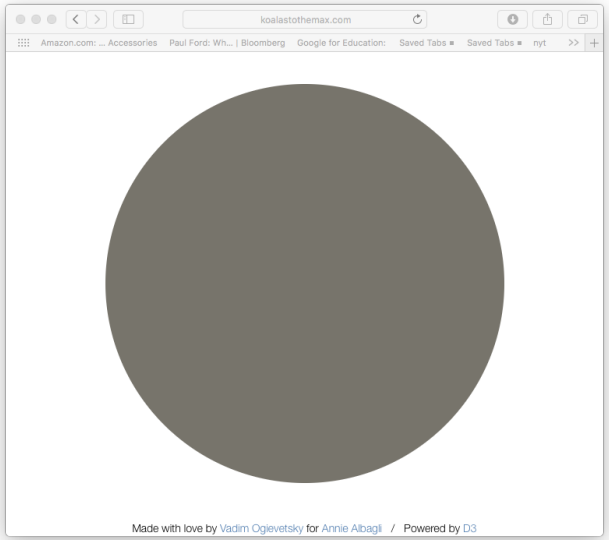
- Excellent approach since you can then test each part separately before adding it to a large program.
- Very common when working with a team: each has their own functions to implement and maintain.

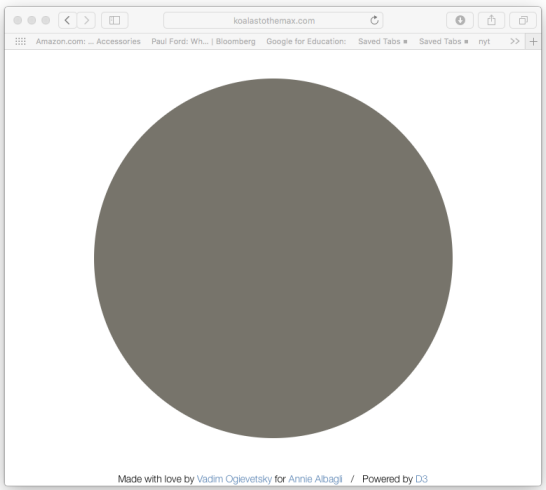
In Pairs or Triples:



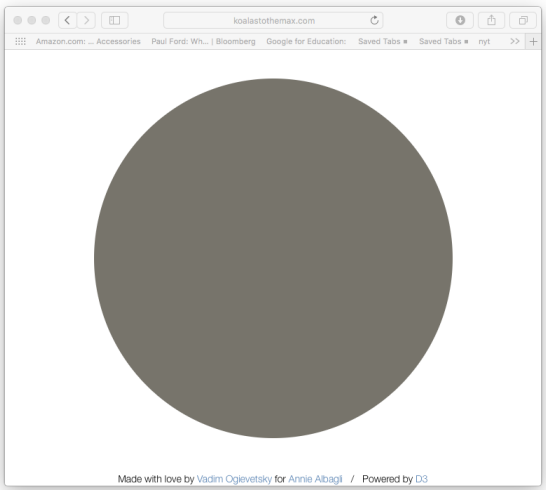
`http://koalastothemax.com`

- Top-down design puzzle:
  - What does `koalastomax` do?
  - What does each circle represent?
- Write a high-level design for it.
- Translate into code with function calls.

Demo


koalastothemax.com
Made with love by Vadim Ogievetsky for Annie Albagli / Powered by D3

