

CSci 127: Introduction to Computer Science



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Frequently Asked Questions

From lecture slips & recitation sections.

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Yes, you must pass the final (60 out of 100 points) to the pass the class.

- **I'd like to take more computer science. What's next?**

Fabulous! The next courses are:

- ▶ *CSci 135: Programming in C++.*

*Lecture: **TBA**; Sections: see schedule.*

- ▶ *CSci 150: Discrete structures (math for computing).*

*Lecture: **TBA**; Sections: see schedule.*

Today's Topics



- Recap: Folium
- Indefinite loops
- Design Patterns: Max (Min)
- Design Challenge

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- **Recap: Folium**
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- Design Challenge

Challenge:

What does this code do?

```
1 import folium
2 import pandas as pd
3 import webbrowser #display html file
4 import os #use to find directory
```

What does this code do?: II

```
1 #Use pandas (alias pd) to read a csv file,  
2 #save the returned data frame object in  
3 #variable cuny.  
4 cuny = pd.read_csv('cunyLocations.csv')
```

Contents of cunyLocations.csv.

```
College or Institution Type,Campus,...,Latitude,Longitude,...  
Senior Colleges,Baruch College,...,40.740977,-73.984252,...  
Senior Colleges,Brooklyn College,...,40.630276,-73.955545,...  
Community Colleges,Borough of Manhattan Community College,...,40.717367,-74.012178,  
...
```

What does this code do?: II

```
5 #Create a map object centered at 40.75,  
   -74.125,  
6 #save in variable mapCUNY.  
7 mapCUNY = folium.Map(location = [40.75,  
   -74.125])
```


What does this code do? II

```
8  for index, row in cuny.iterrows():
9      #iterrow method of dataframe object cuny returns two
      values:
10     #the first is index, the second is row.
11     lat = row["Latitude"]
12     lon = row["Longitude"]
13     name = row["Campus"]
14     if row["College or Institution Type"] == "Senior
        Colleges":
15         collegeIcon = folium.Icon(color="purple")
16     else:
17         collegeIcon = folium.Icon(color="blue")
18
19     #create a marker, sepcify its latitude, longitude,
20     #pop up name, and icon, save in variable newMarker.
21     newMarker = folium.Marker([lat, lon], popup=name,
        icon=collegeIcon)
```

What does this code do? III

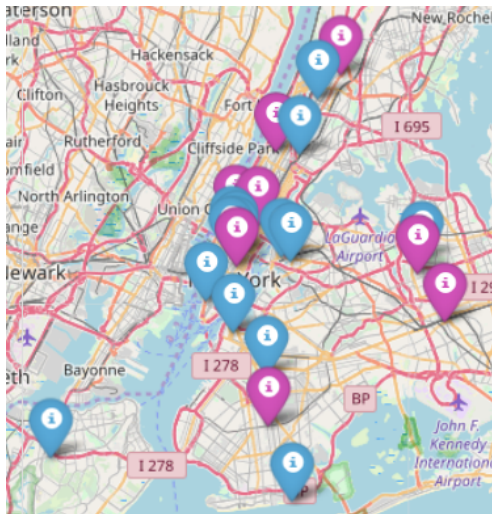
```
24 filename = 'cunyLocationsSenior.html'
25
26 #save mapCUNY to filename
27 mapCUNY.save(outfile = filename)
28
29 #display html using open method of
    webbrowser class.
30 webbrowser.open('file://' + os.path.
    realpath(filename))
```

What does the code do?: V

```
1 import folium
2 import pandas as pd
3 import webbrowser #display html file
4 import os #use to find directory
5
6 #Use pandas (alias pd) to read a csv file,
7 #save the return data frame object in variable cuny.
8 cuny = pd.read_csv('cunyLocations.csv')
9
10 #Create a map object centered at 40.75, -74.125,
11 #save in variable mapCUNY.
12 mapCUNY = folium.Map(location = [40.75, -74.125])
13
14 for index, row in cuny.iterrows():
15     lat = row["Latitude"]
16     lon = row["Longitude"]
17     name = row["Campus"]
18     if row["College or Institution Type"] == "Senior Colleges":
19         collegeIcon = folium.Icon(color="purple")
20     else:
21         collegeIcon = folium.Icon(color="blue")
22
23     #create a marker, sepcify its latitude, longitude,
24     #pop up name, and icon, save in variable newMarker.
25     newMarker = folium.Marker([lat, lon], popup=name, icon=collegeIcon)
26     newMarker.add_to(mapCUNY)
27
28 filename = 'cunyLocationsSenior.html'
29 #save mapCUNY to filename
30 mapCUNY.save(outfile = filename)
31
32 #display html using open method of webbrowser class
33 webbrowser.open('file://' + os.path.realpath(filename))
```

Folium example

What does this code do?



