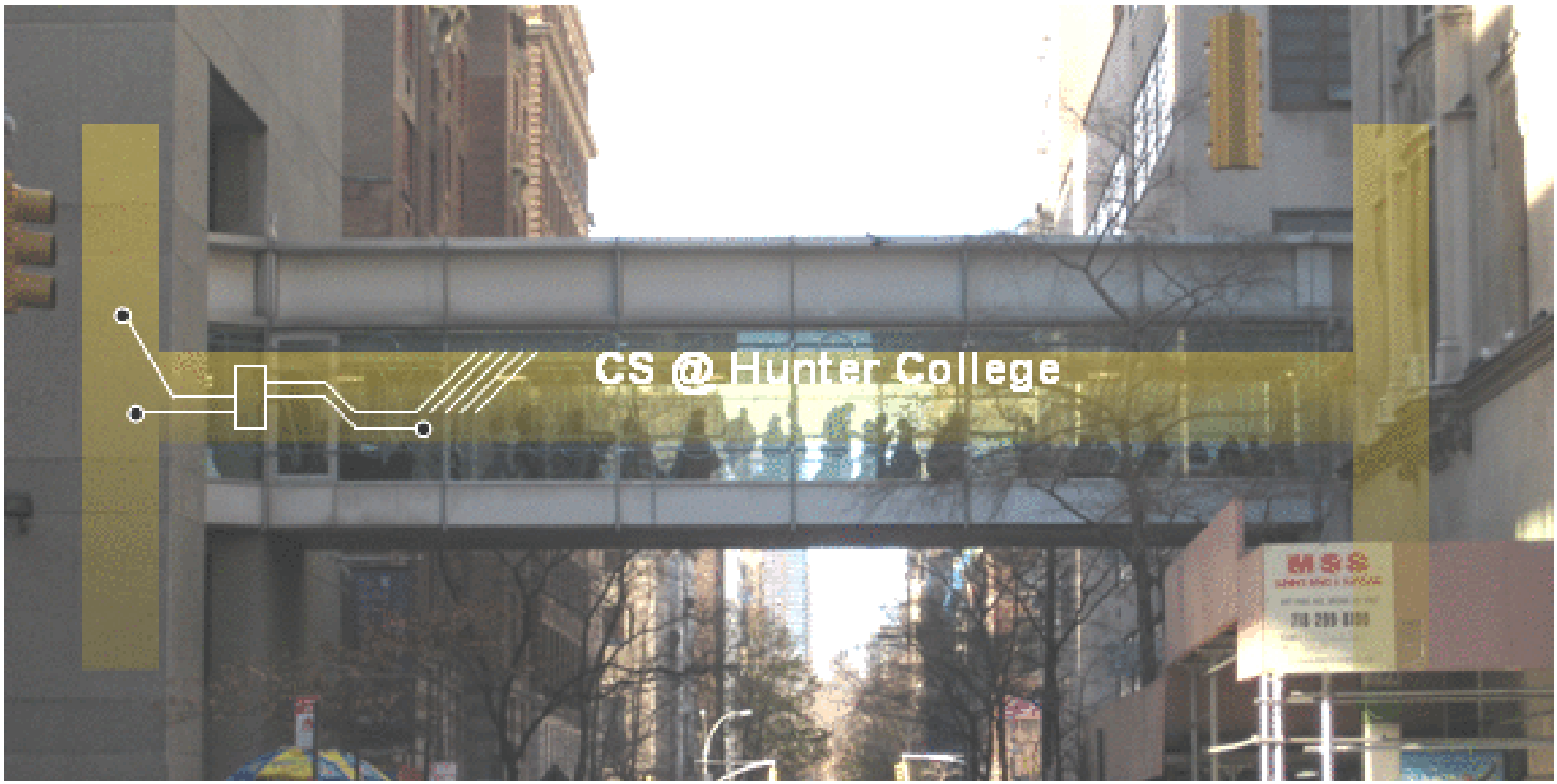
CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

Frequently Asked Questions

From lecture slips & recitation sections.

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- 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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Challenge:

What does this code do?

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import folium
import pandas as pd

cuny = pd.read_csv('cunyLocations.csv')
mapCUNY = folium.Map(location=[40.75, -74.125])

for index,row in cuny.iterrows():
    lat = row["Latitude"]
    lon = row["Longitude"]
    name = row["Campus"]
    if row["College or Institution Type"] == "Senior Colleges":
        collegeIcon = folium.Icon(color="purple")
    else:
        collegeIcon = folium.Icon(color="blue")
    newMarker = folium.Marker([lat, lon], popup=name, icon=collegeIcon)
    newMarker.add_to(mapCUNY)

