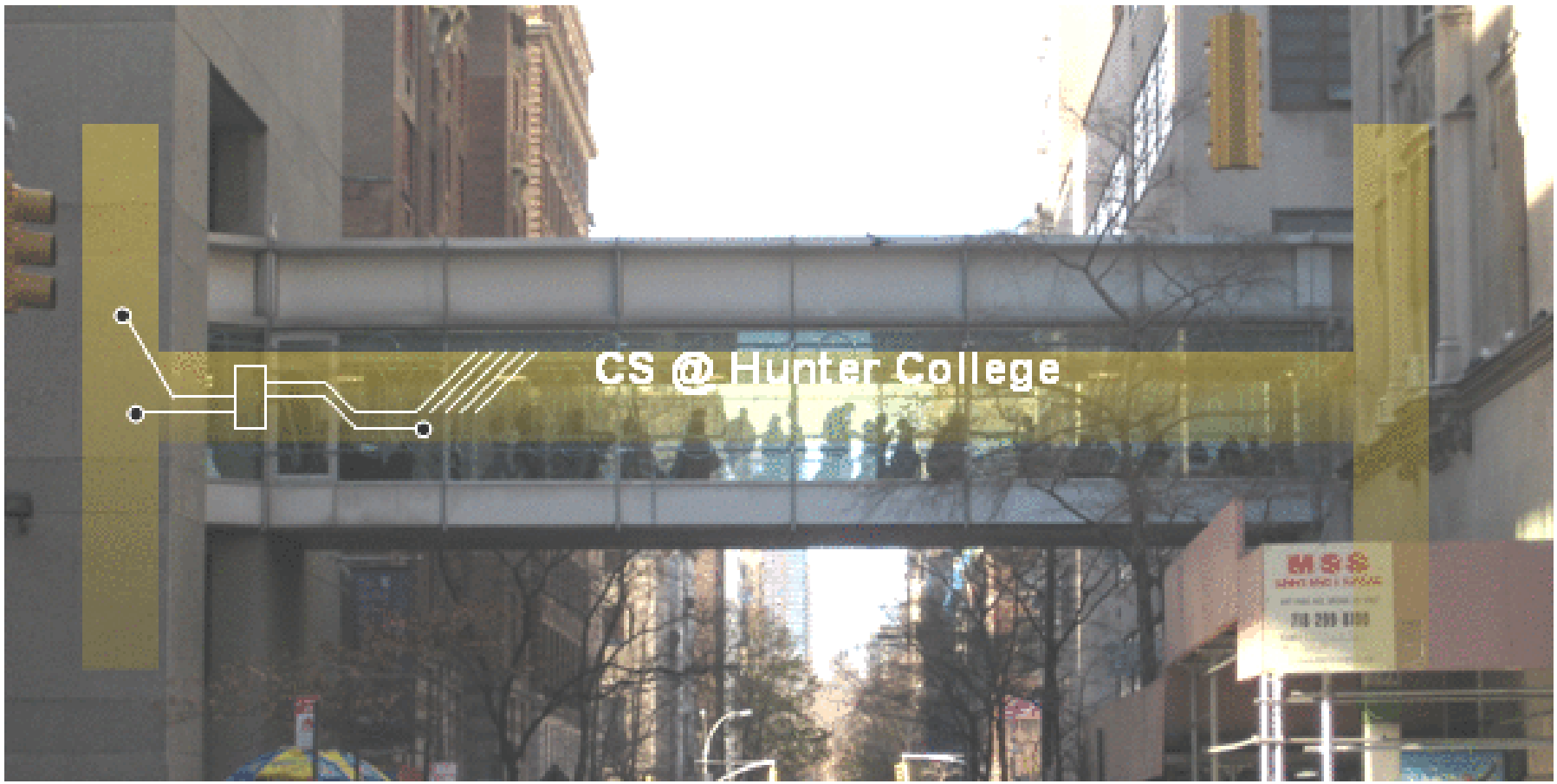
CSci 127: Introduction to Computer Science