Folium

- A module for making HTML maps.

Folium



Folium

Folium



- A module for making HTML maps.
- It's a Python interface to the popular `leaflet.js`.

Folium

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- A module for making HTML maps.
- It's a Python interface to the popular `leaflet.js`.
- Outputs `.html` files which you can open in a browser.

Folium

Folium



- A module for making HTML maps.
- It's a Python interface to the popular `leaflet.js`.
- Outputs `.html` files which you can open in a browser.

Write \rightarrow *Run*
code. *program.*

Today's Topics



- Recap: Folium
- **Indefinite loops**
- Design Patterns: Max (Min)
- Design Challenge

Challenge:

- Write a function that asks a user for number after 2000 but before 2021. The function should repeatedly ask the user for a number until they enter one within the range and return the number.

Coding

- Write a function that asks a user for number after 2000 but before 2021. The function should repeatedly ask the user for a number until they enter one within the range and return the number.

Questions:

- Is 2000 a valid input?
- Is 2021 a valid input?
- Is 2001 a valid input?

Define function header.

```
def getYear():
```

Coding

- Write a function that asks a user for number after 2000 but before 2021. The function should repeatedly ask the user for a number until they enter one within the range and **return** the number.

```
1 def getYear():  
2     #TODO: initialize num  
3  
4     return num
```

Coding

- Write a function that asks a user for number after 2000 but before 2021. The function should repeatedly ask the user for a number until they enter one within the range and return the number.

```
1 def getYear():  
2     num = 0 #initialize num  
3  
4  
5     return num
```

Coding

- Write a function that asks a user for number after 2000 but before 2021. The function should repeatedly ask the user for a number until they enter one within the range and return the number.

```
1 def getYear():
2     num = 0 #initialize num
3     #Repeat entering num until it is in
4     #(2000, 2021), neither end is included.
5     #...invalid...(---valid---)...invalid...
6     #           2000           2021
7     while num <= 2000 or num >= 2021:
8         num = int(input("Enter a number after
9         2000 and before 2021: "))
10    return num #outside loop
```

Define and Call function getYear

```
1 def getYear():
2     num = 0 #initialize num
3     #Repeat entering num until it is in (2000, 2021).
4     #...invalid...(--valid input--)...invalid...
5     #           2000           2021
6     while num <= 2000 or num >= 2021:
7         num = int(input("Enter num after 2000 and before
8                        2021: "))
9     return num
10
11 def main():
12     #num in main has nothing to do with num in getYear
13     num = getYear()
14     print("The year is", num)
15
16 if __name__ == '__main__':
17     main()
```

Can you spot an error?

```
1 num = 0
2
3 def getYear():
4     while num <= 2000 or num >= 2021:
5         num = int(input("Enter a
6             number after 2000 and
7             before 2021: "))
8
9     return num
```


Hints for Programming Assignment 44

Shades of red in Lab 2 looks like a petal.

```
1 import turtle
2
3 turtle.colormode(255) #Allows colors to be given as
   0...255
4 t = turtle.Turtle() #Create a turtle
5
6 #For 0, 10, 20, ..., 250
7 for i in range(0, 255, 10):
8     t.forward(10) #Move forward
9     t.pensize(i) #Set the drawing size to be i (larger
   each time)
10    t.color(i, 0, 0) #Set the red channel to be i (
   brighter each time)
```

Hints for Programming Assignment 44: II

How to change the color of shades? For example, how to generate shades of yellow?

```
1 import turtle
2
3 turtle.colormode(255) #Allows colors to be given as
   0...255
4 t = turtle.Turtle() #Create a turtle
5
6 #For 0, 10, 20, ..., 250
7 for i in range(0, 255, 10):
8     t.forward(10) #Move forward
9     t.pensize(i) #Set the drawing size to be i (larger
   each time)
10    t.color(i, i, 0) #Set the red channel to be i (
   brighter each time)
```

