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

This is what the future of tech looks like

WiTNY
Women in Technology and Entrepreneurship in New York

Radhika, Baruch College '20
Winter 'January 2017
In Pairs or Triples:

*Predict what the code will do:*

```python
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import numpy as np
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plt.imshow(img)
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height = img.shape[0]
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img2 = img[:height//2, :width//2]
plt.imshow(img2)
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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.

Pandas? Can’t we go back to turtles? I like turtles better!

Turtles will reappear, albeit briefly, in Labs 8 & 10.

We will do more with Pandas since it’s an incredibly useful & popular package for structured data. We hope you will soon like Pandas a much as turtles.

Can you explain again when to use brackets and parenthesis?

Parenthesis are for functions: ex:
print("CUNY")
or
tess.left(45)

Brackets are used for access items in a list or string: ex:
message[3]

I’d like to do more. Any suggestions?

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Today’s Topics

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

*Predict what the code will do:*

```python
import matplotlib.pyplot as plt
import numpy as np

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])

img = plt.imread('csBridge.png')
plt.imshow(img)
plt.show()
height = img.shape[0]
width = img.shape[1]
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.
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Python Tutor

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(Demo with pythonTutor)
Structured Data

\[ y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it} \]

- Common to have data structured in a spread sheet.

```
pandas
```
Structured Data

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- The text file version is called **CSV** for comma separated values.
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- Each row is a line; columns are separated by commas.
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- We will use the popular Python Data Analysis Library (**Pandas**).
Structured Data

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- Common to have data structured in a spread sheet.
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- To use, add to the top of your file:
  
  ```python
  import pandas as pd
  ```
Structured Data

pandas

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- Common to have data structured in a spreadsheet.
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- Each row is a line; columns are separated by commas.
- We will use the popular Python Data Analysis Library (**Pandas**).
- To use, add to the top of your file:
  
  import pandas as pd
  
- To read in a CSV file:
  
  myVar = pd.read_csv("myFile.csv")
Example: Reading in CSV Files

```python
import matplotlib.pyplot as plt
import pandas as pd
pop = pd.read_csv('nycHistPop.csv', skiprows=5)
pop.plot(x='Year')
plt.show()
```

nycHistPop.csv

In Lab 6
Example: Reading in CSV Files

```
import matplotlib.pyplot as plt
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pop = pd.read_csv('nycHistPop.csv', skiprows=5)
pop.plot(x="Year")
plt.show()
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In Lab 6

---

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,
Example: Reading in CSV Files

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In Lab 6
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In Lab 6

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All population figures are consistent with present-day boundaries,......
First census after the consolidation of the five boroughs,......

Year, Manhattan, Brooklyn, Queens, Bronx, Staten Island, Total
1609, 4957, 2017, 2064, 7601
1711, 21863, 3623, 2867, 4023
1790, 32321, 4549, 6359, 7891, 3827, 4967
1800, 65015, 5740, 6642, 1755, 4563, 79215
1810, 76373, 8053, 7484, 2287, 5347, 119734
1820, 82706, 1187, 8246, 2780, 6138, 192056
1830, 202860, 20835, 8069, 3031, 7088, 242278
1840, 312710, 47613, 14680, 3466, 10965, 391114
1850, 518567, 138886, 18593, 8033, 15061, 696115
1860, 815465, 279122, 23803, 23593, 25492, 1174779
1870, 942299, 41993, 45468, 37393, 33029, 1478103
1880, 1146475, 59945, 65559, 51980, 38993, 1951698
1890, 1441216, 838847, 87050, 89908, 51693, 2507416
1900, 185093, 116992, 122999, 205907, 67021, 297202
1910, 2331542, 1636351, 204041, 430980, 85549, 476083
1920, 226419, 2018286, 469042, 722416, 146331, 5620548
1930, 1867312, 2568401, 107929, 1262528, 158346, 6930446
1940, 1869996, 2693205, 1297634, 1394711, 1746411, 7459995
1950, 1960101, 2738275, 1550849, 1461277, 1915585, 7891957
1960, 1969212, 2627949, 1809787, 1484013, 2129991, 7781904
1970, 1978233, 2402012, 1986673, 1471011, 235463, 7984062
1980, 1982095, 2230906, 1891259, 1168972, 352121, 7071639
1990, 148738, 2308664, 1951398, 129789, 378977, 722564
2000, 1531755, 2465326, 2229379, 1332600, 4437280, 8080270
2010, 1585073, 2504700, 2230722, 1398109, 468720, 8175133
2015, 1645181, 2636735, 2339510, 1455444, 4745580, 8550405

---

In Lab 6
Series in Pandas

Series can store a column or row of a DataFrame.
Series in Pandas

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

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

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

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

- Example:
  ```python
  print("The largest number living in the Bronx is", pop["Bronx"].max())
  ```
In Pairs or Triples:

*Predict what the code will do:*

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  1. Find data set (great place to look: NYC OpenData).
  2. Open up the CSV file.
  3. Count the number of complaints for each time.
  4. Save the counts in a new column.
  5. Create a plot of time versus counts.
  6. Display the plot.
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6. Display the plot.
(1) Write Python code that prompts the user for distance in kilometers, and prints out the distance in miles. Useful formula: \( \text{miles} = 0.621 \times \text{kilometers} \).

(2) What is the output of the following:

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

# Program converts kilometers to miles
(1) Write Python code that prompts the user for distance in kilometers, and prints out the distance in miles.
Useful formula: \( \text{miles} = 0.621 \cdot \text{kilometers} \).