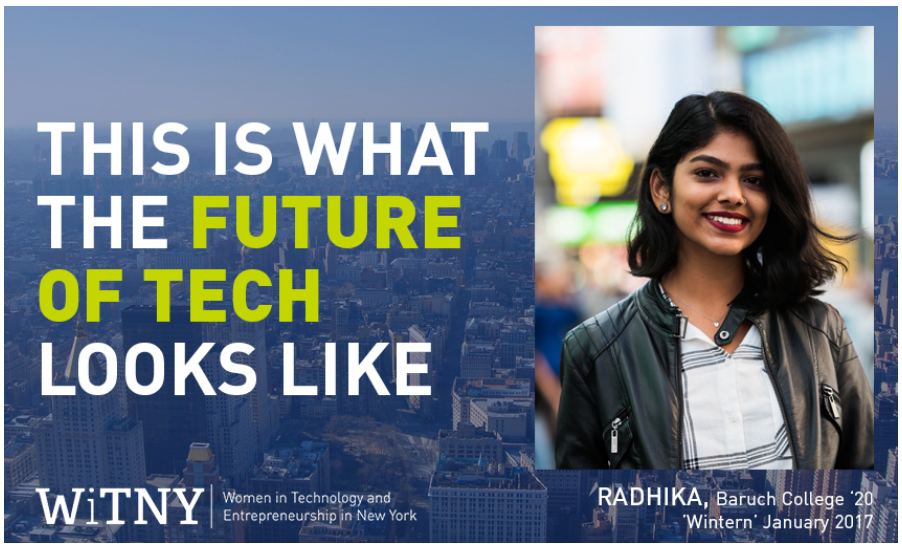
hunter.cuny.edu/csci

Announcements

- Special Guest: President Jennifer Raab!
- Each lecture includes a survey of computing research and tech in NYC.

  Today: Dr. Judy Spitz, Founding Director of Women in Technology & Entrepreneurship in New York (WiTNY)

CS Survey Talk



Dr. Judy Spitz
Founding Director
WiTNY

In Pairs or Triples:

Predict what the code will do:

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motto = "Mihi Cura Futuri"
l = len(motto)
for i in range(l):
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```
import matplotlib.pyplot as plt
import numpy as np
img = plt.imread('csBridge.png')
plt.imshow(img)
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height = img.shape[0]
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img2 = img[:height/2, :width/2]
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- And, design a program that asks maps time of day versus last month's 311 complaints.
  (Design only the pseudocode.)

Frequently Asked Questions

From lecture slips & recitation sections.

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  - *Tech Meetups: both via CUNY (next: MongoDB, 11/2) and across city (focused on just about everything tech).*
  - *Hackathons: upcoming student-focused: Brooklyn Navy Yard 11/10.*

Today's Topics

- CS Survey: Judy Spitz of WiTNY
- Recap: Pandas (Accessing formatted data) & Prep I
- Introduction to Functions
- Final Exam Overview

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- And, design a program that asks maps time of day versus last month's 311 complaints.
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Python Tutor

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(Demo with `pythonTutor`)

Structured Data

pandas

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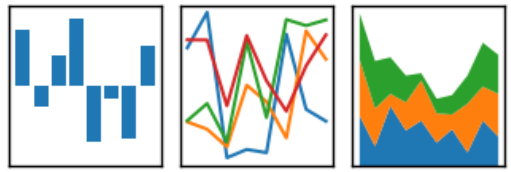

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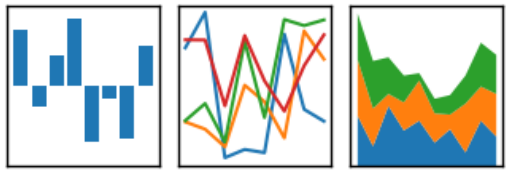

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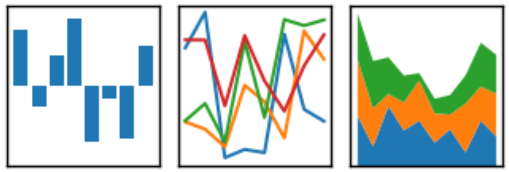

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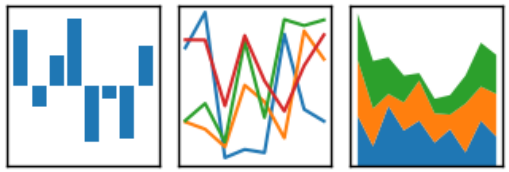