Hints for Programming Assignment 44: III

Define function `petal`, draw a petal in given color and tilted a given angle in the beginning. **Is there a return?**

Philosophy of function: someone needs to do the work!

```
1 import turtle
2 def petal(color, angle):
3     turtle.colormode(255)
4     t = turtle.Turtle()
5     #TODO: t turns (ie, tilts) left angle degree
6     for i in range(0, 255, 10):
7         t.forward(10)
8         t.pensize(i)
9         if color == 'red':
10             t.color(i, 0, 0)
11         elif color == 'green':
12             t.color(0, i, 0)
13         #omit the rest of color
```

Can you spot an error?

In Programming Assignment 44, which defines function `petal(color, angle)` and `flower(color, numPetals)`.

```
1 import turtle
2
3 turtle.colormode(255)
4
5 def petal(color,angle):
6     t = turtle.Turtle()
7     #omit the rest codes
```

Draw a flower

For a given color and numPetals, draw a flower.

```
1 def flower(color, numPetals):
2     #numPetals: number of petals of a flower
3     angle = ? #initialize angle, what is the
4                 angle of the first petal?
5     Do the following for numPetals times:
6         (1) draw a petal for the given color
            and angle
        (2) Update angle as the tilting angle
            of the petal right to the current
            petal. What is the angle between a
            petal and its right neighbor for a
            flower with numPetals petals?
```

Indefinite Loops

```
#Spring 2012 Final Exam, #8  
nums = [1,4,0,6,5,2,9,8,12]  
print(nums)  
i=0  
while i < len(nums)-1:  
    if nums[i] < nums[i+1]:  
        nums[i], nums[i+1] = nums[i+1], nums[i]  
        i=i+1  
print(nums)
```

Indefinite Loops

- Indefinite loops repeat as long as the condition is true.

```
#Spring 2012 Final Exam, #8  
nums = [1,4,0,6,5,2,9,8,12]  
print(nums)  
i=0  
while i < len(nums)-1:  
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        i=i+1  
print(nums)
```

Indefinite Loops

- Indefinite loops repeat as long as the condition is true.
- Could execute the body of the loop zero times, 10 times, infinite number of times.

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        i=i+1  
print(nums)
```


Indefinite Loops

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        nums[i], nums[i+1] = nums[i+1], nums[i]  
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```

- Indefinite loops repeat as long as the condition is true.
- Could execute the body of the loop zero times, 10 times, infinite number of times.
- The condition determines how many times.

Indefinite Loops

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#Spring 2012 Final Exam, #8
nums = [1,4,0,6,5,2,9,8,12]
print(nums)
i=0
while i < len(nums)-1:
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        nums[i], nums[i+1] = nums[i+1], nums[i]
        i=i+1
print(nums)
```

- Indefinite loops repeat as long as the condition is true.
- Could execute the body of the loop zero times, 10 times, infinite number of times.
- The condition determines how many times.
- Very useful for checking input, simulations, and games.

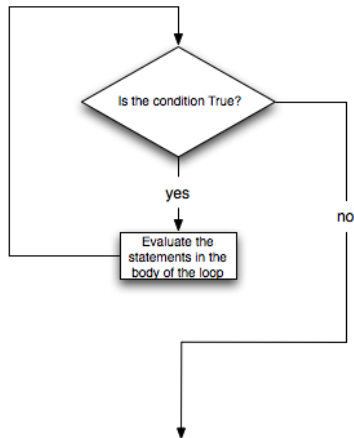
Indefinite Loops

```
#Spring 2012 Final Exam, #8  
nums = [1,4,0,6,5,2,9,8,12]  
print(nums)  
i=0  
while i < len(nums)-1:  
    if nums[i] < nums[i+1]:  
        nums[i], nums[i+1] = nums[i+1], nums[i]  
        i=i+1  
print(nums)
```

Indefinite Loops

#Spring 2012 Final Exam, #8

```
nums = [1,4,0,6,5,2,9,8,12]
print(nums)
i=0
while i < len(nums)-1:
    if nums[i] < nums[i+1]:
        nums[i], nums[i+1] = nums[i+1], nums[i]
    i=i+1
print(nums)
```