Demo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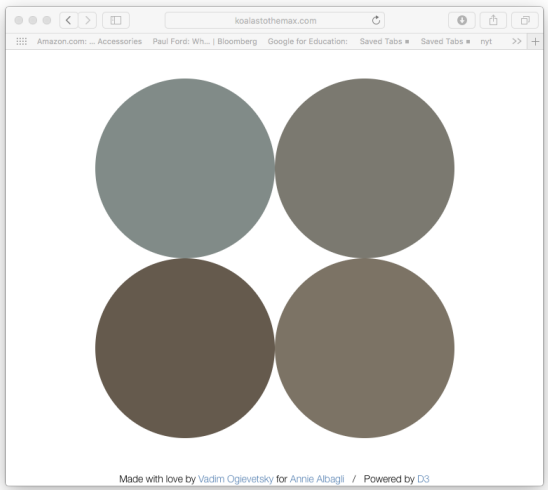
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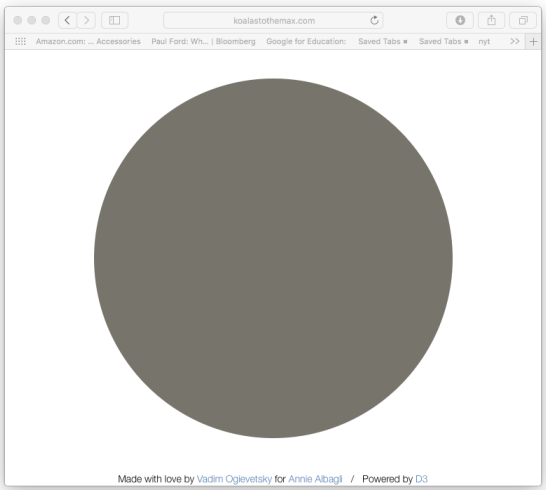
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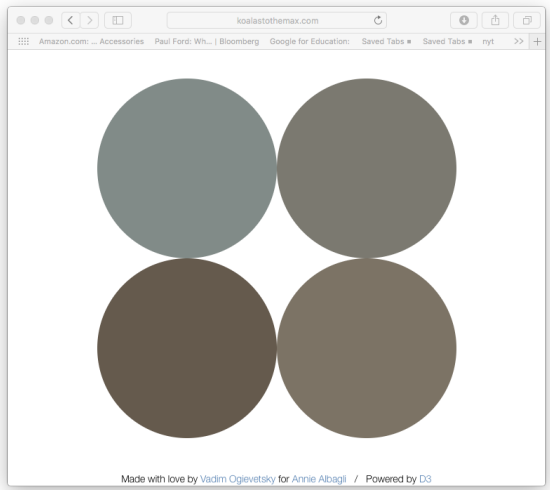
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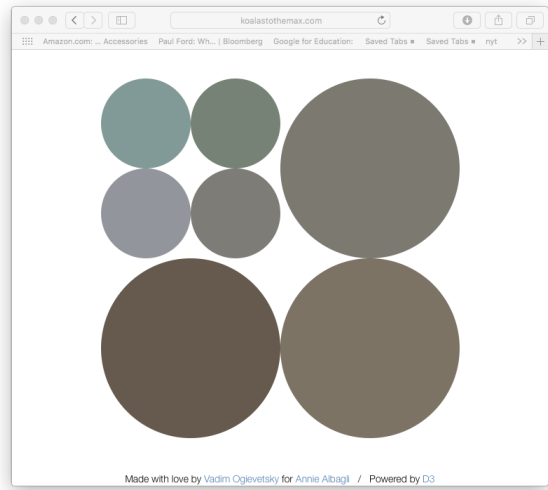
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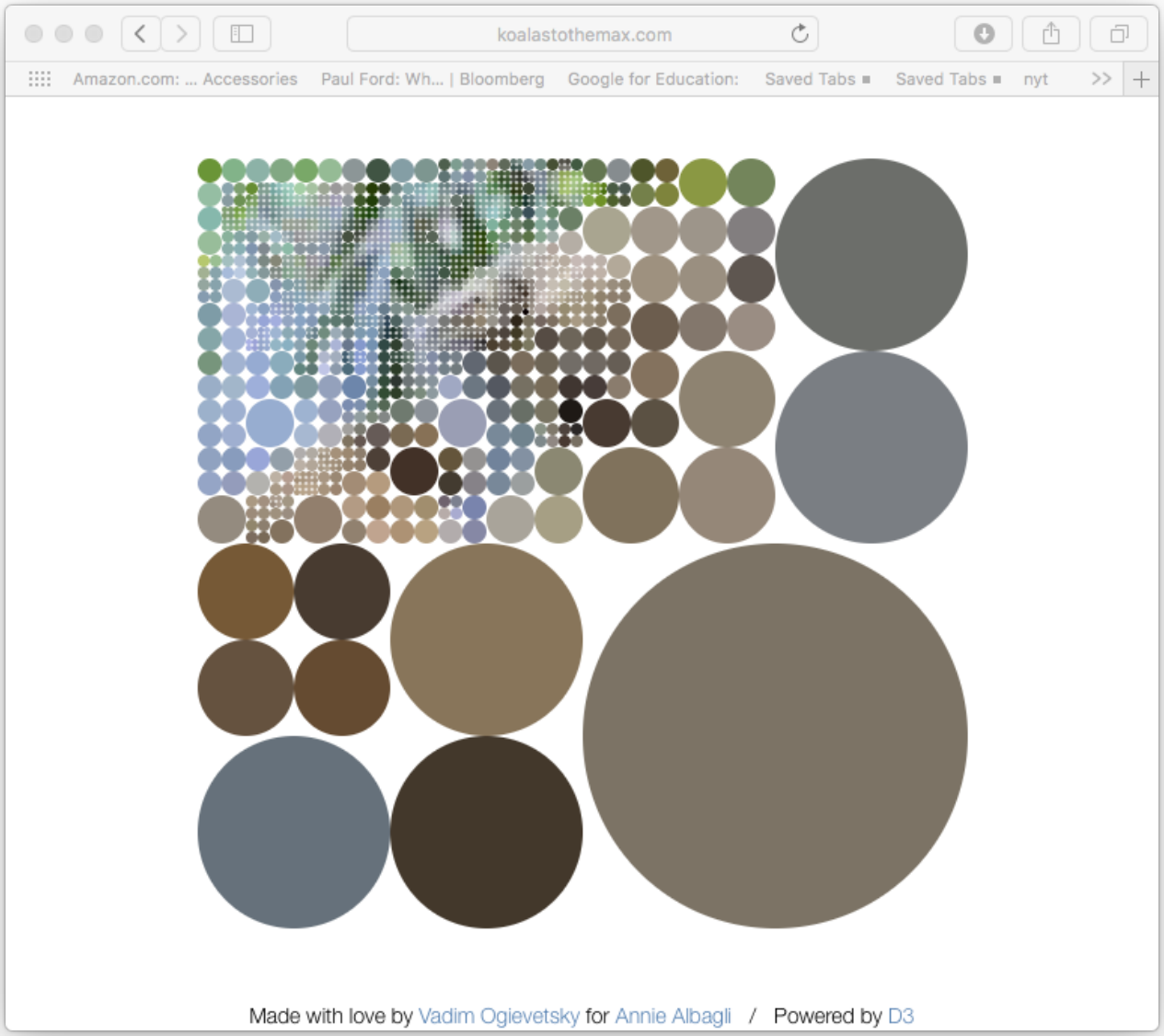
koalastothemax.com
Amazon.com: ... Accessories
Paul Ford: Wh... | Bloomberg
Google for Education:
Saved Tabs
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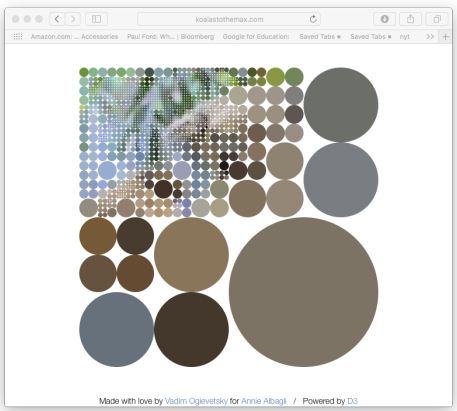
Made with love by Vadim Ogievetsky for Annie Albagli / Powered by D3

Design: Koalas to the Max



- **Input:** Image & mouse movements

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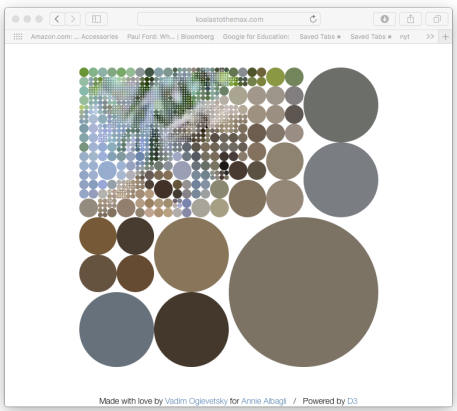

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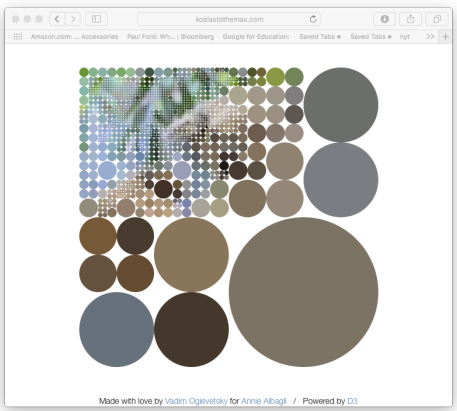

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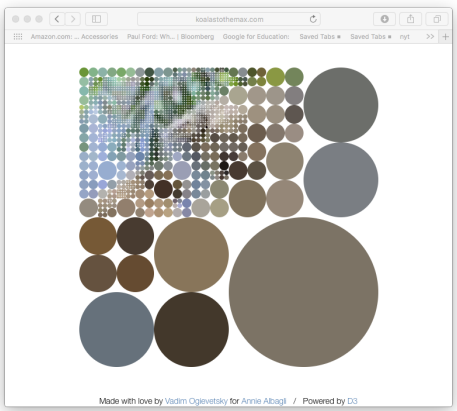