```python
# Your name
# Program converts kilometers to miles

km = float(input('Enter kilometers'))
miles = 0.621 * km
print(km)
```

(2) What is the output of the following:

```python
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
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Python Tutor

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```
Functions

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

```python
# Name: your name here
# Date: October 2017
# This program, uses functions,
# says hello to the world!

def main():
    print("Hello, World!")

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

- Functions are a way to break code into pieces, that can be easily reused.
- Many languages require that all code must be organized with functions.

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  Example: `print("Hello", "World")`

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- The opening function is often called main().
- You **call** or **invoke** a function by typing its name, followed by any inputs, surrounded by parenthesis:
  Example: `print("Hello", "World")`
- Can write, or **define** your own functions,

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```
Functions

- Functions are a way to break code into pieces, that can be easily reused.
- Many languages require that all code must be organized with functions.
- The opening function is often called `main()`.
- You **call** or **invoke** a function by typing its name, followed by any inputs, surrounded by parenthesis: Example: `print("Hello", "World")`
- Can write, or **define** your own functions, which are stored, until invoked or called.

```python
# This program, uses functions, says hello to the world!
def main():
    print("Hello, World!")
if __name__ == "__main__":
    main()
```
“Hello, World!” with Functions

#Name: your name here
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#This program, uses functions, says hello to the world!

def main():
    print("Hello, World!")

if __name__ == "__main__":
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Python Tutor

#Name: your name here
#Date: October 2017
#This program, uses functions,
#    says hello to the world!

def main():
    print("Hello, World!")

if __name__ == "__main__":
    main()
In Pairs or Triples:

**Predict what the code will do:**

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

```python
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.
    """

    monthString = ""
    
    #…………………………………………………………………………………………
    # 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)
```
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 to 12
    """

    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: "))
    nString = monthString(n)
    print("The month is", nString)
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)

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()
```
#CSci 127 Teaching Staff
#Triangles two ways...

```python
import turtle

def setup(t, dist, col):
    t.penup()
    t.forward(dist)
    t.pendown()
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def nestedTriangle(t, side):
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    if side > 10:
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            t.forward(side)
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            fractalTriangle(t, side/2)
```

(Demo with IDLE)
Recap: Functions

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

```python
# Name: your name here
# Date: October 2017
# This program uses functions,
# says hello to the world!

def main():
    print("Hello, World!")

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

- Functions are a way to break code into pieces, that can be easily reused.
- You **call** or **invoke** a function by typing its name, followed by any inputs, surrounded by parenthesis:

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Example: `print("Hello", "World")`

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def main():
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Recap: Functions

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

- You **call** or **invoke** a function by typing its name, followed by any inputs, surrounded by parenthesis:

  Example: `print("Hello", "World")`

- Can write, or **define** your own functions,
Recap: Functions

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

- You call or invoke a function by typing its name, followed by any inputs, surrounded by parenthesis:
  Example: `print("Hello", "World")`

- Can write, or define your own functions, which are stored, until invoked or called.
On-line lecture slips: tinyurl.com/ybgz7bks
The last 5 minutes of lecture will be on mock final exam questions.
Final Prep

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- Will discuss solutions next lecture.