Switch adjacent elements if left element is smaller

```
1 nums = [1, 4, 0, 6, 5, 2]
2 print(nums)
3 i = 0
4 while i < len(nums)-1:
5     if nums[i] < nums[i+1]:
6         nums[i], nums[i+1] = nums[i+1], nums[
            i]
7     i = i+1
8 print(nums)
```

Switch adjacent elements if left element is smaller

```
1 nums = [1, 4, 0, 6, 5] #simplify with fewer numbers
2 print(nums)
3 i = 0
4 while i < len(nums)-1:
5     if nums[i] < nums[i+1]:
6         nums[i], nums[i+1] = nums[i+1], nums[i]
7     i = i+1
8 print(nums)
```

len(nums) is 5.

i	i < len(nums)-1	if nums[i] < nums[i+1], swap nums[i] and nums[i+1]
0	yes	nums[0]=1 and nums[1]=4, swap, nums=[4,1,...]
1	yes	nums[1]=4 and nums[2]=0, no swap, nums=[4,1,0,...]
2	yes	nums[2]=0 and nums[3]=6, swap. nums=[4,1,6,0,...]
3	yes	nums[3]=0 and nums[4]=5, swap. nums=[4,1,6,5,0]
4	no, exit loop	

Now nums is [4, 1, 6, 5, 0]

Challenge

Predict what this code does:

```
1 def move(): #move tess
2     tess = turtle.Turtle()
3     tess.color('steelBlue')
4     tess.shape('turtle')
5     tess.penup()
6     #Start off screen:
7     tess.goto(-250,-250)
```

Predict what the code do: II

```
8      #Remember: abs(x) < 25 means absolute  
9      value: -25 < x < 25  
10     while abs(tess.xcor()) > 25 or abs(tess.  
11         ycor()) > 25:  
12         x = random.randrange(-200,200)  
13         y = random.randrange(-200,200)  
14         tess.goto(x,y)  
15         tess.stamp()  
16         print(tess.xcor(), tess.ycor())  
17     print('Found the center!')
```

turtle.done()

Trinket Demo

```
#Random search
import turtle
import random
tess = turtle.Turtle()
tess.color('steelBlue')
tess.shape('turtle')
tess.penup()
#Start off screen:
tess.goto(-250,-250)
#Remember: abs(x) < 25 means absolute value: -25 < x < 25
while abs(tess.xcor()) > 25 or abs(tess.ycor()) > 25:
    x = random.randrange(-200,200)
    y = random.randrange(-200,200)
    tess.goto(x,y)
    tess.stamp()
    print(tess.xcor(), tess.ycor())
print('Found the center!')
```

(Demo with trinket)

Today's Topics



- Recap: Folium
- Indefinite loops
- **Design Patterns: Max (Min)**
- Design Challenge

Design Patterns

- A **design pattern** is a standard algorithm or approach for solving a common problem.



Design Patterns



- A **design pattern** is a standard algorithm or approach for solving a common problem.
- The pattern is independent of the programming language.

Design Patterns



- A **design pattern** is a standard algorithm or approach for solving a common problem.
- The pattern is independent of the programming language.
- Can think of as a master recipe, with variations for different situations.

Design Question:



You can uncover one card at a time.
How would you go about finding the highest card?

Challenge:

Predict what the code will do:

```
1  nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2  maxNum = 0
3  for n in nums:
4      if n > maxNum:
5          #TODO: update maxNum to be n
6
7  print(maxNum)
```

Fill in Code

```
1 nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2 maxNum = 0
3 for n in nums:
4     if n > maxNum:
5         #TODO: update maxNum to be n
6         maxNum = n
7
8 print(maxNum)
```


Step by Step Explanation

```
1 nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2 maxNum = 0
3 for n in nums:
4     if n > maxNum:
5         maxNum = n
6
7 print(maxNum)
```

n	if n > maxNum: maxNum = n	maxNum initialized to be 0
---	------------------------------	-------------------------------

Step by Step Explanation

```
1 nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2 maxNum = 0
3 for n in nums:
4     if n > maxNum:
5         maxNum = n
6
7 print(maxNum)
```

n	if n > maxNum: maxNum = n	maxNum initialized to be 0
1	n > maxNum, set maxNum to 1	1