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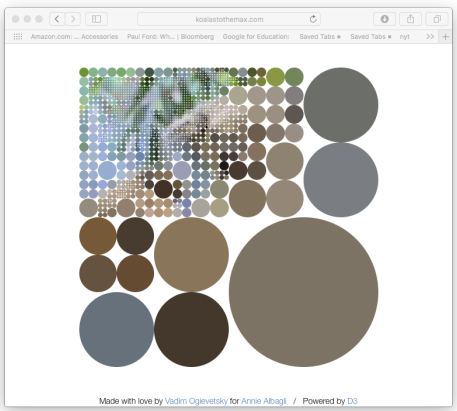

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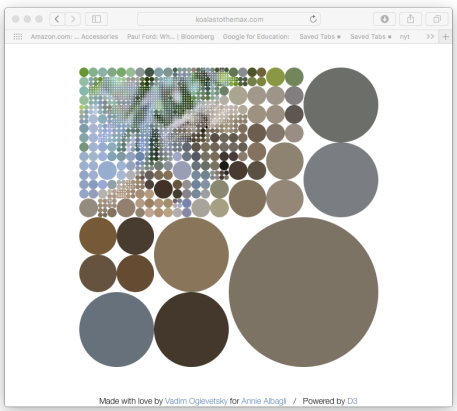

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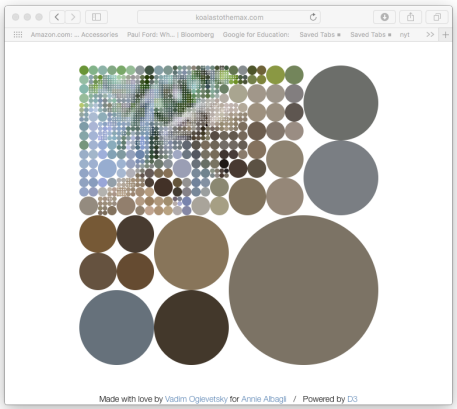

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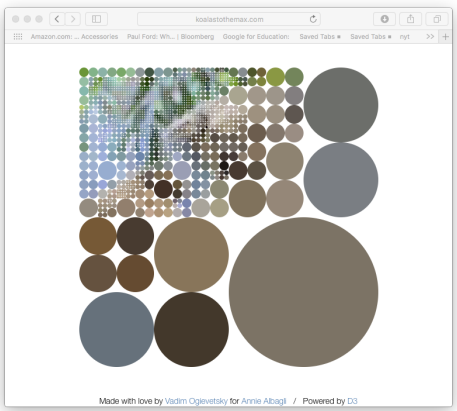

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(Demo program from github.)

Today's Topics

- More on Functions
- Recap: Open Data
- Top Down Design
- **Github**
- CS Survey: Career Services

Github

- Like Google docs for code...

Octocat

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- Github provides hosting for repositories (‘**repos**’) of code.
- Also convenient place to host websites (i.e. `stjohn.github.io`).
- In lab, we will set up github accounts and copy (‘**clone**’) documents from the class repo. (More in future courses.)

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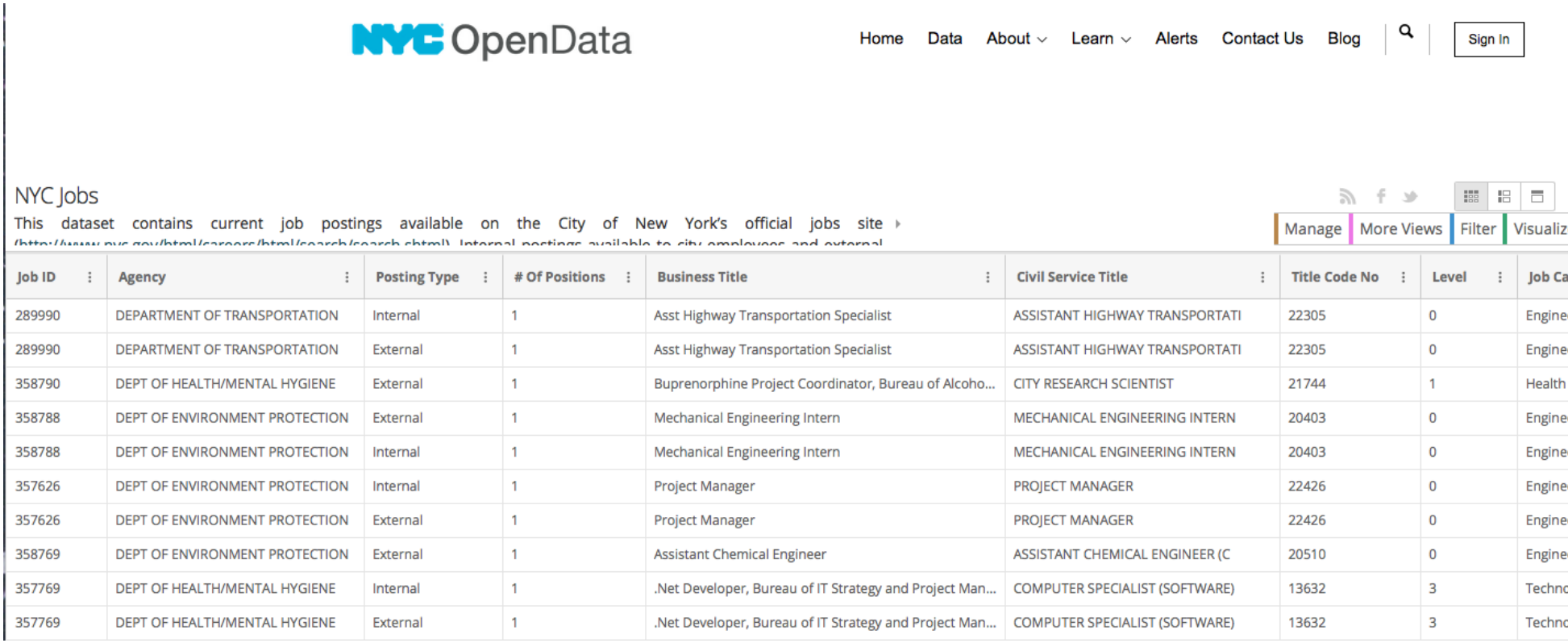
CS Survey Talk