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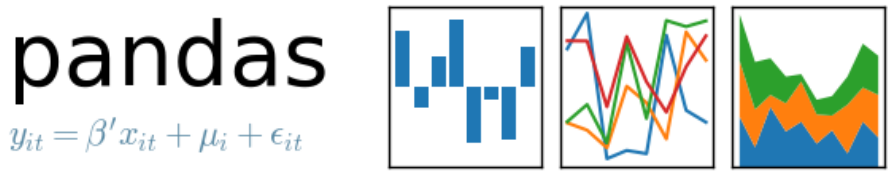

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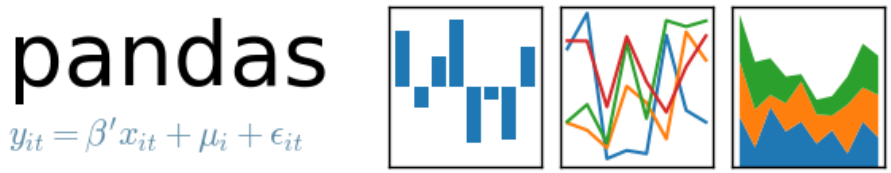

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- To use, add to the top of your file:

```
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- To read in a CSV file:

```
myVar = pd.read_csv("myFile.csv")
```

Example: Reading in CSV Files

```
Source:  https://en.wikipedia.org/wiki/Demographics_of_New_York_City,,,,,,
All population figures are consistent with present-day boundaries.,,,,,,
First census after the consolidation of the five boroughs,,,,,,
,,,,,,
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Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island,Total
1698,4937,2017,,,727,7681
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```

`nycHistPop.csv`

In Lab 6

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Example: Reading in CSV Files

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import matplotlib.pyplot as plt
import pandas as pd

pop = pd.read_csv('nycHistPop.csv',skiprows=5)
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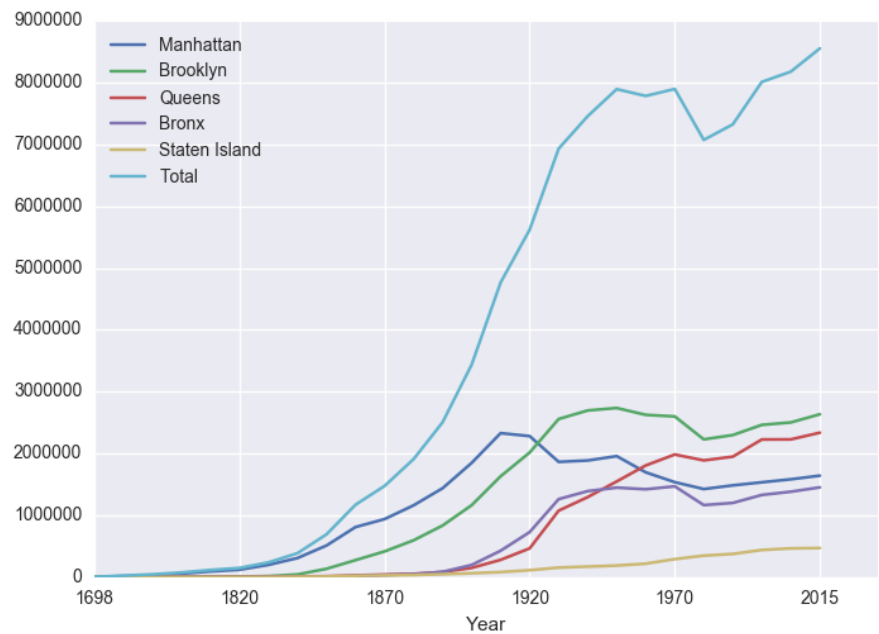
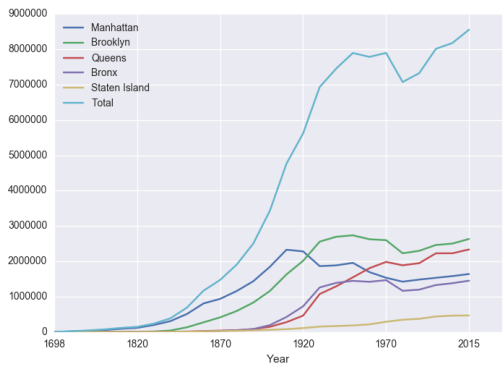


Series in Pandas



- Series can store a column or row of a DataFrame.