Step by Step Explanation

```
1 nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2 maxNum = 0
3 for n in nums:
4     if n > maxNum:
5         maxNum = n
6
7 print(maxNum)
```

n	if n > maxNum: maxNum = n	maxNum initialized to be 0
1	n > maxNum, set maxNum to 1	1
4	n > maxNum, set maxNum to 4	4

Step by Step Explanation

```
1 nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2 maxNum = 0
3 for n in nums:
4     if n > maxNum:
5         maxNum = n
6
7 print(maxNum)
```

n	if n > maxNum: maxNum = n	maxNum initialized to be 0
1	n > maxNum, set maxNum to 1	1
4	n > maxNum, set maxNum to 4	4
10	n > maxNum, set maxNum to 10	10

Step by Step Explanation

```
1 nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2 maxNum = 0
3 for n in nums:
4     if n > maxNum:
5         maxNum = n
6
7 print(maxNum)
```

n	if n > maxNum: maxNum = n	maxNum initialized to be 0
1	n > maxNum, set maxNum to 1	1
4	n > maxNum, set maxNum to 4	4
10	n > maxNum, set maxNum to 10	10
6	n is not > maxNum, no update on maxNum	10

Step by Step Explanation

```
1 nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2 maxNum = 0
3 for n in nums:
4     if n > maxNum:
5         maxNum = n
6
7 print(maxNum)
```

n	if n > maxNum: maxNum = n	maxNum initialized to be 0
1	n > maxNum, set maxNum to 1	1
4	n > maxNum, set maxNum to 4	4
10	n > maxNum, set maxNum to 10	10
6	n is not > maxNum, no update on maxNum	10
5	n is not > maxNum, no update on maxNum	10

Step by Step Explanation

```
1 nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2 maxNum = 0
3 for n in nums:
4     if n > maxNum:
5         maxNum = n
6
7 print(maxNum)
```

n	if n > maxNum: maxNum = n	maxNum initialized to be 0
1	n > maxNum, set maxNum to 1	1
4	n > maxNum, set maxNum to 4	4
10	n > maxNum, set maxNum to 10	10
6	n is not > maxNum, no update on maxNum	10
5	n is not > maxNum, no update on maxNum	10
42	n > maxNum, set maxNum to 42	42

Step by Step Explanation

```
1 nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2 maxNum = 0
3 for n in nums:
4     if n > maxNum:
5         maxNum = n
6
7 print(maxNum)
```

n	if n > maxNum: maxNum = n	maxNum initialized to be 0
1	n > maxNum, set maxNum to 1	1
4	n > maxNum, set maxNum to 4	4
10	n > maxNum, set maxNum to 10	10
6	n is not > maxNum, no update on maxNum	10
5	n is not > maxNum, no update on maxNum	10
42	n > maxNum, set maxNum to 42	42
...

Improvement

```
1 nums = [-1, -5, -4]
2 maxNum = 0
3 for n in nums:
4     if n > maxNum:
5         maxNum = n
6
7 print(maxNum)
```

Improvement: II

Initialize maxNum to be the smallest number in system, so that any actual number is no smaller than it (larger or equal to it).

```
1 import sys #use sys.maxsize
2
3 nums = [-1, -5, -4]
4 maxNum = -sys.maxsize-1
5 for n in nums:
6     if n > maxNum:
7         maxNum = n
8
9 print(maxNum)
```

Improvement: III

Initialize with the first element in the list, one of its own.

```
1  nums = [1, 4, 10, 6, 5, 42, 9, 8, 12]
2  size = len(nums)
3  if size == 0:
4      print("The list is empty and does not
5          have a maximum")
6      exit(0) #cannot use return since this is
7              not an function
8  maxNum = nums[0]
9  for i in range(1, size):
10     if nums[i] > maxNum:
11         maxNum = nums[i]
12     print(maxNum)
```

Analog: Cute babies Competition



Babies may join competition at any time.

If the incoming baby is cuter than the current winner model, choose the new baby as model; otherwise, keep the current model.

Cute babies Competition: II



In January, Alex came and became the winner model.

Oh yea, no competitors yet!

Cute baby Competition: III

After several months, **Bob** comes.

Bob competes with
winner model .

If **Bob** is cuter, then he
becomes winner model .



Cute baby Competition: IV

After several months, **Chris** comes.

Chris competes with
winner model .