Keith Okrosy
Career Development Services

Design Challenge

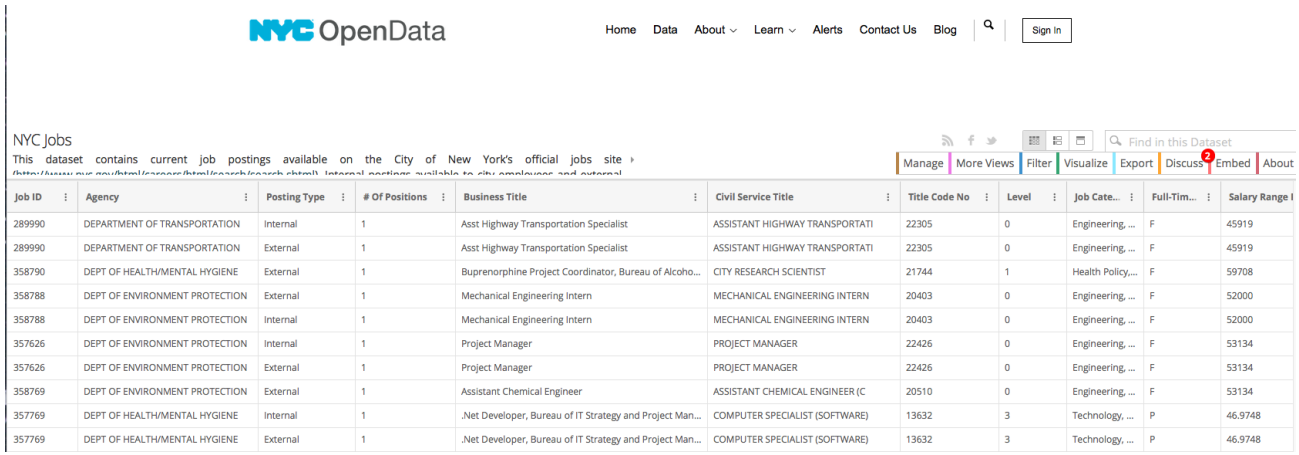


Job ID	Agency	Posting Type	# Of Positions	Business Title	Civil Service Title	Title Code No	Level	Job Ca
289990	DEPARTMENT OF TRANSPORTATION	Internal	1	Asst Highway Transportation Specialist	ASSISTANT HIGHWAY TRANSPORTATI	22305	0	Engine
289990	DEPARTMENT OF TRANSPORTATION	External	1	Asst Highway Transportation Specialist	ASSISTANT HIGHWAY TRANSPORTATI	22305	0	Engine
358790	DEPT OF HEALTH/MENTAL HYGIENE	External	1	Buprenorphine Project Coordinator, Bureau of Alcoho...	CITY RESEARCH SCIENTIST	21744	1	Health
358788	DEPT OF ENVIRONMENT PROTECTION	External	1	Mechanical Engineering Intern	MECHANICAL ENGINEERING INTERN	20403	0	Engine
358788	DEPT OF ENVIRONMENT PROTECTION	Internal	1	Mechanical Engineering Intern	MECHANICAL ENGINEERING INTERN	20403	0	Engine
357626	DEPT OF ENVIRONMENT PROTECTION	Internal	1	Project Manager	PROJECT MANAGER	22426	0	Engine
357626	DEPT OF ENVIRONMENT PROTECTION	External	1	Project Manager	PROJECT MANAGER	22426	0	Engine
358769	DEPT OF ENVIRONMENT PROTECTION	External	1	Assistant Chemical Engineer	ASSISTANT CHEMICAL ENGINEER (C	20510	0	Engine
357769	DEPT OF HEALTH/MENTAL HYGIENE	Internal	1	.Net Developer, Bureau of IT Strategy and Project Man...	COMPUTER SPECIALIST (SOFTWARE)	13632	3	Techno
357769	DEPT OF HEALTH/MENTAL HYGIENE	External	1	.Net Developer, Bureau of IT Strategy and Project Man...	COMPUTER SPECIALIST (SOFTWARE)	13632	3	Techno

`(data.cityofnewyork.us/City-Government/NYC-Jobs/kpav-sd4t)`

Find all current city job postings for internship positions.

Design Challenge



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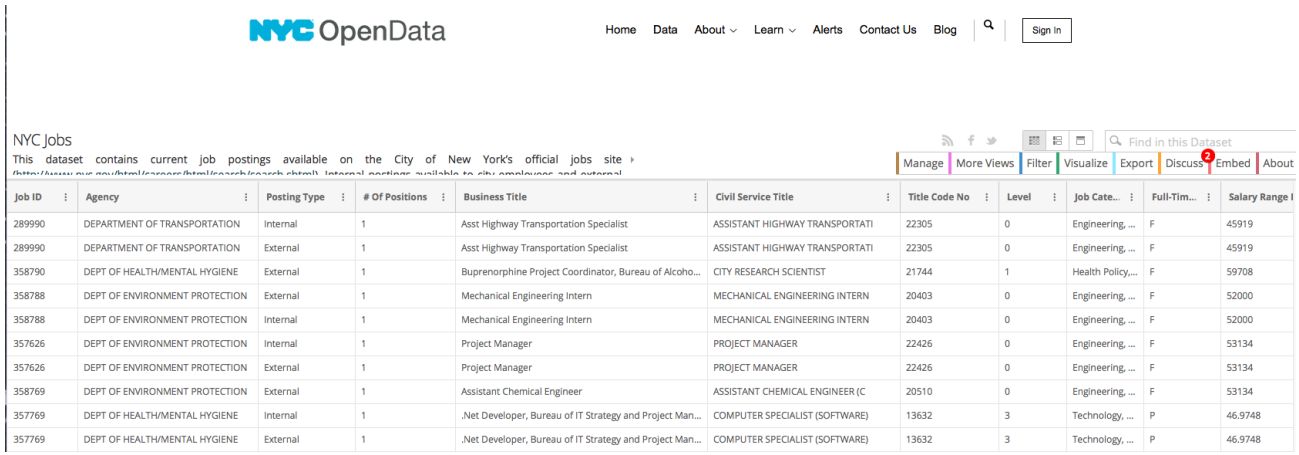

