

# CSci 127: Introduction to Computer Science



[hunter.cuny.edu/csci](http://hunter.cuny.edu/csci)

# Announcements

- Drop-in Sessions for the CSCI 127 & 135 students:

- ▶ Amanda Bell, department advisor
- ▶ 1001-L Hunter North
- ▶ Tuesday 11am-12pm
- ▶ Thursday 3pm-4pm



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  - ▶ Amanda Bell, department advisor
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  - ▶ Thursday 3pm-4pm
- CS Survey:

Brian Campbell, '19  
Grubhub

# Today's Topics



- Recap: Slicing & Images
- Introduction to Functions
- NYC Open Data
- CS Survey

# Today's Topics



- **Recap: Slicing & Images**
- Introduction to Functions
- NYC Open Data
- CS Survey

## Challenge: Cropping Images

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

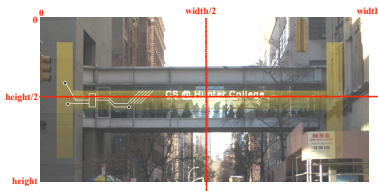
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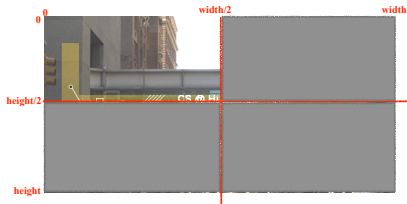
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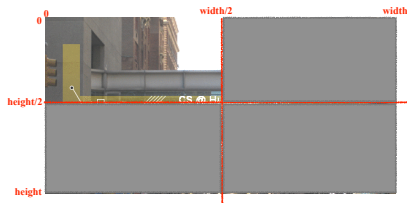
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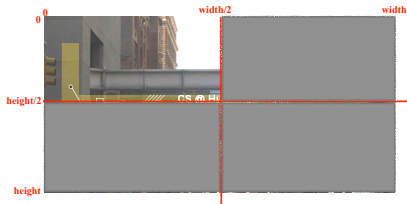
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- How would you select the lower left corner?

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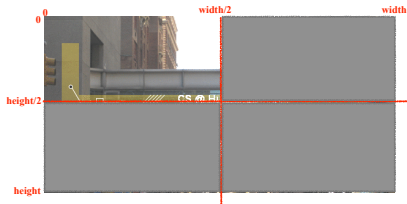


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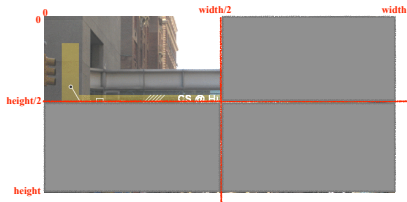
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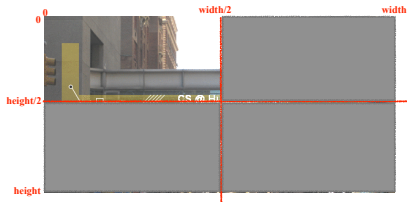
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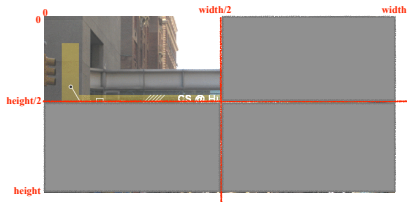
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# Functions

- 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!")

if __name__ == "__main__":
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- Many languages require that all code must be organized with functions.

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

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- Can write, or **define** your own functions,

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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, which are stored, until invoked or called.

## “Hello, World!” with Functions

```
#Name:  your name here  
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#This program, uses functions,  
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```

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

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



# Python Tutor

```
#Name: your name here  
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```
def main():  
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if __name__ == "__main__":  
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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)
```

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# Input Parameters & Return Values

- Functions can have **input parameters**.

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- Surrounded by parentheses, both in the function definition, and in the function call (invocation).
- The “placeholders” in the function definition: **formal parameters**.

# Input Parameters & Return Values

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- Functions can have **input parameters**.
- Surrounded by parentheses, both in the function definition, and in the function call (invocation).
- The “placeholders” in the function definition: **formal parameters**.
- The ones in the function call: **actual parameters**

# Input Parameters & Return Values

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- Surrounded by parentheses, both in the function definition, and in the function call (invocation).
- The “placeholders” in the function definition: **formal parameters**.
- The ones in the function call: **actual parameters**
- Functions can also **return values** to where it was called.



# Input Parameters & Return Values

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Formal Parameters

Actual Parameters

- Functions can have **input parameters**.
- Surrounded by parentheses, both in the function definition, and in the function call (invocation).
- The “placeholders” in the function definition: **formal parameters**.
- 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()
```

