

CSci 127: Introduction to Computer Science



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Announcements



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NYC OpenData Initiative
Mayor's Office

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*Today: Adrienne Schmoeker & Albert Webber
NYC OpenData Initiative
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- 11:10am: Informal Q&A with Adrienne & Albert in 1203 Hunter East.

Frequently Asked Questions

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- For the intrepid few that keep asking: When are you covering recursion?
When we cover functions. See today and next week's lecture, and Program #40.

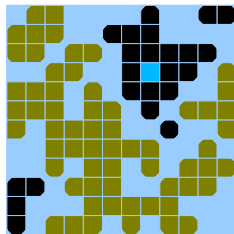
Today's Topics



- Recap: Prof. Saad's torus-land
- Introduction to Functions
- NYC Open Data

Recap: Living on a Torus

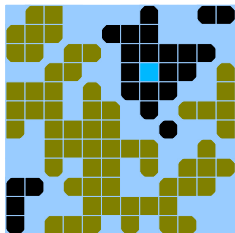
A random torus with
5 islands and 2 pools



- How many pools and how many islands does each version have? (Collect all 5!)

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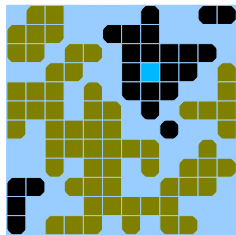
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- How many pools and how many islands does each version have? (Collect all 5!)
- Design an algorithm that will count the number of islands.

Recap: Count the number of islands.

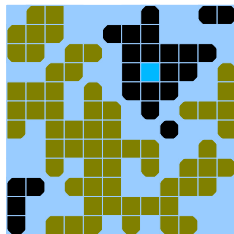
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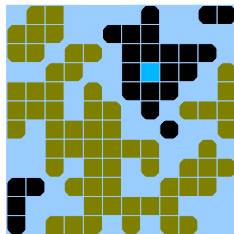
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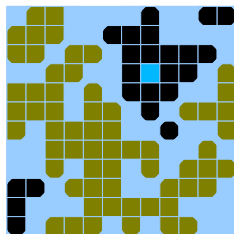
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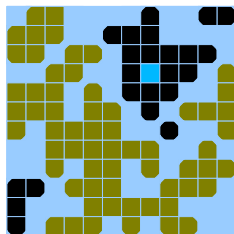
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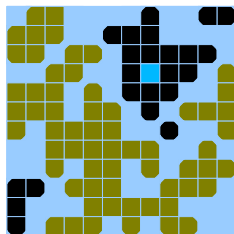
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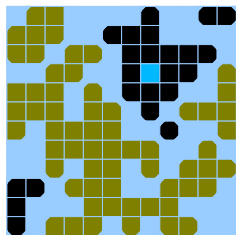
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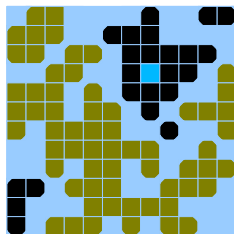
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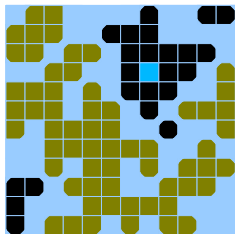
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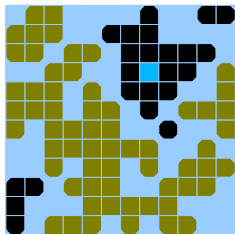
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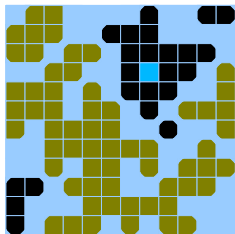
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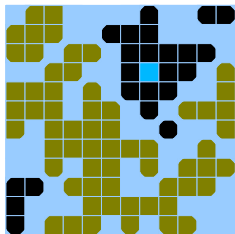
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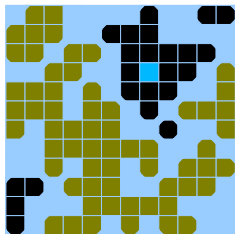
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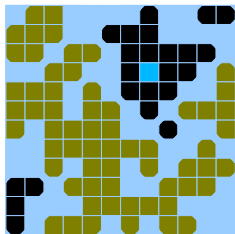
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 - ▶ Return count.

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,
#    says hello to the world!

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

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

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- Can write, or **define** your own functions, which are stored, until invoked or called.