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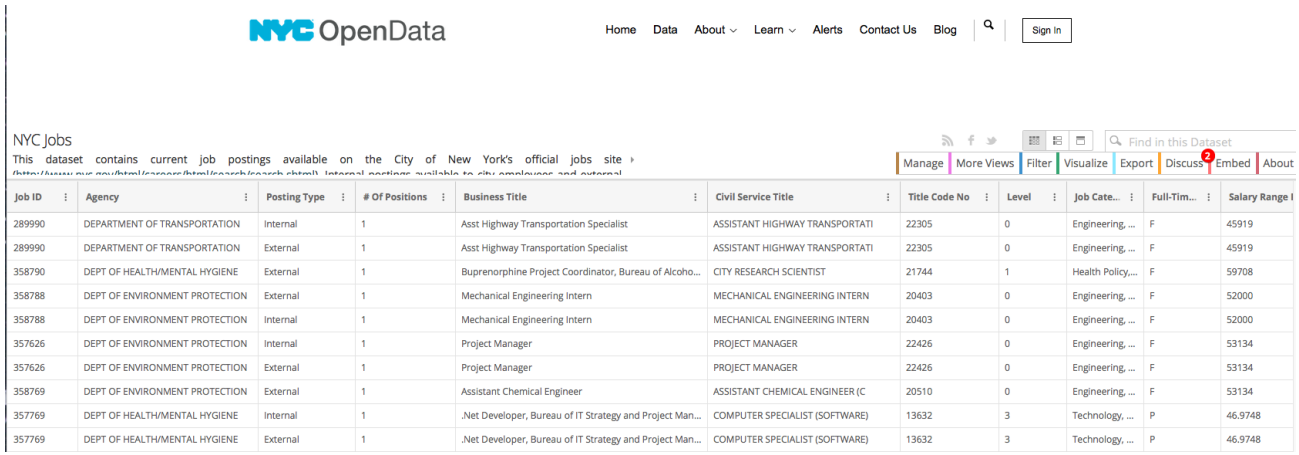

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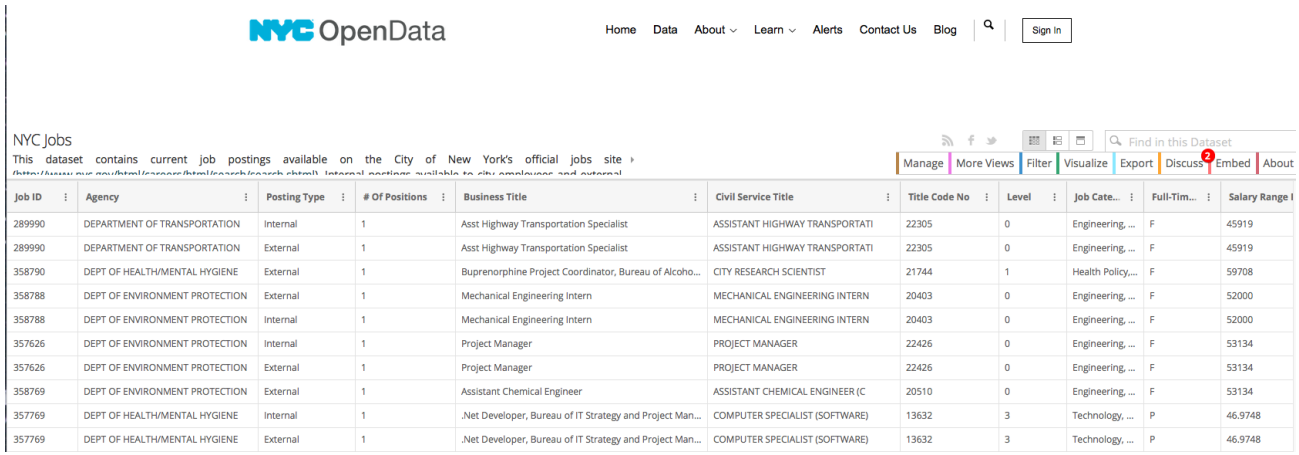

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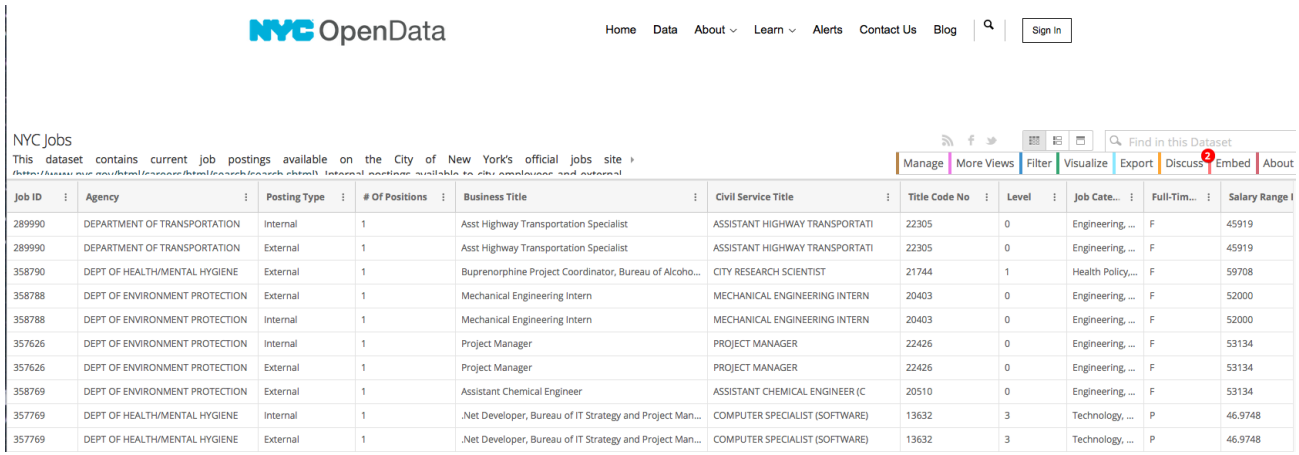

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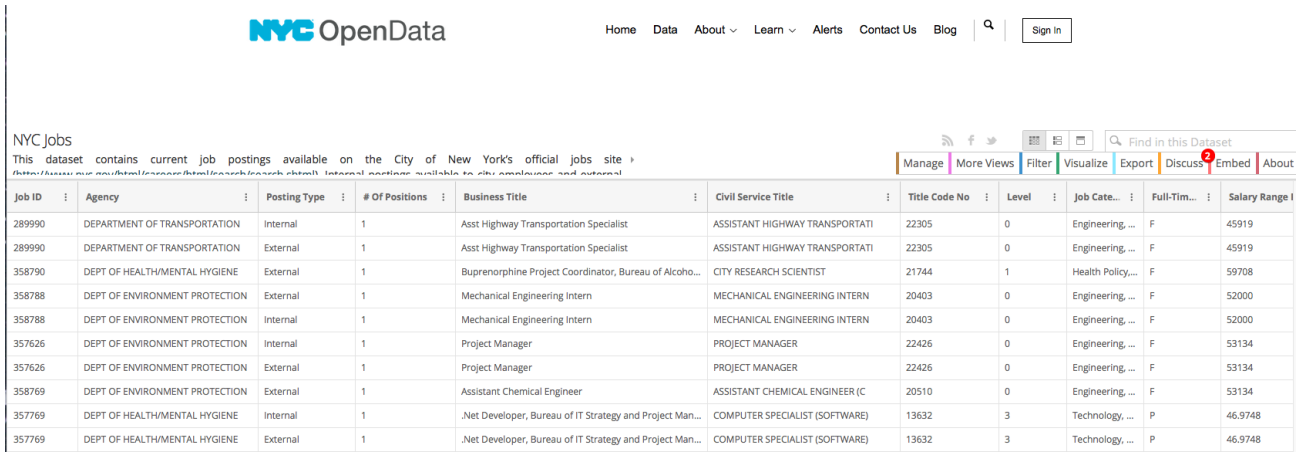

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  3. Print out those rows.