# In Pairs or Triples:

*Circle the actual parameters and underline the formal parameters:*

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prob4()
```

The diagram illustrates the flow of parameters between functions. Purple arrows, labeled "Actual Parameters", point from the circled arguments in function calls to the underlined parameters in function definitions. Red arrows, labeled "Formal Parameters", point from the underlined parameters in function definitions to the function call itself.

- Actual Parameters (circled):** `verse` in `mystery(verse)`, `verse` and `c` in `enigma(verse, c)`, and `"jam"` in `v.count("jam")`.
- Formal Parameters (underlined):** `v` in `mystery(v)`, `v` and `c` in `enigma(v, c)`, and the empty parentheses in `prob4()`.

# In Pairs or Triples:

*Predict what the code will do:*

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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):
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    for i in range(c):
        print("jam")
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prob4()
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# Python Tutor

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(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")
```

---

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#Greet loop example

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(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

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# Recap: Functions

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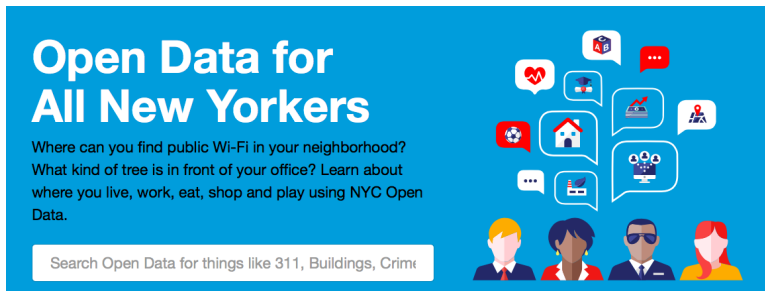
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- CS Survey

# Accessing Structured Data: NYC Open Data

A blue banner for NYC Open Data. On the left, the text "Open Data for All New Yorkers" is in large white font. Below it, a paragraph asks: "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." At the bottom left is a white search bar with the text "Search Open Data for things like 311, Buildings, Crime". On the right, there are several speech bubbles containing icons for various services: a heart with a pulse line, a graduation cap, a house, a soccer ball, a factory, a bar chart, a location pin, and a group of people. Below the speech bubbles are four stylized avatars of diverse people.

**Open Data for All New Yorkers**

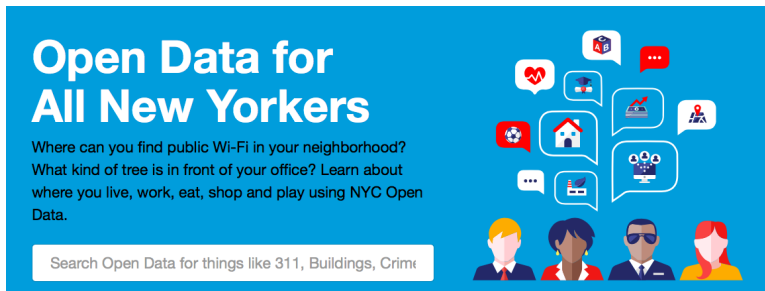
Where can you find public Wi-Fi in your neighborhood? What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

Search Open Data for things like 311, Buildings, Crime

- Freely available source of data.



# Accessing Structured Data: NYC Open Data



**Open Data for All New Yorkers**

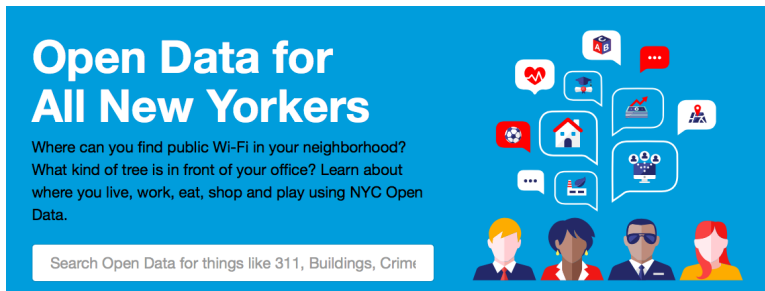
Where can you find public Wi-Fi in your neighborhood?  
What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

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 hat.