“Hello, World!” with Functions

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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)  
  
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- The ones in the function call: **actual parameters**

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- The ones in the function call: **actual parameters**
- Functions can also **return values** to where it was called.

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Formal Parameters

Actual Parameters

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- The ones in the function call: **actual parameters**.
- Functions can also **return values** to where it was called.

In Pairs or Triples:

Circle the actual parameters and underline the formal parameters:

```
def prob4():  
    verse = "jam tomorrow and jam yesterday,"  
    print("The rule is,")  
    c = mystery(verse)  
    w = enigma(verse,c)  
    print(c,w)  
def mystery(v):  
    print(v)  
    c = v.count("jam")  
    return(c)  
def enigma(v,c):  
    print("but never", v[-1])  
    for i in range(c):  
        print("jam")  
    return("day.")  
prob4()
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prob4()
```

The diagram illustrates the flow of parameters between functions. Purple arrows, labeled "Actual Parameters", point from the arguments in function calls to the parameters in function definitions. Red arrows, labeled "Formal Parameters", point from the parameter names in function definitions to the function call. Specifically, purple arrows point from `verse` in `mystery(verse)` to `v` in `mystery(v)`, and from `verse` and `c` in `enigma(verse, c)` to `v` and `c` in `enigma(v, c)`. Red arrows point from `v` in `mystery(v)` to `prob4()`, and from `v` and `c` in `enigma(v, c)` to `prob4()`.

In Pairs or Triples:

Predict what the code will do:

```
def prob4():
    verse = "jam tomorrow and jam yesterday,"
    print("The rule is,")
    c = mystery(verse)
    w = enigma(verse,c)
    print(c,w)
def mystery(v):
    print(v)
    c = v.count("jam")
    return(c)
def enigma(v,c):
    print("but never", v[-1])
    for i in range(c):
        print("jam")
    return("day.")
prob4()
```

#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] )
```

Python Tutor

```
def prob4():
    verse = "jam tomorrow and jam yesterday."
    print("The rule is.")
    c = mystery(verse)
    w = enigma(verse,c)
    print(c,w)
def mystery(v):
    print(v)
    c = v.count("jam")
    return(c)
def enigma(v,c):
    print("but never", v[-1])
    for i in range(c):
        print("jam")
    return("day.")
prob4()
```

#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] )
```

(Demo with pythonTutor)

In Pairs or Triples:

Predict what the code will do:

```
#Greet loop example
```

```
def greetLoop(person):  
    print("Greetings")  
    for i in range(5):  
        print("Hello", person)
```

```
greetLoop("Thomas")
```

```
# From "Teaching with Python" by John Zelle
```

```
def happy():  
    print("Happy Birthday to you!")
```

```
def sing(P):  
    happy()  
    happy()  
    print("Happy Birthday dear " + P + "!")  
    happy()
```

```
sing("Fred")  
sing("Thomas")  
sing("Hunter")
```

Python Tutor

```
#Greet loop example

def greetLoop(person):
    print("Greetings")
    for i in range(5):
        print("Hello", person)

greetLoop("Thomas")
```

```
# From "Teaching with Python" by John Zelle
```

```
def happy():
    print("Happy Birthday to you!")

def sing(P):
    happy()
    happy()
    print("Happy Birthday dear " + P + "!")
    happy()
```

```
sing("Fred")
sing("Thomas")
sing("Hunter")
```

(Demo with pythonTutor)

In Pairs or Triples:

Fill in the missing code:

```
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: '))  
    mString = monthString(n)  
    print('The month is', mString)
```

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
    """

    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)
```

(Demo with IDLE)

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

```
#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)
```

(Demo with IDLE)

Recap: Functions

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

Recap: Functions

```
#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 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:

Recap: Functions

```
#Name: your name here
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#This program, uses functions,
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def main():
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if __name__ == "__main__":
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```

- 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")`

Recap: Functions

```
#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 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