Recap

- On lecture slip, write down a topic you wish we had spent more time (and why).

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#Name:  your name here
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#This program, uses functions,
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def main():
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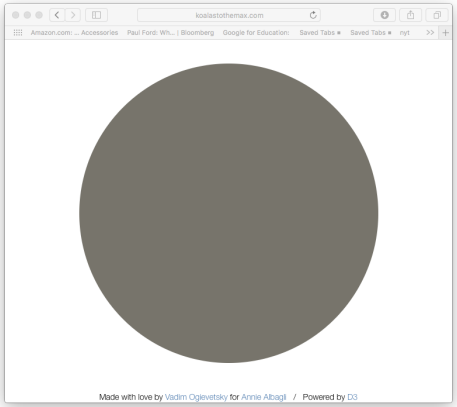
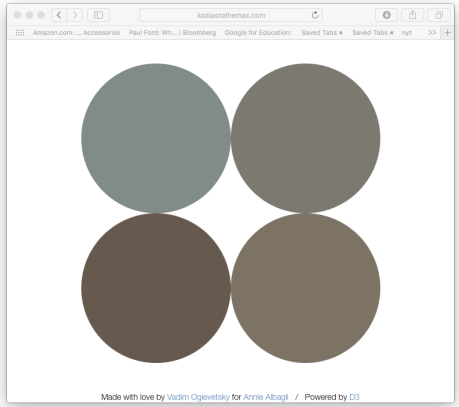
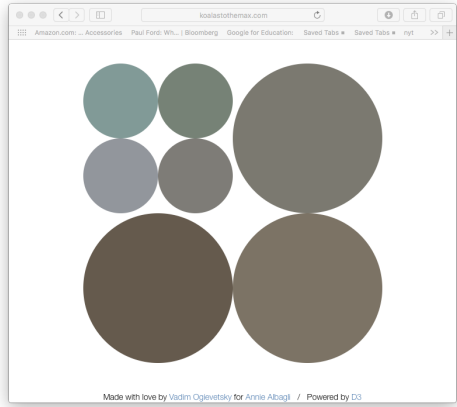
Practice Quiz & Final Questions







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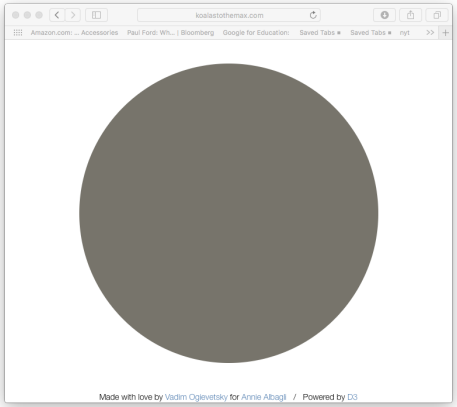
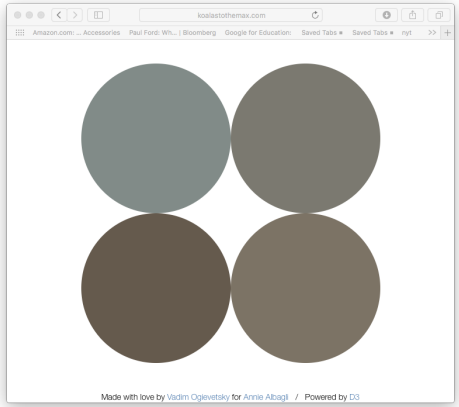
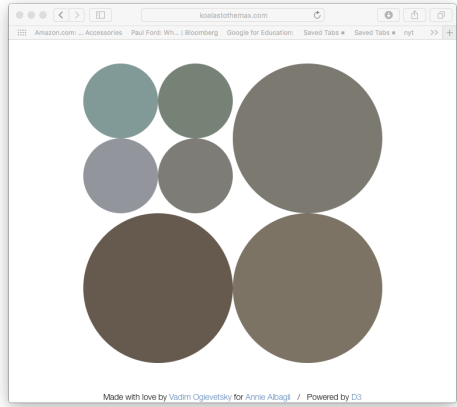
Practice Quiz & Final Questions







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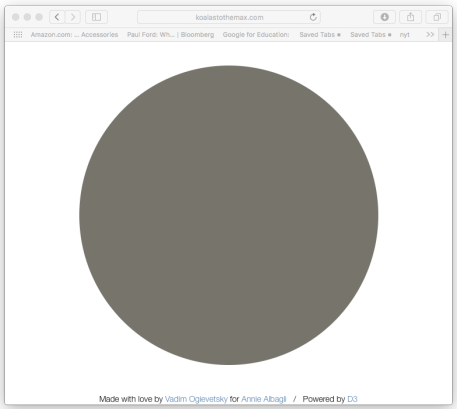

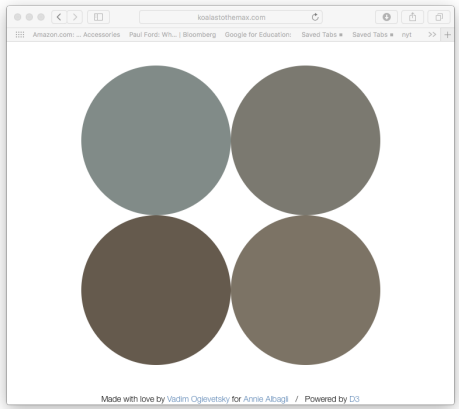

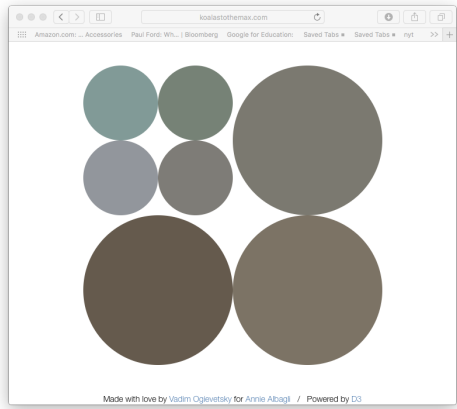

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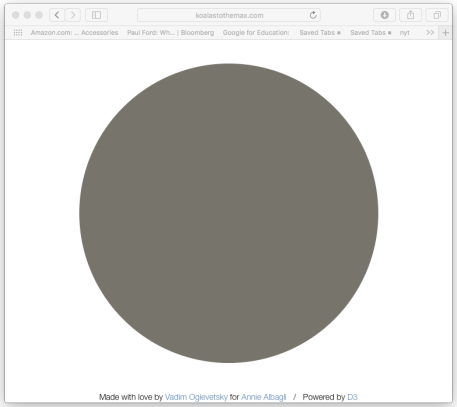