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

# Accessing Structured Data: NYC Open Data



**Open Data for All New Yorkers**

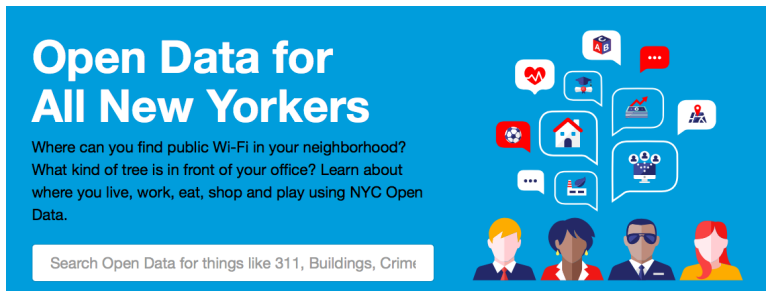
Where can you find public Wi-Fi in your neighborhood?  
What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

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 representing various data categories: 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.
- 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**

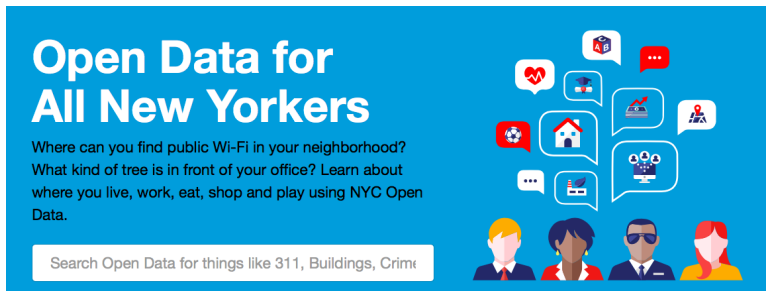
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What kind of tree is in front of your office? Learn about where you live, work, eat, shop and play using NYC Open Data.

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, there are several speech bubbles containing icons for various NYC services: a heart with a pulse line, a graduation cap, a house, a soccer ball, a factory, a location pin, a bar chart, and a group of people. Below the speech bubbles are four stylized human figures in business attire.

- 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: OpenData Film Permits



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## Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/mome/permits/when-permit-required.page>

EventID	EventType	StartDateTL	EndDateTime	EnteredOn	EventAg	ParkingHeld	Borou
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:36...	Mayor's Offic...	STARR AVENUE b...	Queens
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/04/2018 09:11...	Mayor's Offic...	EAGLE STREET be...	Brooklyn
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offic...	SOUTH OXFORD ...	Brooklyn
454920	Shooting Permit	12/06/2018 10:00...	12/06/2018 11:59...	12/04/2018 03:28...	Mayor's Offic...	13 AVENUE betw...	Queens
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offic...	ELDERT STREET b...	Brooklyn
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/04/2018 02:45...	Mayor's Offic...	ELDERT STREET b...	Brooklyn
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offic...	35 STREET betwe...	Queens

# Example: OpenData Film Permits

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Film Permits 📄 📊 📅

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/mome/permits/when-permit-required.page> More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDateTL	EndDateTime	EnteredOn	EventAg	ParkingHeld	Borou	Com	Police	Categ	SubC	Count	ZipCo
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:36...	Mayor's Offic...	STARR AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/04/2018 09:11...	Mayor's Offic...	EAGLE STREET be...	Brooklyn	1	94	Television	Episodic s...	United Sta...	11222
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offic...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	Still Photo...	Not Applic...	United Sta...	11217, 11...
454920	Shooting Permit	12/06/2018 10:00...	12/06/2018 11:59...	12/04/2018 03:28...	Mayor's Offic...	13 AVENUE betw...	Queens	1, 3, 7	109, 7, 90	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4, 5	104, 75, 83	Television	Episodic s...	United Sta...	11207, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/04/2018 02:45...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11237
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offic...	35 STREET betwe...	Queens	1	114	Television	Cable-epis...	United Sta...	11101, 11...

- What's the most popular street for filming?

# Example: OpenData Film Permits



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## Film Permits

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Find in this Dataset

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EventID	EventType	StartDateTL	EndDateTime	EnteredOn	EventAg	ParkingHeld	Borou	Com	Police	Categ	SubC	Count	ZipCo
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:36...	Mayor's Offic...	STARR AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/04/2018 09:11...	Mayor's Offic...	EAGLE STREET be...	Brooklyn	1	94	Television	Episodic s...	United Sta...	11222
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offic...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	Still Photo...	Not Applic...	United Sta...	11217, 11...
454920	Shooting Permit	12/06/2018 10:00...	12/06/2018 11:59...	12/04/2018 03:28...	Mayor's Offic...	13 AVENUE betw...	Queens	1, 3, 7	109, 7, 90	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4, 5	104, 75, 83	Television	Episodic s...	United Sta...	11207, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/04/2018 02:45...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11237
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offic...	35 STREET betwe...	Queens	1	114	Television	Cable-epis...	United Sta...	11101, 11...

- What's the most popular street for filming?
- What's the most popular borough?