If **Chris** is cuter, then he
becomes winner model .



Pseudo code to find a winner model

- ① The first comer is awarded as the winner model automatically.
- ② Every time a new comer comes, he/she challenges the current winner model. If the new comer wins, he/she becomes the new winner model (what if the challenger does not win?)
- ③ Repeat (2) for every new comer.

General idea to find max or min

```
1 Initialize the min to be the first element
2
3 for the rest of elements:
4     if the incoming element is smaller than
        the current minimum, update the
        current minimum to be the current
        element
5     #smaller than the current smallest
6     #bigger than the current biggest
7     #stronger than the current strongest
8     #weaker than the current weakest
```

Improvement: IV

Define a function to return a maximum element in a given list.

Input: a list of numbers Return: maximum element of this list

```
1 def maximum(nums):  
2     size = len(nums)  
3     if size == 0:  
4         #print("The list is empty and does  
5         not have a maximum") #do not print  
6         intermediate result unless the duty  
         of the function is input/output.  
7         return float('nan') #nan means Not a  
8         Number  
9         #int('nan') does not work, since int  
10        in python is not bounded.
```

Improvement: IV

Define a function to return the maximum element of a list.

```
8   maxNum = nums[0]
9   for i in range(1, size):
10      if nums[i] > maxNum:
11         maxNum = nums[i]
12
13  return maxNum
```

Max Design Pattern

- Set a variable to the smallest value.

```
nums = [1,4,10,6,5,42,9,8,12]

maxNum = 0
for n in nums:
    if n > maxNum:
        maxNum = n
print('The max is', maxNum)
```

Max Design Pattern

- Set a variable to the smallest value.
- Loop through the list,

```
nums = [1,4,10,6,5,42,9,8,12]

maxNum = 0
for n in nums:
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Max Design Pattern

- Set a variable to the smallest value.
- Loop through the list,
- If the current number is larger, update your variable.

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nums = [1,4,10,6,5,42,9,8,12]

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- Print/return the largest number found.

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- Must look at entire list to determine max is found

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- Similar idea works for finding the minimum value.

Max Design Pattern

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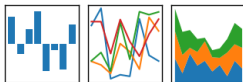
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    if n > maxNum:
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print('The max is', maxNum)
```

- Set a variable to the smallest value.
- Loop through the list,
 - If the current number is larger, update your variable.
- Print/return the largest number found.
- Must look at entire list to determine max is found
- Similar idea works for finding the minimum value.
- Different from **Linear Search**: can stop when value you are looking for is found.

Pandas: Minimum Values

pandas

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

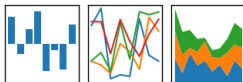


- In Pandas, lovely built-in functions:

Pandas: Minimum Values

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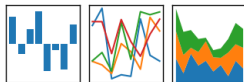


- In Pandas, lovely built-in functions:
 - ▶ `df.sort_values('First Name')` and
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Pandas: Minimum Values

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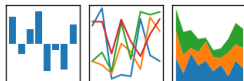


- In Pandas, lovely built-in functions:
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- What if you don't have a CSV and DataFrame, or data not ordered?

Design Question: Find first alphabetically

pandas

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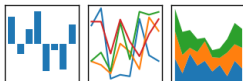


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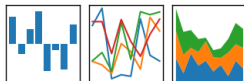


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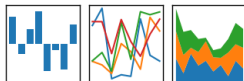


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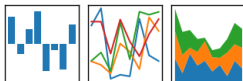


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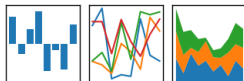


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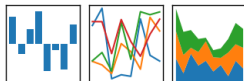


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 - ▶ Print/return X.