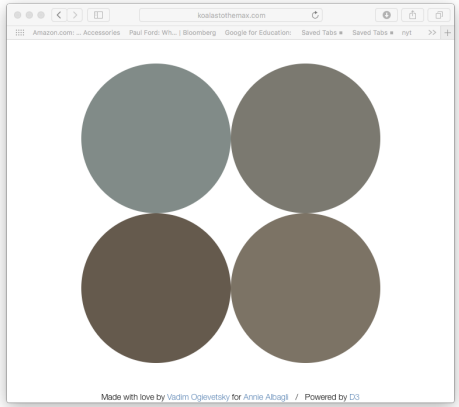

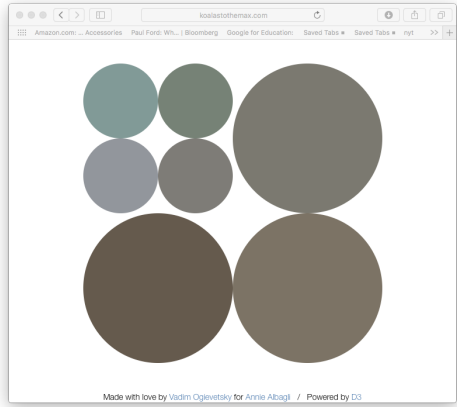

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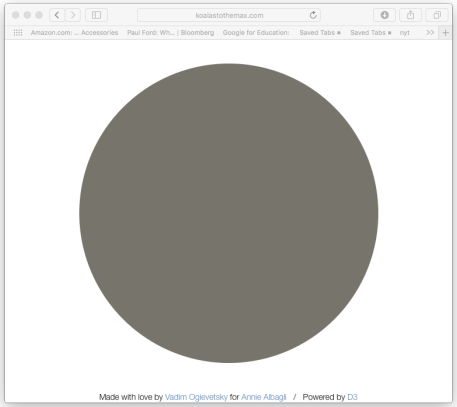
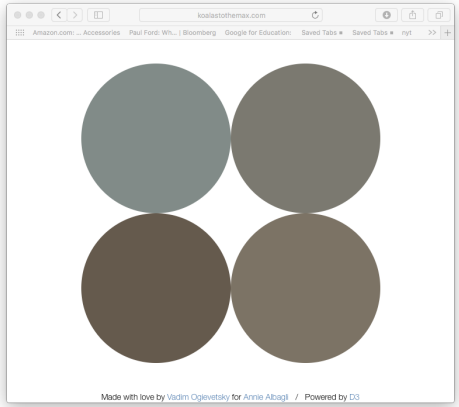
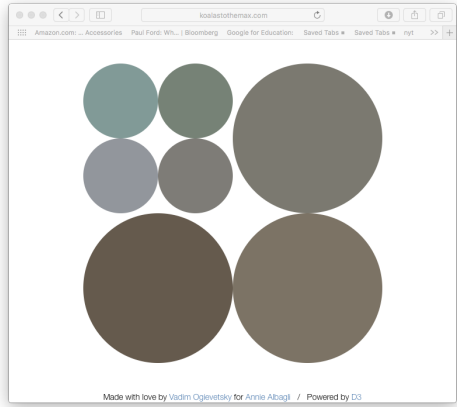
  - write as much you can for 60 seconds;

Practice Quiz & Final Questions







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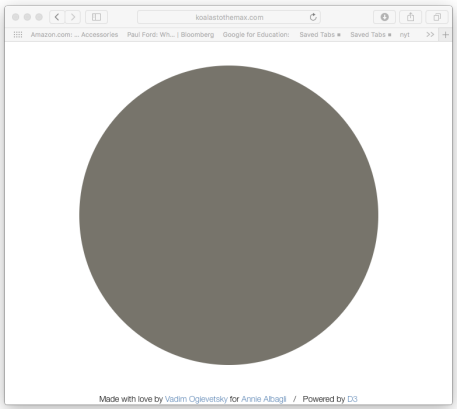
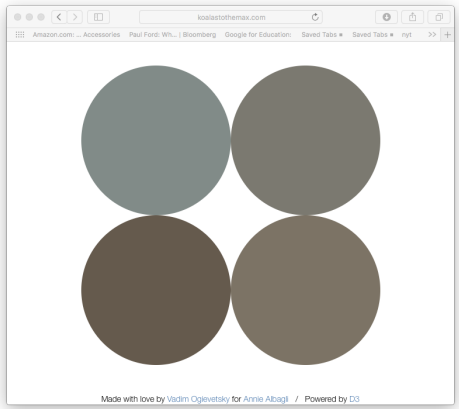
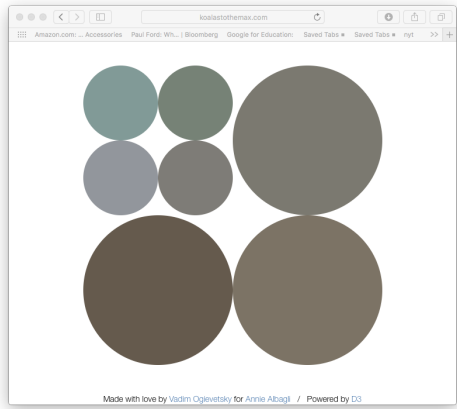
Practice Quiz & Final Questions







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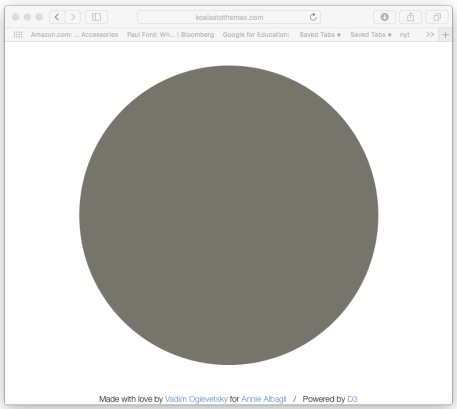