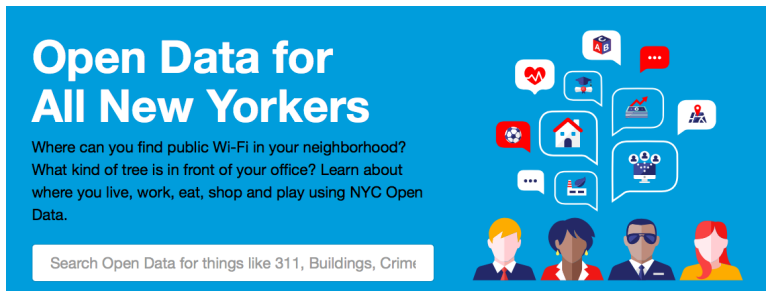
```
#Name: your name here
#Date: October 2017
#This program, uses functions,
#    says hello to the world!

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

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

- Functions 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.

Accessing Structured Data: NYC Open Data



Open Data for All New Yorkers

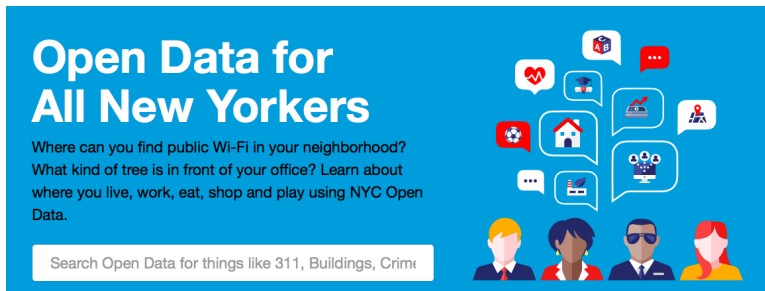
Where can you find public Wi-Fi in your neighborhood? What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

Search Open Data for things like 311, Buildings, Crime

The banner features a blue background with white text. On the right side, there are several speech bubbles containing icons representing various city services and data points: a heart with a pulse line, a graduation cap, a bar chart with an upward arrow, a location pin, a house, a soccer ball, a factory, and a group of people. Below the speech bubbles are four stylized avatars of diverse people.

- Freely available source of data.

Accessing Structured Data: NYC Open Data



Open Data for All New Yorkers

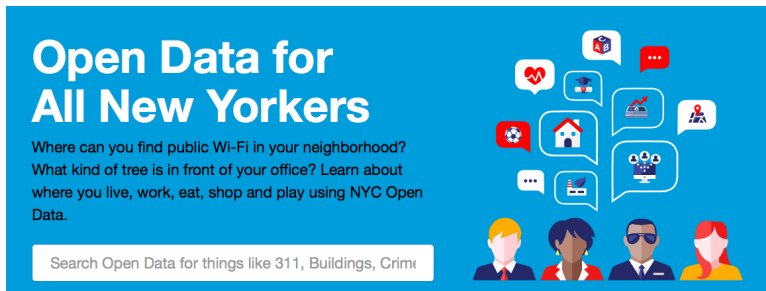
Where can you find public Wi-Fi in your neighborhood?
What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

Search Open Data for things like 311, Buildings, Crime

The graphic features a blue background with white text. Below the title, there are two lines of text asking questions about public Wi-Fi and trees. Below that is a search bar with the text "Search Open Data for things like 311, Buildings, Crime". To the right of the text, there are several speech bubbles containing icons: a heart with a pulse line, a graduation cap, a bar chart with an upward arrow, a location pin, a house, a soccer ball, a person with a magnifying glass, and a person with a speech bubble. At the bottom right, there are four stylized human figures in different colors (yellow, blue, black, and red) wearing various accessories like sunglasses and a graduation cap.

- Freely available source of data.
- Maintained by the NYC data analytics team.

Accessing Structured Data: NYC Open Data



Open Data for All New Yorkers

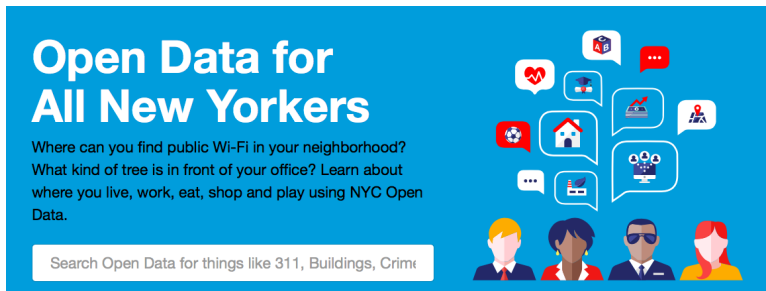
Where can you find public Wi-Fi in your neighborhood?
What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

Search Open Data for things like 311, Buildings, Crime

The banner features a blue background with white text. On the right side, there are several speech bubbles containing icons: a heart with a pulse line, a graduation cap, a bar chart with an upward arrow, a location pin, a house, a soccer ball, a factory, and a group of people. Below the speech bubbles are four stylized human figures with different skin tones and hairstyles.

- Freely available source of data.
- Maintained by the NYC data analytics team.
- We will use several different ones for this class.