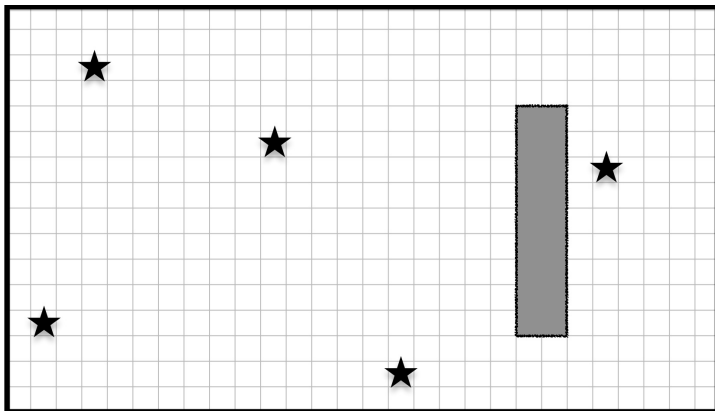
Today's Topics



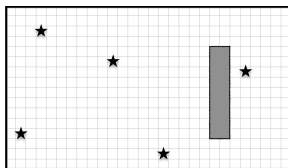
- Recap: Folium
- Indefinite loops
- Design Patterns: Max (Min)
- **Design Challenge**

Design Challenge

On your Lecture Slip: collect all five stars (locations randomly generated):

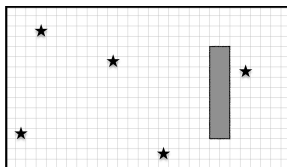


Design Challenge



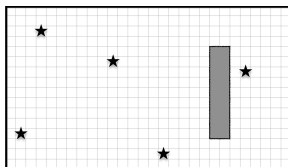
- Possible approaches:

Design Challenge



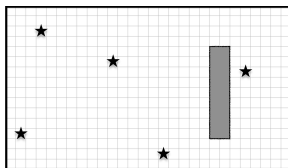
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Design Challenge



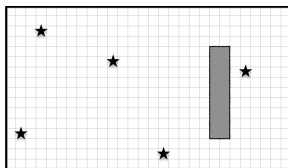
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Design Challenge



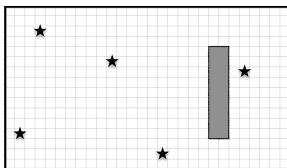
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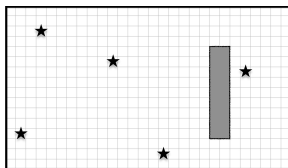
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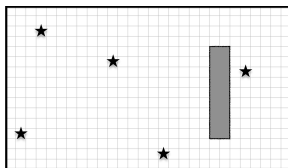
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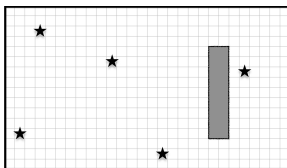
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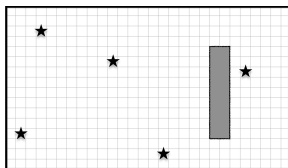
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 - ▶ Move forward.

Design Challenge



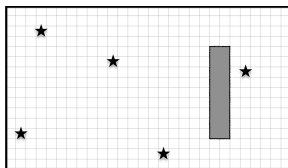
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 - ▶ Otherwise, mark 2 in map that it's an empty square.

Recap



- Quick recap of a Python library, Folium for creating interactive HTML maps.

Recap



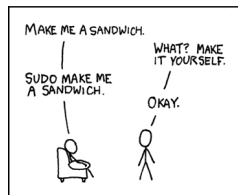
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Recap



- Quick recap of a Python library, Folium for creating interactive HTML maps.
- More details on `while` loops for repeating commands for an indefinite number of times.
- Introduced the `max/min` and linear-search design pattern.

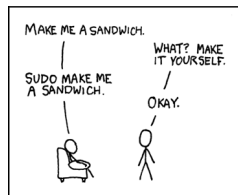
Final Exam Prep: UNIX



xkcd 149

- This course has three main themes:
 - ▶ Programming & Problem Solving

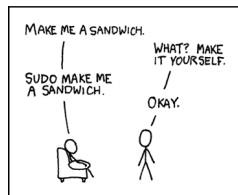
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xkcd 149

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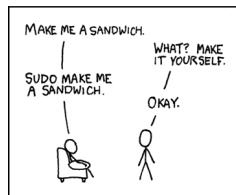
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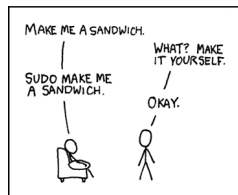
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Final Exam Prep: UNIX

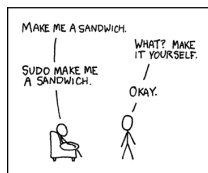


xkcd 149

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- Unix commands in the weekly on-line labs