# Example: OpenData Film Permits



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## Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/mome/permits/when-permit-required.page>

Find in this Dataset

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EventID	EventType	StartDateTL	EndDateTime	EnteredOn	EventAg...	ParkingHeld	Borou...	Com...	Police...	Categ...	SubC...	Count...	ZipCo...
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:36...	Mayor's Offic...	STARR AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/04/2018 09:11...	Mayor's Offic...	EAGLE STREET be...	Brooklyn	1	94	Television	Episodic s...	United Sta...	11222
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offic...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	Still Photo...	Not Applic...	United Sta...	11217, 11...
454920	Shooting Permit	12/06/2018 10:00...	12/06/2018 11:59...	12/04/2018 03:28...	Mayor's Offic...	13 AVENUE betw...	Queens	1, 3, 7	109, 7, 90	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4, 5	104, 75, 83	Television	Episodic s...	United Sta...	11207, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/04/2018 02:45...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11237
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offic...	35 STREET betwe...	Queens	1	114	Television	Cable-epis...	United Sta...	11101, 11...

- What's the most popular street for filming?
- What's the most popular borough?
- How many TV episodes were filmed?



# Example: OpenData Film Permits

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Film Permits

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EventID	EventType	StartDateT...	EndDateTime	EventDate	EventAg...	ParkingInfr...	Borne...	Cent...	Police...	Categ...	SubCat...	Count...	ZipCo...
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:35...	Mayor's Offi...	STARKE AVENUE b...	Queens	2	108	Television	Epicodic S...	United Sta...	11101
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/06/2018 09:11...	Mayor's Offi...	EAGLE STREET b...	Brooklyn	1	84	Television	Epicodic S...	United Sta...	11222
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/06/2018 05:44...	Mayor's Offi...	SOUTH OXFORD b...	Brooklyn	2, 6	76, 88	3/8 Photo...	Not Applica...	United Sta...	11215, 11...
454920	Shooting Permit	12/06/2018 13:00...	12/06/2018 11:55...	12/06/2018 03:28...	Mayor's Offi...	13 AVENUE betwe...	Queens	1, 3, 7	108, 7, 96	Film	Feature	United Sta...	10052, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/06/2018 09:05...	Mayor's Offi...	ELBERT STREET b...	Brooklyn	4, 9	104, 76, 83	Television	Epicodic S...	United Sta...	11250, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 09:00...	12/06/2018 02:45...	Mayor's Offi...	ELBERT STREET b...	Brooklyn	4	83	Television	Epicodic S...	United Sta...	11227
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/06/2018 02:17...	Mayor's Offi...	35 STREET betwe...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.

# Example: OpenData Film Permits

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Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/nycopendata/permits/when-permit-required.page>

Find in this Dataset

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EventID	EventType	StartDateT...	EndDateTime	EnteredOn	EventAg...	ParkingInf...	Borne...	Cent...	Police...	Categ...	SubCat...	Count...	ZipCo...
45503	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:35...	Mayor's Offi...	STARKE AVENUE b...	Queens	2	108	Television	Episodic S...	United Sta...	11101
45467	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/06/2018 09:11...	Mayor's Offi...	EAGLE STREET bet...	Brooklyn	1	84	Television	Episodic S...	United Sta...	11222
45481	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offi...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	3/8 Photo...	Not Applica...	United Sta...	11215, 11...
45400	Shooting Permit	12/06/2018 13:00...	12/06/2018 11:00...	12/04/2018 03:28...	Mayor's Offi...	13 AVENUE betwe...	Queens	1, 3, 7	108, 7, 98	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/06/2018 09:05...	Mayor's Offi...	ELDERST STREET b...	Brooklyn	4, 6	104, 76, 83	Television	Episodic S...	United Sta...	11200, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 09:00...	12/04/2018 02:45...	Mayor's Offi...	ELDERST STREET b...	Brooklyn	4	83	Television	Episodic S...	United Sta...	11227
454865	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offi...	35 STREET betwe...	Queens	1	114	Television	Cable-epi...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.
- Python program:

```
#CSci 127 Teaching Staff
#March 2019
#OpenData Film Permits
```

```
#Import pandas for reading and analyzing CSV data:
import pandas as pd
csvFile = "filmPermits.csv" #Name of the CSV file
tickets = pd.read_csv(csvFile)#Read in the file to a dataframe
```

# Example: OpenData Film Permits

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Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/nycopendata/permits/when-permit-required.page>