Accessing Structured Data: NYC Open Data



Open Data for All New Yorkers

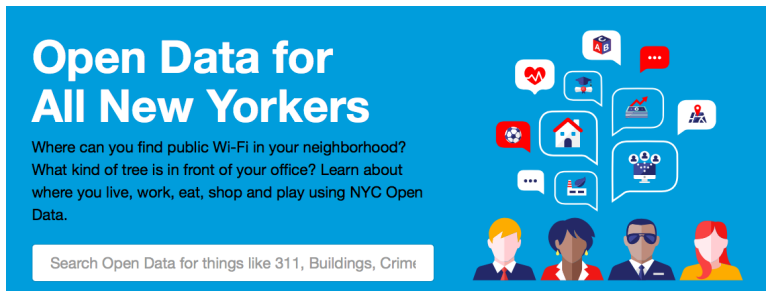
Where can you find public Wi-Fi in your neighborhood?
What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

Search Open Data for things like 311, Buildings, Crime

The banner features a blue background with white text. On the right side, there are several white speech bubbles containing icons: a heart with a pulse line, a graduation cap, a bar chart with an upward arrow, a location pin, a house, a soccer ball, a factory, and a group of people. Below the speech bubbles are four stylized human figures with different skin tones and hairstyles.

- Freely available source of data.
- Maintained by the NYC data analytics team.
- We will use several different ones for this class.
- Will use pandas, pyplot & folium libraries to analyze, visualize and map the data.

Accessing Structured Data: NYC Open Data



Open Data for All New Yorkers

Where can you find public Wi-Fi in your neighborhood?
What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

Search Open Data for things like 311, Buildings, Crime

The banner features a blue background with white text. On the right side, there are several white speech bubbles containing icons: a heart with a pulse line, a graduation cap, a bar chart with an upward arrow, a location pin, a house, a soccer ball, a factory, and a group of people. Below the speech bubbles are four stylized human figures with different skin tones and hairstyles, representing diverse New Yorkers.

- Freely available source of data.
- Maintained by the NYC data analytics team.
- We will use several different ones for this class.
- Will use pandas, pyplot & folium libraries to analyze, visualize and map the data.
- Lab 7 covers accessing and downloading NYC OpenData datasets.

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,,,,,,
,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,45049,6159,1781,3827,49447
1800,40515,5740,6642,1755,4563,79215
1810,96373,40203,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,3344,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813649,279122,32963,23593,25492,1174779
1870,942292,419801,45468,37393,33829,1470183
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51692,2507414
1900,1650093,1146582,152899,200507,67021,3437202
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284103,2018296,469042,732018,116511,5420048
1930,1867312,2560461,1079129,1265258,159346,6904466
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1940101,2738075,1550849,1452277,191555,78991957
1960,1698281,2627319,1809578,1424815,221993,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1801325,1168872,352121,7071439
1990,1487536,2300644,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8008278
2010,1494873,2504790,2230722,1385108,448730,8175123
2015,1644518,2636735,2339150,1455444,476558,8550405
```