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

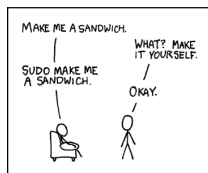


xkcd 149

Final Exam Prep: UNIX

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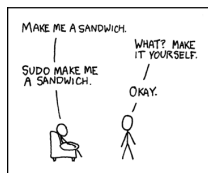


xkcd 149

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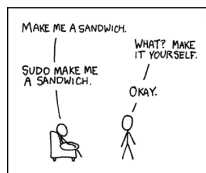


xkcd 149

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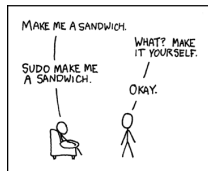


xkcd 149

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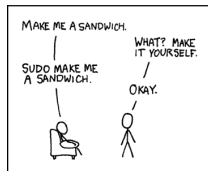


xkcd 149

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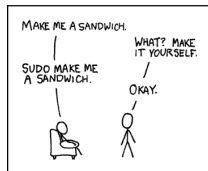


xkcd 149

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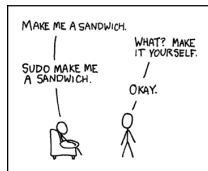


xkcd 149

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- *Lab 8:* `git` from the command line

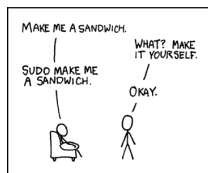


xkcd 149

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- *Lab 7:* Running Python from the command line
- *Lab 8:* `git` from the command line
- *Lab 9:* `ls *.py` (wildcards)

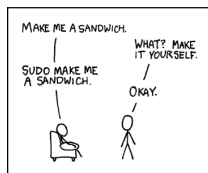


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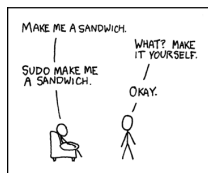


xkcd 149

Final Exam Prep: UNIX

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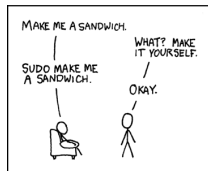


xkcd 149

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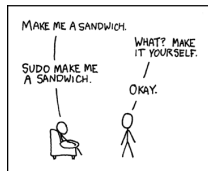


xkcd 149

Final Exam Prep: UNIX

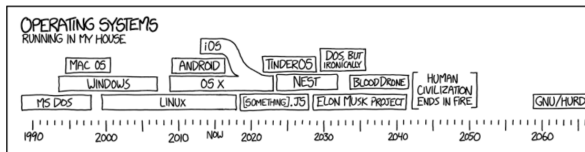
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xkcd 149

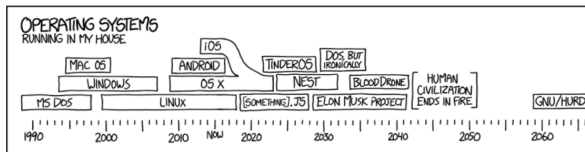
Practice Quiz & Final Questions



xkcd #1508

- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
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- Lightning rounds:
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Weekly Reminders!



Before next lecture, don't forget to:

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Before next lecture, don't forget to:

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- Schedule an appointment to take the Quiz in lab 1001G Hunter North

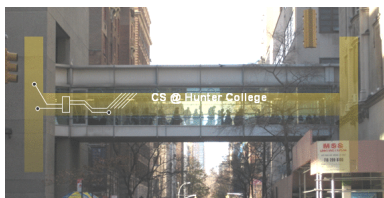
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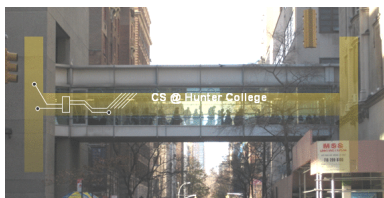
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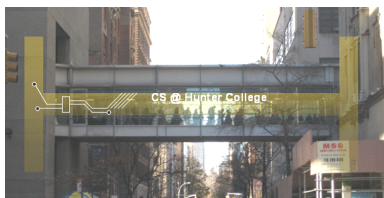
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- Take the Lecture Preview on Blackboard on Monday (or no later than 10:15am on Tuesday)

Lecture Slips & Writing Boards



- Hand your lecture slip to a UTA.
- Return writing boards as you leave.