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EventId	Event Type	StartDate	EndDate	EventName	ParkingInfo	Borough	Cent.	Police	Catg.	SubCat.	Count	ZipCo.	
45503	Shooting Permit	12/06/2018 07:00	12/06/2018 09:00	12/05/2018 12:35	Mayor's Office	STARKE AVENUE B...	Queens	2	108	Television	Episodic S...	United Sta...	11101
45467	Shooting Permit	12/06/2018 07:00	12/06/2018 09:00	12/06/2018 09:11	Mayor's Office	EAGLE STREET B...	Brooklyn	1	84	Television	Episodic S...	United Sta...	11222
45491	Shooting Permit	12/06/2018 07:00	12/06/2018 07:00	12/06/2018 05:44	Mayor's Office	SOUTH OXFORD	Brooklyn	2	76, 88	S&B Photo...	Not Applica...	United Sta...	11215, 11...
45400	Shooting Permit	12/06/2018 13:00	12/06/2018 11:00	12/06/2018 03:28	Mayor's Office	13 AVENUE betwe...	Queens	1, 3, 7	108, 7, 98	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00	12/06/2018 11:00	12/06/2018 03:05	Mayor's Office	ELBERT STREET B...	Brooklyn	4, 9	104, 76, 83	Television	Episodic S...	United Sta...	11200, 11...
454909	Shooting Permit	12/05/2018 08:00	12/05/2018 09:00	12/06/2018 02:45	Mayor's Office	ELBERT STREET B...	Brooklyn	4	83	Television	Episodic S...	United Sta...	11227
454905	Shooting Permit	12/06/2018 07:00	12/06/2018 10:00	12/06/2018 02:17	Mayor's Office	35 STREET betwe...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

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```
#March 2019
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#Import pandas for reading and analyzing CSV data:
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```
import pandas as pd
```

```
csvFile = "filmPermits.csv" #Name of the CSV file
```

```
tickets = pd.read_csv(csvFile)#Read in the file to a dataframe
```

```
print(tickets) #Print out the dataframe
```

# Example: OpenData Film Permits

NYC OpenData

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Film Permits

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Find in this Dataset

More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDate	EndDate	EventDate	EventName	ParkingHeld	Borough	Cent.	Police	Catg.	SubCat.	County	ZipCode
45503	Shooting Permit	12/06/2018 07:00	12/06/2018 09:00	12/05/2018 12:35	Mayor's Office	STARKE AVENUE B...	Queens	2	108	Television	Epidemic S...	United Sta...	11101
45467	Shooting Permit	12/06/2018 07:00	12/06/2018 09:00	12/04/2018 09:11	Mayor's Office	EAGLE STREET B...	Brooklyn	1	84	Television	Epidemic S...	United Sta...	11222
45481	Shooting Permit	12/06/2018 07:00	12/06/2018 07:00	12/04/2018 05:44	Mayor's Office	SOUTH OXFORD	Brooklyn	2	76, 88	3-D Photo...	Not Applica...	United Sta...	11215, 11...
45400	Shooting Permit	12/06/2018 13:00	12/06/2018 11:00	12/04/2018 03:28	Mayor's Office	13 AVENUE betw...	Queens	1, 3, 7	108, 7, 98	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00	12/06/2018 11:00	12/04/2018 03:05	Mayor's Office	ELBERT STREET B...	Brooklyn	4, 6	104, 76, 83	Television	Epidemic S...	United Sta...	11202, 11...
454809	Shooting Permit	12/05/2018 08:00	12/05/2018 09:00	12/04/2018 02:45	Mayor's Office	ELBERT STREET B...	Brooklyn	4	83	Television	Epidemic S...	United Sta...	11227
454865	Shooting Permit	12/06/2018 07:00	12/06/2018 10:00	12/04/2018 02:17	Mayor's Office	35 STREET betw...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.
- Python program:

```
#CSci 127 Teaching Staff
#March 2019
#OpenData Film Permits
```

```
#Import pandas for reading and analyzing CSV data:
import pandas as pd
csvFile = "filmPermits.csv" #Name of the CSV file
tickets = pd.read_csv(csvFile)#Read in the file to a dataframe
print(tickets) #Print out the dataframe
print(tickets["ParkingHeld"]) #Print out streets (multiple times)
```

# Example: OpenData Film Permits

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Film Permits

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Find in this Dataset

More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDateT...	EndDateTime	EnteredOn	EventAg...	ParkingHeld	Borne...	Cent...	Police...	Camp...	SubC...	Count...	ZipCo...
45503	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:35...	Mayor's Offi...	STARKE AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
45467	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/04/2018 09:11...	Mayor's Offi...	EAGLE STREET b...	Brooklyn	1	84	Television	Episodic s...	United Sta...	11222
45461	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 09:44...	Mayor's Offi...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	3/8 Photo...	Not Applica...	United Sta...	11215, 11...
45400	Shooting Permit	12/06/2018 13:00...	12/06/2018 11:55...	12/04/2018 03:28...	Mayor's Offi...	13 AVENUE betwe...	Queens	1, 3, 7	108, 7, 96	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 09:05...	Mayor's Offi...	ELBERT STREET b...	Brooklyn	4, 6	104, 76, 83	Television	Episodic s...	United Sta...	11200, 11...
454809	Shooting Permit	12/05/2018 08:00...	12/05/2018 09:00...	12/04/2018 02:45...	Mayor's Offi...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11227
454865	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offi...	35 STREET betwe...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.
- Python program:

```
#CSci 127 Teaching Staff
#March 2019
#OpenData Film Permits
```

```
#Import pandas for reading and analyzing CSV data:
import pandas as pd
csvFile = "filmPermits.csv" #Name of the CSV file
tickets = pd.read_csv(csvFile)#Read in the file to a dataframe
print(tickets) #Print out the dataframe
print(tickets["ParkingHeld"]) #Print out streets (multiple times)
print(tickets["ParkingHeld"].value_counts()) #Print out streets & number of times used
```

# Example: OpenData Film Permits

NYC OpenData

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Film Permits

Permits are generally required when asserting the exclusive use of city property, like a sidewalk, a street, or a park. See <http://www1.nyc.gov/site/nycopen/permits/when-permit-required.page>

Find in this Dataset

More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDate	EndDate	EnterDate	EventAg	ParkingHeld	Borne	Cent	Police	Catg	SubCat	Count	ZipCo
45503	Shooting Permit	12/06/2018 07:00	12/06/2018 09:00	12/05/2018 12:35	Mayor's Offi...	STARKE AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
45467	Shooting Permit	12/06/2018 07:00	12/06/2018 09:00	12/04/2018 09:11	Mayor's Offi...	EAGLE STREET bet...	Brooklyn	1	84	Television	Episodic s...	United Sta...	11222
45461	Shooting Permit	12/06/2018 07:00	12/06/2018 07:00	12/04/2018 09:44	Mayor's Offi...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	SUB Photo...	Not Applica...	United Sta...	11215, 11...
45400	Shooting Permit	12/06/2018 13:00	12/06/2018 11:00	12/04/2018 03:28	Mayor's Offi...	13 AVENUE betwe...	Queens	1, 3, 7	108, 7, 98	Film	Feature	United Sta...	10002, 11...
45414	Shooting Permit	12/06/2018 08:00	12/06/2018 11:00	12/04/2018 03:05	Mayor's Offi...	ELBERT STREET b...	Brooklyn	4, 6	104, 76, 83	Television	Episodic s...	United Sta...	11200, 11...
45409	Shooting Permit	12/05/2018 08:00	12/05/2018 09:00	12/04/2018 02:45	Mayor's Offi...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11227
45405	Shooting Permit	12/06/2018 07:00	12/06/2018 10:00	12/04/2018 02:17	Mayor's Offi...	35 STREET betwe...	Queens	1	114	Television	Cable-epic...	United Sta...	11101, 11...

- Download the data as a CSV file and store on your computer.
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#Import pandas for reading and analyzing CSV data:
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csvFile = "filmPermits.csv" #Name of the CSV file
tickets = pd.read_csv(csvFile)#Read in the file to a dataframe
print(tickets) #Print out the dataframe
print(tickets["ParkingHeld"]) #Print out streets (multiple times)
print(tickets["ParkingHeld"].value_counts()) #Print out streets & number of times used
print(tickets["ParkingHeld"].value_counts()[:10]) #Print 10 most popular
```

# Example: OpenData Film Permits

NYC OpenData

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Film Permits

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Find in this Dataset

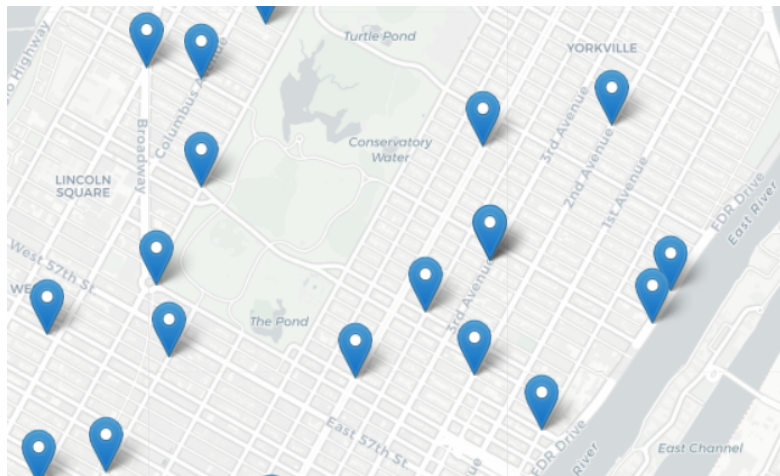
More Views Filter Visualize Export Discuss Embed About