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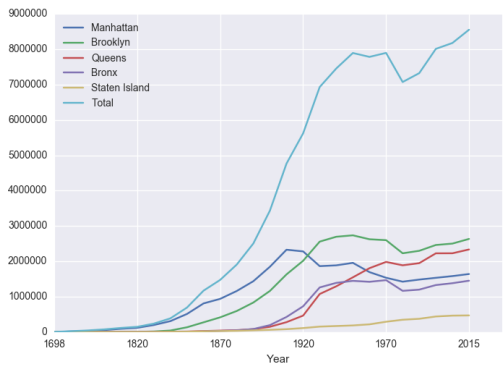

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- Example: `pop["Manhattan"]` is the Series corresponding to the column of Manhattan data.

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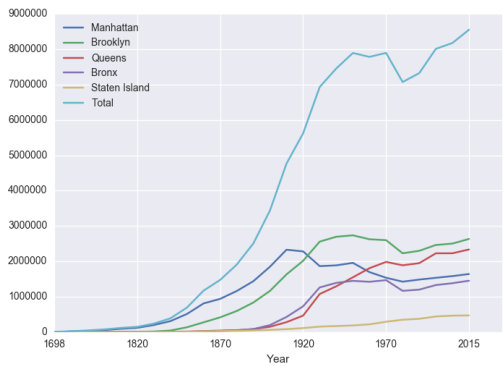

- Series can store a column or row of a DataFrame.
- Example: `pop["Manhattan"]` is the Series corresponding to the column of Manhattan data.
- Example:
```
print("The largest number living in the Bronx is", pop["Bronx"].max())
```

In Pairs or Triples:

Predict what the code will do:

```
motto = "Mihi Cura Futuri"
l = len(motto)
for i in range(l):
    print(motto[i])
for j in range(l-1,-1,-1):
    print(motto[j])
```

```
import matplotlib.pyplot as plt
import numpy as np
img = plt.imread('csBridge.png')
plt.imshow(img)
plt.show()
height = img.shape[0]
width = img.shape[1]
img2 = img[:height/2, :width/2]
plt.imshow(img2)
plt.show()
```

- And, design a program that asks maps time of day versus last month's 311 complaints.
  (Design only the pseudocode.)

Design Question

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- Example:
  1. Find data set (great place to look: NYC OpenData).
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  4. Save the counts in a new column.

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  5. Create a plot of time versus counts.

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  5. Create a plot of time versus counts.
  6. Display the plot.

Final Prep, #1

(1) Write Python code that prompts the user for distance in kilometers, and prints out the distance in miles.
Useful formula: $miles = 0.621 \cdot kilometers$.

(2) What is the output of the following:

```
a = 4
b = a**2
c = b % 5
d = b // 5
print(a,b,c,d)
a,b = b,c
print(a,b,c,d)
a = b % 2
print(a,b,c,d)
```

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# Program converts kilometers to miles
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print(km)
```

Python Tutor

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(Demo with pythonTutor)

Functions

- Functions are a way to break code into pieces, that can be easily reused.

```
#Name:  your name here
#Date:  October 2017
#This program, uses functions,
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def main():
     print("Hello, World!")

if __name__ == "__main__":
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  Example: `print("Hello", "World")`
- Can write, or **define** your own functions, which are stored, until invoked or called.

"Hello, World!" with Functions

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Python Tutor

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(Demo with pythonTutor)

In Pairs or Triples:

Predict what the code will do:

```
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: '))
dTip = float(input('Enter dinner tip:' ))
dTotal = totalWithTax(dinner, dTip)
print('Dinner total is', dTotal)
```

```
def monthString(monthNum):
    """
    Takes as input a number, monthNum, and
    returns the corresponding month name as a string
    Example: monthString(1) returns "January".
    Assumes that input is an integer ranging from 1
    """

    monthString = ""

    ###################################
    ### FILL IN YOUR CODE HERE      ###
    ### Other than your name above, ###
    ### this is the only section    ###
    ### you change in this program. ###
    ###################################

    return(monthString)

def main():
    n = int(input('Enter the number of the month: '))
    mString = monthString(n)
    print('The month is', mString)
```

Python Tutor

```
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: '))
dTip = float(input('Enter dinner tip:' ))
dTotal = totalWithTax(dinner, dTip)
print('Dinner total is', dTotal)
```

(Demo with `pythonTutor`)

IDLE

```
def monthString(monthNum):
    """
    Takes as input a number, monthNum, and
    returns the corresponding month name as a string.
    Example: monthString(1) returns "January".
    Assumes that input is an integer ranging from 1 to 12
    """

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(Demo with IDLE)

In Pairs or Triples:

Predict what the code will do: main() with turtles