nycHistPop.csv

In Lab 6

Example: Reading in CSV Files

```
import matplotlib.pyplot as plt
import pandas as pd
```

```
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,,,,,,
,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,4548,6159,1781,3827,49447
1800,40515,5740,6642,1755,4563,79215
1810,96373,8003,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,3344,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813649,279122,32963,23593,25492,1174779
1870,942292,419921,45468,37393,33829,1470193
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51692,2507414
1900,1650093,1146582,152899,200507,67021,2437202
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284103,2018256,469042,732018,116511,2620048
1930,1867312,2560461,1079129,1262580,159346,6930446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1940101,2738075,1500849,1452177,191555,78991957
1960,1698281,2627319,1809578,1624815,221993,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1801325,1168872,352121,7071439
1990,1487536,2300644,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8008278
2010,1548473,2504790,2230722,1385108,448730,81751523
2015,1644518,2636735,2339150,1455444,476558,8550405
```

nycHistPop.csv

In Lab 6

Example: Reading in CSV Files

```
import matplotlib.pyplot as plt
import pandas as pd
```

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

```
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,,,,,,
,,,,,
,,,,,
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,4548,6159,1781,3827,49447
1800,40515,5740,6642,1755,4563,79215
1810,96373,8023,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,3344,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813649,279122,32963,23593,25492,1174779
1870,942292,419921,45468,37393,33829,1470183
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51692,2507414
1900,1650093,1146582,152899,200507,67021,2437202
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284123,2018256,469042,732016,116511,5620048
1930,1867312,2560461,1079129,1265258,159346,4590446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1940101,2738075,1500849,1451277,191555,78991957
1960,1698281,2627319,1809578,1624815,221993,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1801325,1168872,352121,7071639
1990,1487536,2300644,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8008278
2010,1494873,2504790,2230722,1385108,448730,8175123
2015,1644518,2636735,2339150,1455444,476558,8550405
```

nycHistPop.csv

In Lab 6

Example: Reading in CSV Files

```
import matplotlib.pyplot as plt
import pandas as pd
```

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

```
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,,,,,,
,,,,,
,,,,,
```

```
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island>Total
1698,4937,2017,,,727,7681
1771,21863,3623,,,2847,28423
1790,33131,4548,6159,1781,3827,49447
1800,40515,5740,6642,1755,4563,79215
1810,96373,8003,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,3344,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813649,279122,32963,23593,25492,1174779
1870,942292,419801,45468,37393,33829,1470183
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51692,2507414
1900,1650093,1146582,152899,200507,67021,24372702
1910,2331542,1634351,284041,430980,85969,4766883
1920,2284103,2018256,469042,732016,116511,5620048
1930,1867312,2580461,1079129,1265258,159346,6506446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1940101,2738075,1550849,1451277,191505,78991957
1960,1698281,2627319,1809578,1624815,221993,7781984
1970,1539233,2602012,1986473,1471701,295443,7894862
1980,1428285,2230936,1801325,1168872,352121,7071639
1990,1487536,2300644,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1332650,443728,8006278
2010,1484873,2504790,2230722,1385108,448730,81751123
2015,1644518,2636735,2339150,1455444,476558,8550405
```

nycHistPop.csv

In Lab 6

```
pop.plot(x="Year")
plt.show()
```

Example: Reading in CSV Files

```
import matplotlib.pyplot as plt
import pandas as pd
```

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

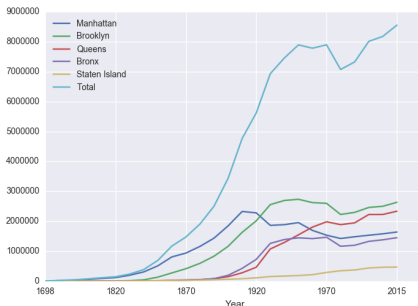
```
pop.plot(x="Year")
plt.show()
```

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.

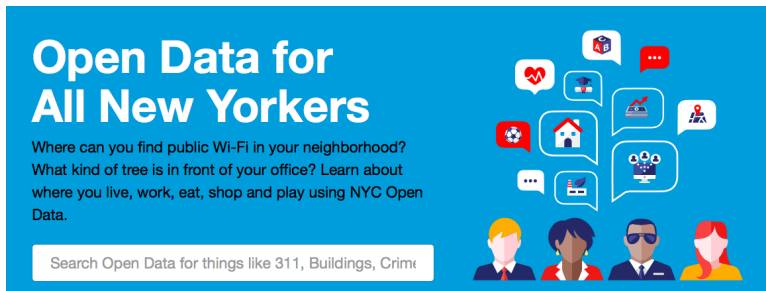
```
Year,Manhattan,Brooklyn,Queens,Bronx,Staten Island,Total
1698,4937,2017,,727,7681
1771,21863,3623,,2847,28423
1790,33131,4549,6159,1781,3827,49447
1800,40515,5740,6642,1755,4563,79215
1810,96373,9303,7444,2267,5347,119734
1820,123706,11187,8246,2782,6135,152056
1830,202589,20535,9049,3023,7082,242278
1840,312710,47613,14480,5344,10965,391114
1850,515547,138882,18593,8032,15061,696115
1860,813649,279122,32963,23593,25492,1174779
1870,942292,419901,45468,37393,33829,1470183
1880,1164673,599495,56559,51980,38991,1911698
1890,1441216,838547,87050,88908,51692,2507414
1900,1650093,1146582,152899,200507,67021,2437202
1910,2331542,1634351,284041,430980,85969,4668083
1920,2284103,2018256,469042,732016,116511,4620048
1930,1867312,2560451,1079129,1265598,159346,4930446
1940,1889924,2698285,1297634,1394711,174441,7454995
1950,1940101,2738275,1500449,1452177,291559,7892957
1960,1698281,2627319,1809578,1624815,221993,7781984
1970,1539233,2602012,1986473,1471701,295443,7094862
1980,1428285,2230936,1801325,1168872,352121,7071439
1990,1487536,2300644,1951598,1203789,378977,7322564
2000,1537195,2465326,2229379,1326450,443728,8006278
2010,1484873,2504760,2230722,1385108,468730,8175123
2015,1644518,2636735,2339155,1455444,476558,8550405
```