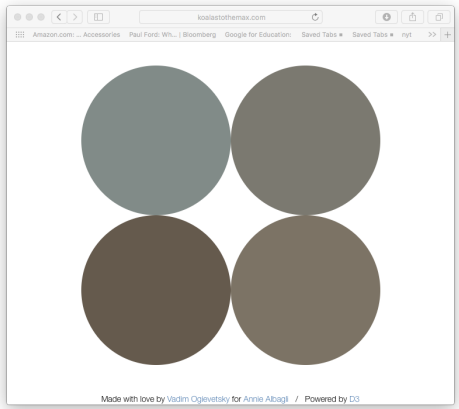

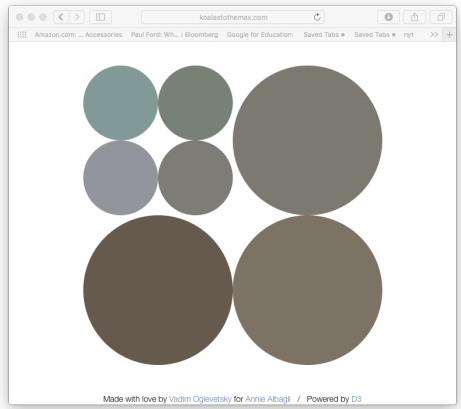

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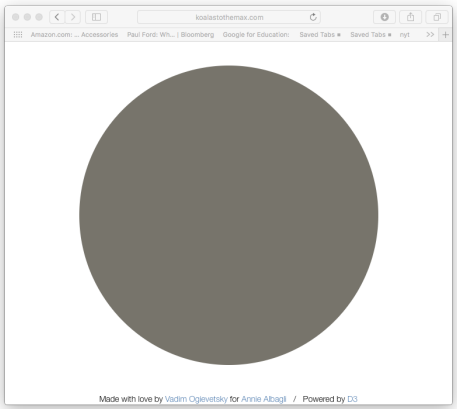
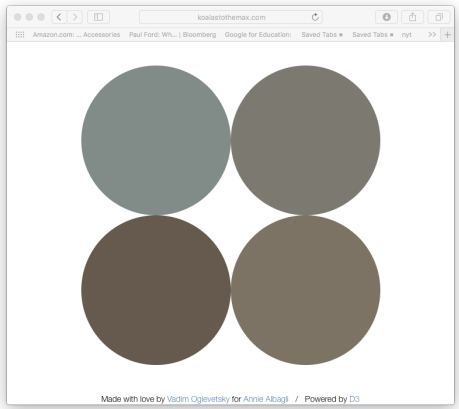
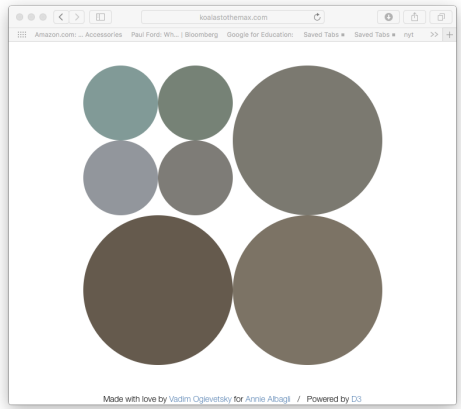
Practice Quiz & Final Questions







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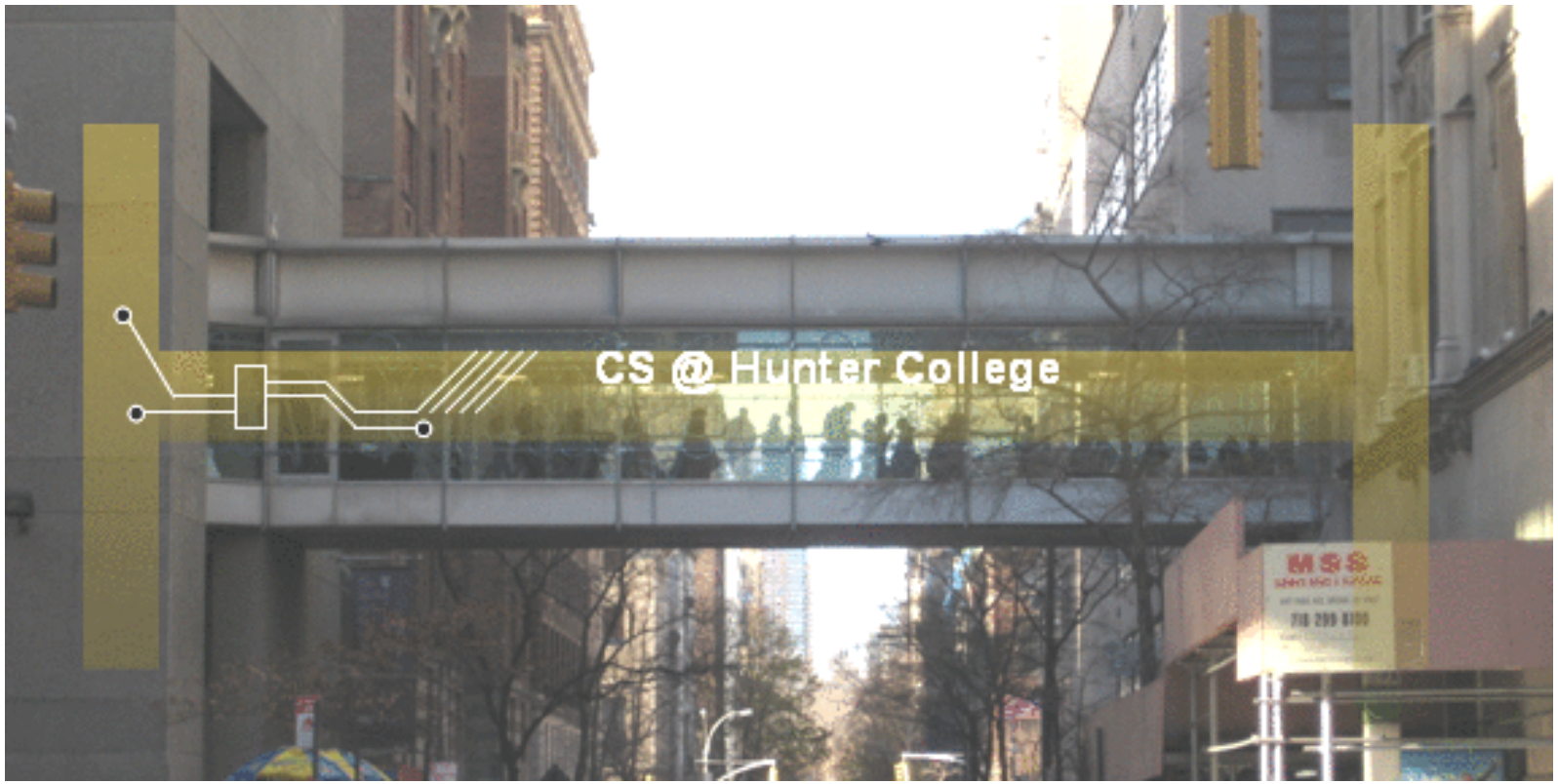
- Theme: Functions! Starting with S18, V1, #4 and #7.

Writing Boards



- Return writing boards as you leave...