EventID	EventType	StartDateTL	EndDateTime	EnteredOn	EventAg	ParkingHeld	Borou	Com	Police	Categ	SubC	Count	ZipCo
455063	Shooting Permit	12/06/2018 07:00...	12/06/2018 09:00...	12/05/2018 12:36...	Mayor's Offic...	STARR AVENUE b...	Queens	2	108	Television	Episodic s...	United Sta...	11101
454967	Shooting Permit	12/06/2018 07:00...	12/06/2018 05:00...	12/04/2018 09:11...	Mayor's Offic...	EAGLE STREET be...	Brooklyn	1	94	Television	Episodic s...	United Sta...	11222
454941	Shooting Permit	12/06/2018 07:00...	12/06/2018 07:00...	12/04/2018 05:44...	Mayor's Offic...	SOUTH OXFORD ...	Brooklyn	2, 6	76, 88	Still Photo...	Not Applic...	United Sta...	11217, 11...
454920	Shooting Permit	12/06/2018 10:00...	12/06/2018 11:59...	12/04/2018 03:28...	Mayor's Offic...	13 AVENUE betw...	Queens	1, 3, 7	109, 7, 90	Film	Feature	United Sta...	10002, 11...
454914	Shooting Permit	12/06/2018 08:00...	12/06/2018 11:00...	12/04/2018 03:05...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4, 5	104, 75, 83	Television	Episodic s...	United Sta...	11207, 11...
454909	Shooting Permit	12/05/2018 08:00...	12/05/2018 06:00...	12/04/2018 02:45...	Mayor's Offic...	ELBERT STREET b...	Brooklyn	4	83	Television	Episodic s...	United Sta...	11237
454905	Shooting Permit	12/06/2018 07:00...	12/06/2018 10:00...	12/04/2018 02:17...	Mayor's Offic...	35 STREET betwe...	Queens	1	114	Television	Cable-epis...	United Sta...	11101, 11...

## Can approach the other questions in the same way:

- What's the most popular street for filming?
- What's the most popular borough?
- How many TV episodes were filmed?

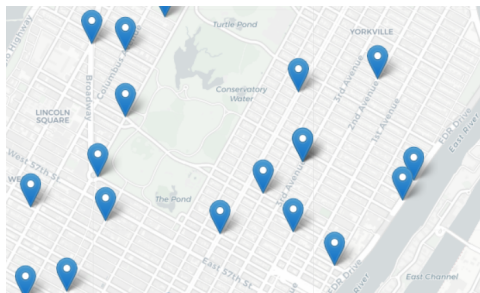
# Design Question



Design an algorithm that finds the closest collision.



# Design Question



Design an algorithm that finds the closest collision.

DATE	TIME	BOROUGH	ZIP CODE	LATITUDE	LONGITUDE	LOCATION	ON STREET	CROSS STREET	OFF STREET	NUMBER OF
12/31/16	9:56						2 AVENUE			0
12/31/16	9:55	BRONX	10462	40.83521	-73.85497	{40.8352098	UNIONPORT	OLMSTEAD AVENUE		0
12/31/16	9:50						JESUP AVENUE			0
12/31/16	9:40	BROOKLYN	11225	40.66911	-73.95335	{40.6691137	ROGERS AVE	UNION STREET		0
12/31/16	20:23	BROOKLYN	11209	40.62578	-74.02415	{40.6257805	80 STREET	5 AVENUE		0
12/31/16	20:20	QUEENS	11375	40.71958	-73.83977	{40.719584,	ASCAN AVEN	QUEENS BOULEVARD		0
12/31/16	20:15	BROOKLYN	11204				60 STREET	BAY PARKWAY		0
12/31/16	20:10			40.66479	-73.82047	{40.6647944, -73.8204653}				0
12/31/16	20:10						69 STREET	37 AVENUE		0
12/31/16	20:05	BRONX	10457	40.85429	-73.90026	{40.8542925	RYER AVENUE	EAST 181 STREET		0

# 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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- Create a “To Do” list of what your program has to accomplish.
- Read through the problem, and break it into “To Do” items.
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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:
  - 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.

# 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:

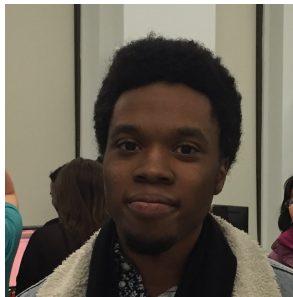
- Create a “To Do” list of what your program has to accomplish.
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  - 2 Ask user for current location.
  - 3 Open up the CSV file.
  - 4 Check distance to each to user’s location.
  - 5 Save the location with the smallest distance.