nycHistPop.csv

In Lab 6



CS Survey: Adrienne Schmoeker & Albert Webber



Open Data for All New Yorkers

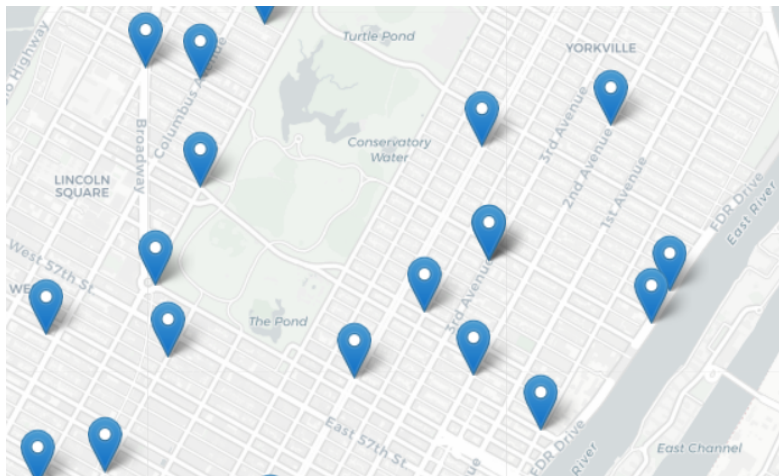
Where can you find public Wi-Fi in your neighborhood?
What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

Search Open Data for things like 311, Buildings, Crime

The banner features a blue background with white text. On the right side, there are several speech bubbles containing icons representing various data categories: a heart with a pulse line, a graduation cap, a red speech bubble with three dots, a soccer ball, a house, a factory with a smokestack, a location pin with a person icon, a speech bubble with three dots, a speech bubble with a bar chart, and a speech bubble with a person icon. Below the speech bubbles are four stylized human figures: a man with blonde hair, a woman with dark skin and short dark hair, a man with dark skin wearing sunglasses, and a woman with red hair.

- Adrienne Schmoeker & Albert Webber
NYC Mayor's Office of Data Analytics

Design Question



Design an algorithm that finds the closest collision.

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

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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- 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).
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 - 3 Open up the CSV file.

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Design Question

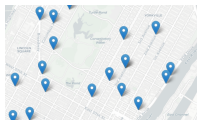
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- Example:
 - 1 Find data set (great place to look: NYC OpenData).
 - 2 Ask user for current location.
 - 3 Open up the CSV file.
 - 4 Check distance to each to user’s location.
 - 5 Save the location with the smallest distance.

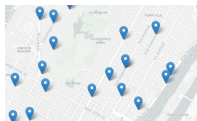
Recap

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



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

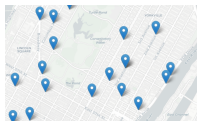


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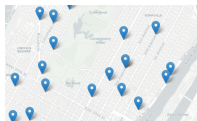
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Example: `print("Hello", "World")`

Recap



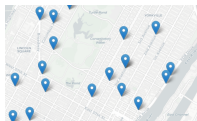
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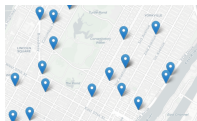
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- Accessing Formatted Data: NYC OpenData
- Pass your lecture slips to the aisles for the UTAs to collect.

Practice Quiz & Final Questions

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

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

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

```
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)

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def prob1():
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    print("but never", v[-1])
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prob4()
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- Since you must pass the final exam to pass the course, we end every lecture with final exam review.

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 - ▶ write as much you can for 60 seconds;

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- Theme: Functions!

Writing Boards



- Return writing boards as you leave...