```
#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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(Demo with IDLE)

Recap: Functions

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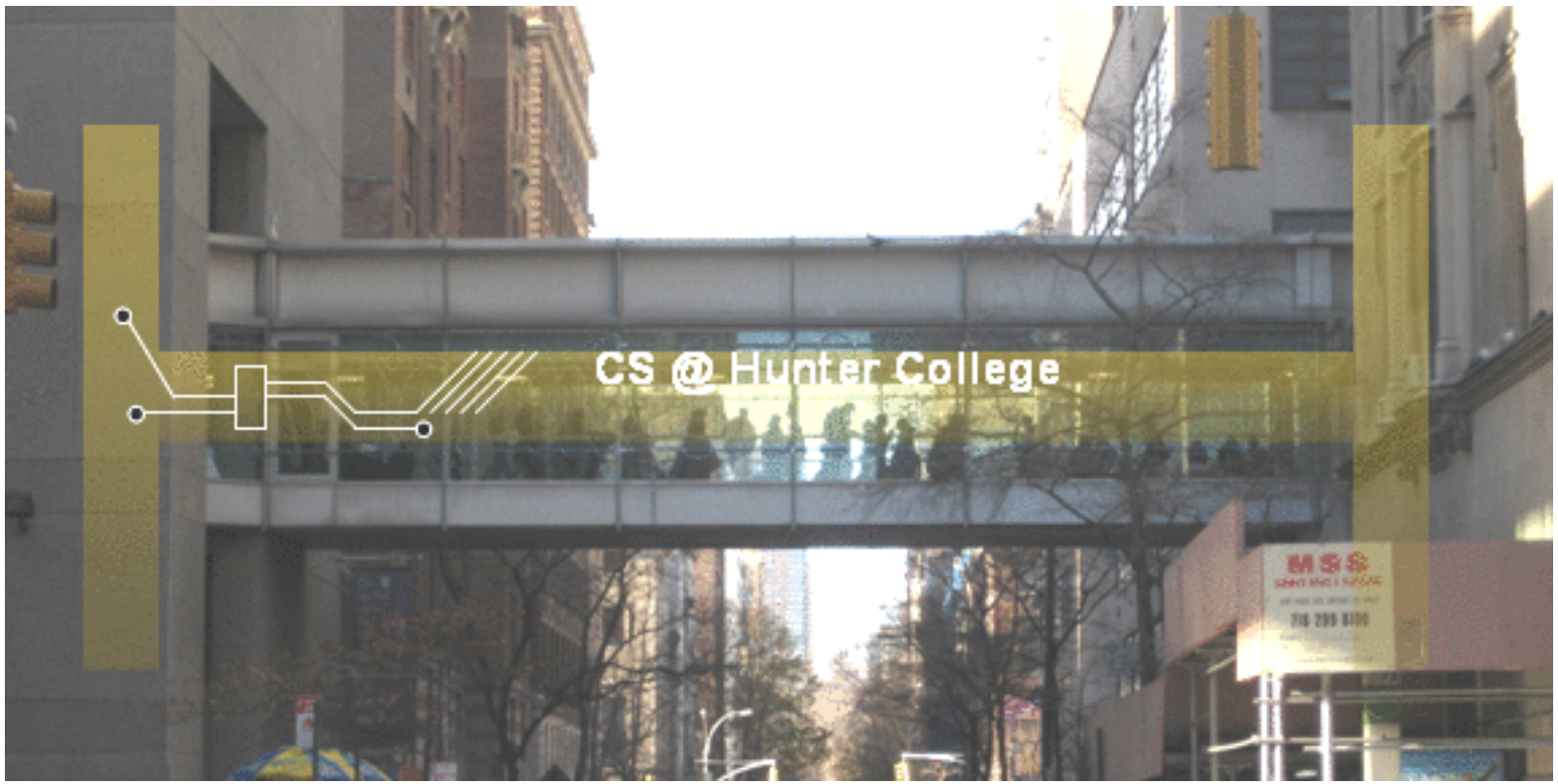
Lecture Slips



- On-line lecture slips: `tinyurl.com/ybgz7bks`

Final Prep

- The last 5 minutes of lecture will be on mock final exam questions.

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- Pull out a sheet of paper, and do as much as you can before class ends.

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- Will discuss solutions next lecture.