# Today's Topics



- Recap: Slicing & Images
- Introduction to Functions
- NYC Open Data
- **CS Survey**

# CS Survey



CS Survey:  
Brian Campbell '19  
Grubhub

# Design Challenge

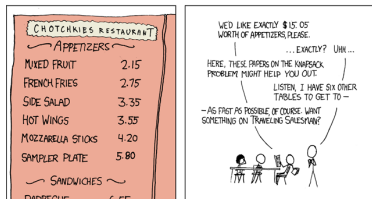
## MY HOBBY: EMBEDDING NP-COMPLETE PROBLEMS IN RESTAURANT ORDERS

CHOTCHKIES RESTAURANT	
~ APPETIZERS ~	
MIXED FRUIT	2.15
FRENCH FRIES	2.75
SIDE SALAD	3.35
HOT WINGS	3.55
MOZZARELLA STICKS	4.20
SAMPLER PLATE	5.80
~ SANDWICHES ~	
BARBECUE	6.55



# Design Challenge

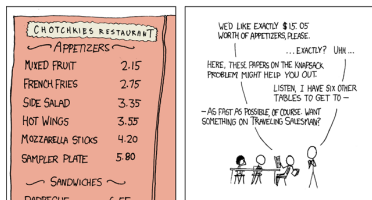
MY HOBBY:  
EMBEDDING NP-COMPLETE PROBLEMS IN RESTAURANT ORDERS



- Possible solutions:

# Design Challenge

MY HOBBY:  
EMBEDDING NP-COMPLETE PROBLEMS IN RESTAURANT ORDERS

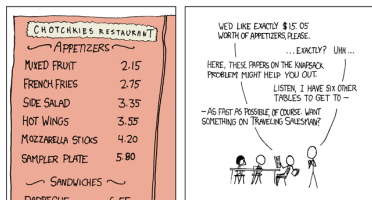


- Possible solutions:
  - ▶ 7 orders of mixed fruit, or



# Design Challenge

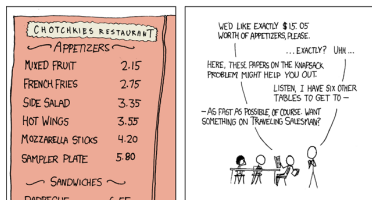
MY HOBBY:  
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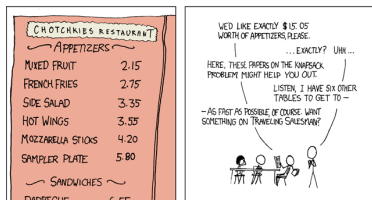
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- **Input:** List of items with prices and amount to be spent.

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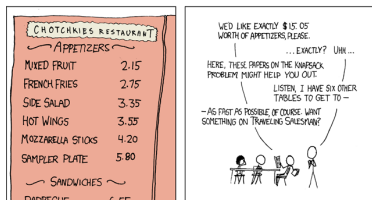
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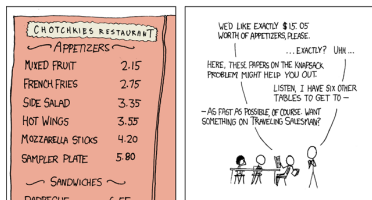
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- Possible algorithms: For each item on the list, divide total by price. If no remainder, return a list of that item. Repeat with two items, trying 1 of the first, 2 of the first, etc. Repeat with three items, etc.

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- “NP-Complete” problem: possible answers can be checked quickly, but not known how to compute quickly.

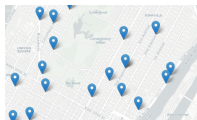
# Today's Topics



- Recap: Slicing & Images
- Introduction to Functions
- NYC Open Data
- CS Survey

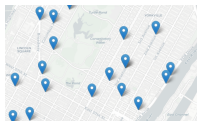
# Recap

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



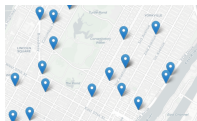
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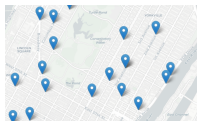
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Example: `print("Hello", "World")`

# Recap



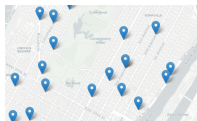
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- Accessing Formatted Data: NYC OpenData
- Pass your lecture slips to the aisles for the UTAs to collect.

# Practice Quiz & Final Questions

```
#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()
```

```
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 prob4(l):
    verse = "jam tomorrow and jam yesterday."
    print("The rule is.")
    c = mystery(verse)
    w = enigma(verse, c)
    print(c, w)

def mystery(s):
    print(w)
    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()
```

- Since you must pass the final exam to pass the course, we end every lecture with final exam review.

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- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).
- Lightning rounds:

# Practice Quiz & Final Questions

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Starting with Summer 18, #4.

# Writing Boards



- Return writing boards as you leave...