CSci 127: Introduction to Computer Science

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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  - *You need to pass the final, which takes 60 out of 100 points.*

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    - *You need to pass the final, which takes 60 out of 100 points.*
    - *If final counts 70%, that would be 60% of 70 = 42 points.*

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  ▸ *With higher final score, you need fewer programs: Final: 80, Programs: 27.*

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  - *With higher final score, you need fewer programs: Final: 80, Programs: 27.*
  - *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**.

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

lunch = float(input('Enter lunch total: '))
lTip = float(input('Enter lunch tip:' ))
lTotal = totalWithTax(lunch, lTip)
print('Lunch total is', lTotal)

dinner= float(input('Enter dinner total: '))
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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?

```python
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)
```

```python
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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Actual Parameters

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- The actual parameters do not change.

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- The copies are discarded when the function is done.
- The time a variable exists is called its **scope**.

Input Parameters: What about Lists?

```
#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] ):
        return kuwae( inLst )
    else:
        return -1

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:

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

- What is the output of:
  ```python
  r = foo([1024,512,256,128])
  print("Return:  ", r)
  ```

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def bar(n):
    if n <= 8:
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(Demo with `pythonTutor`)

In Pairs or Triples:

Predict what the code will do:

```python
#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)
```

```python
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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(Demo with IDLE)

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

OpenData Design Question
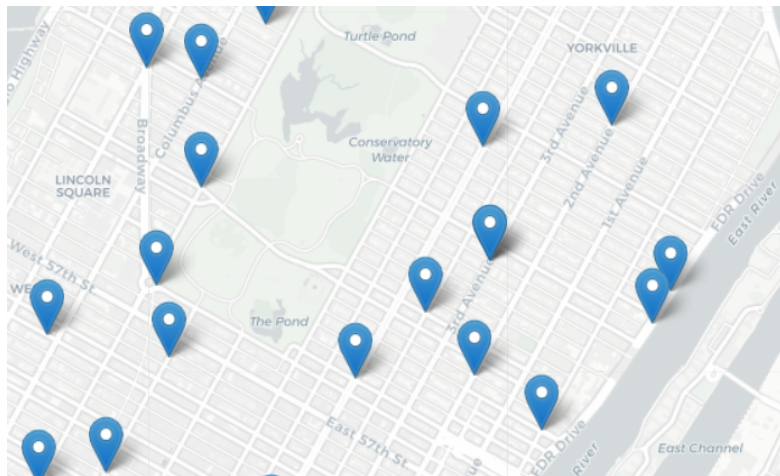
Design an algorithm that finds the closest collision.
(Sample NYC OpenData collision data file on back of lecture slip.)

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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How to approach this:

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- Read through the problem, and break it into "To Do" items.
- Don't worry if you don't know how to do all the items you write down.

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- Example:

  1. Find data set (great place to look: NYC OpenData).

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- Example:
  1. Find data set (great place to look: NYC OpenData).
  2. Ask user for current location.

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- Example:
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  2. Ask user for current location.
  3. Open up the CSV file.

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    3. Open up the CSV file.
    4. Check distance to each to user's location.

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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.
  4. Check distance to each to user's location.
  5. Print the location with the smallest distance.

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:

- Create a "To Do" list of what your program has to accomplish.
- Read through the problem, and break it into "To Do" items.
- 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.
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- Let's use function names as placeholders for the ones we're unsure...

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

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- Very common when working with a team: each has their own functions to implement and maintain.

In Pairs or Triples:
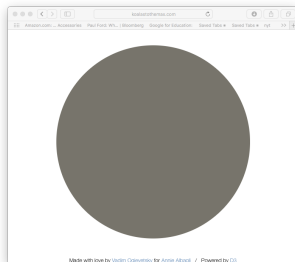
http://koalastothemax.com

- 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
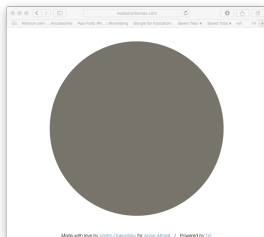
Demo
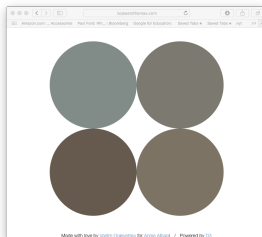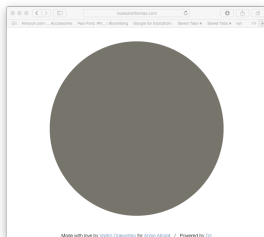
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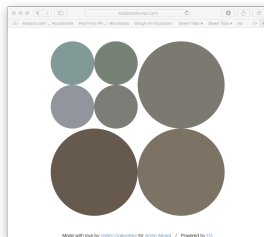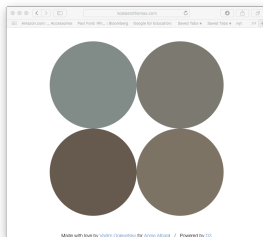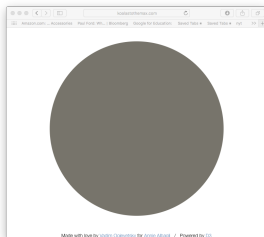
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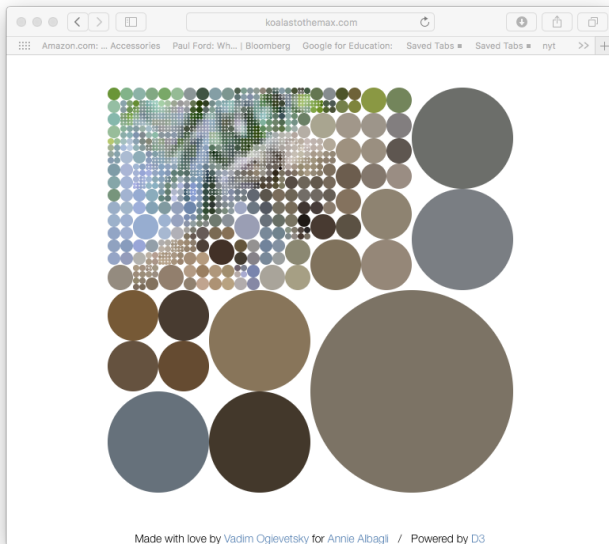
Design: Koalas to the Max

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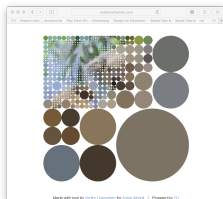
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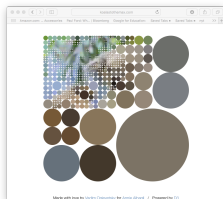
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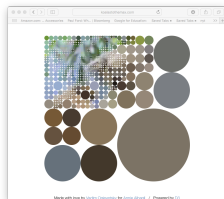
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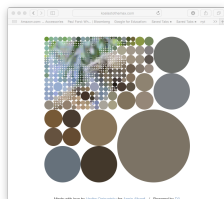
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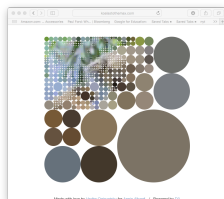
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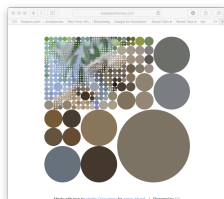
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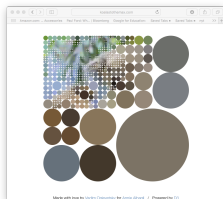
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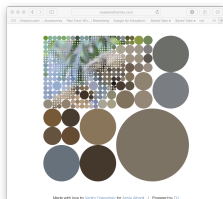
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(Demo program from github.)

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Octocat

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- More formally: git is a version control protocol for tracking changes and versions of documents.
- 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

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

Find all current city job postings for internship positions.

Design Challenge

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

- **Input:** CSV file from NYC OpenData.

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Recap

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

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#This program, uses functions,
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def main():
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Practice Quiz & Final Questions
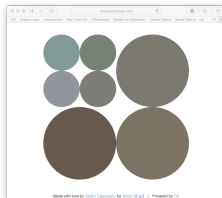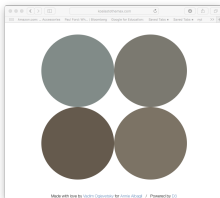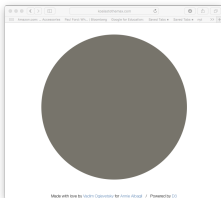
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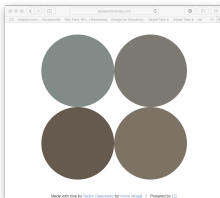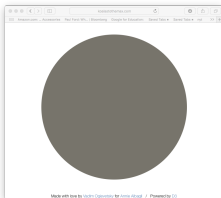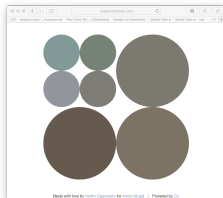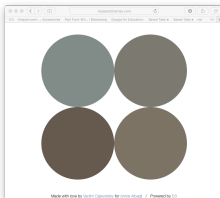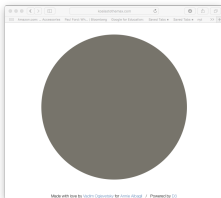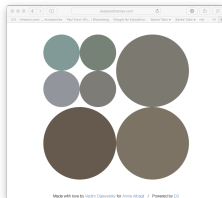
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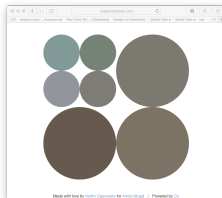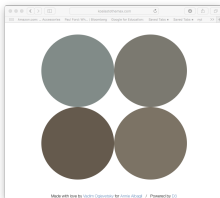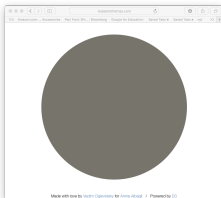
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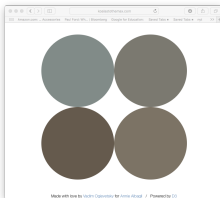
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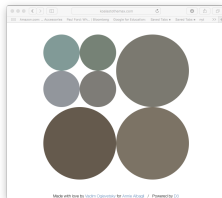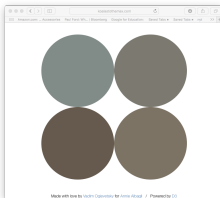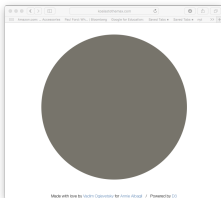
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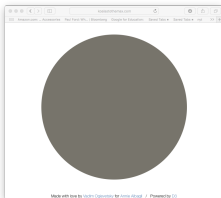- Lightning rounds:

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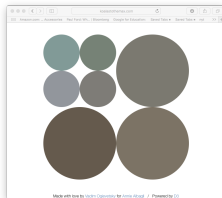
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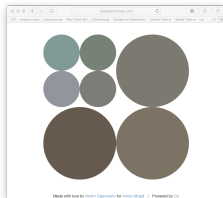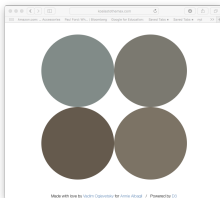- Lightning rounds:
  - ▶ write as much you can for 60 seconds;

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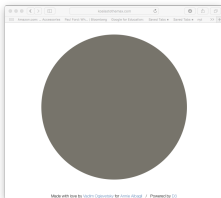 - ▸ followed by answer; and
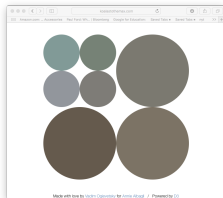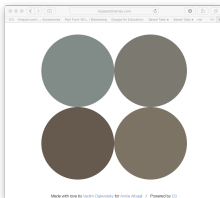
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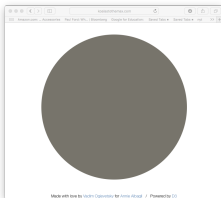
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- Theme: Functions! Starting with S18, V1, #4 and #7.

Writing Boards

- Return writing boards as you leave...