mapCUNY.save(outfile='cunyLocationsSenior.html')
```

Folium example

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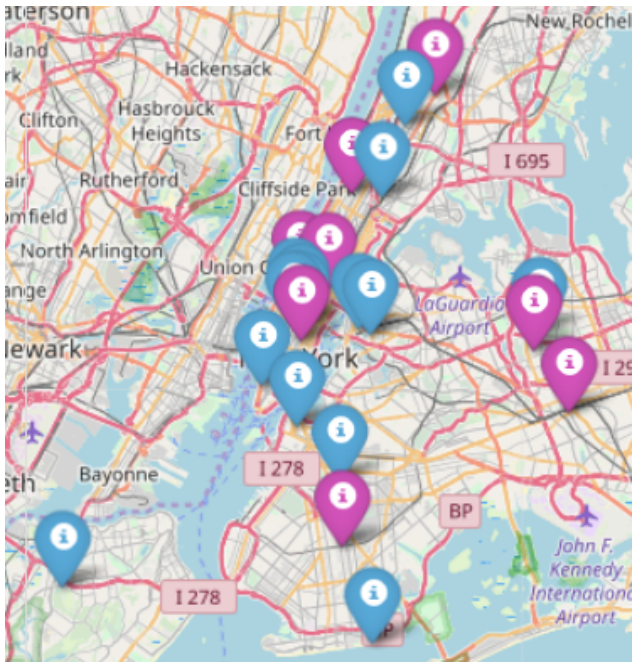

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- An extra step:

Write code. → *Run program.* → *Open .html in browser.*

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- 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.

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def getYear():
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def getYear():
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- 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.

```
def getYear():
    num = 0
    while num <= 2000 or num >= 2021:
        num = int(input('Enter a number > 2000 & < 2021'))

    return(num)
```

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)
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Indefinite Loops

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

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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.
- Very useful for checking input, simulations, and games.

Indefinite Loops

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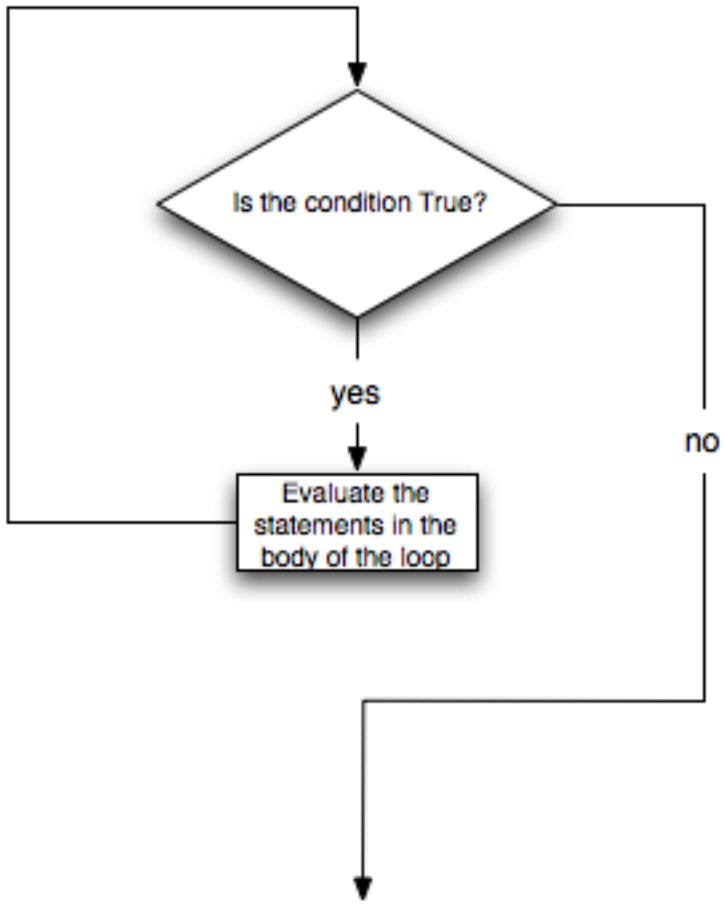

Challenge

Predict what this code does:

```
#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!')
```

Trinket Demo

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(Demo with `trinket`)

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- **Design Patterns: Max (Min)**
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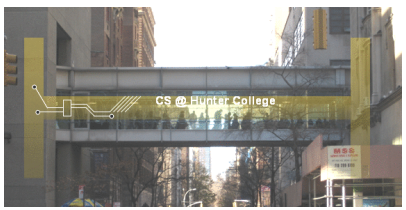
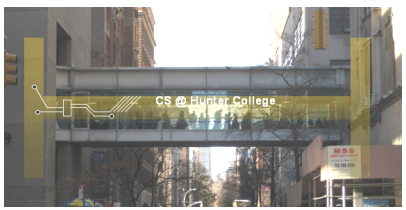
Design Patterns



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

Design Patterns



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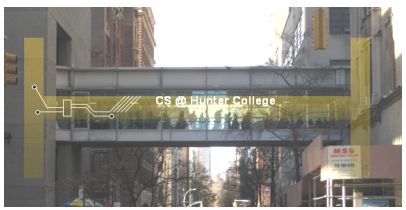
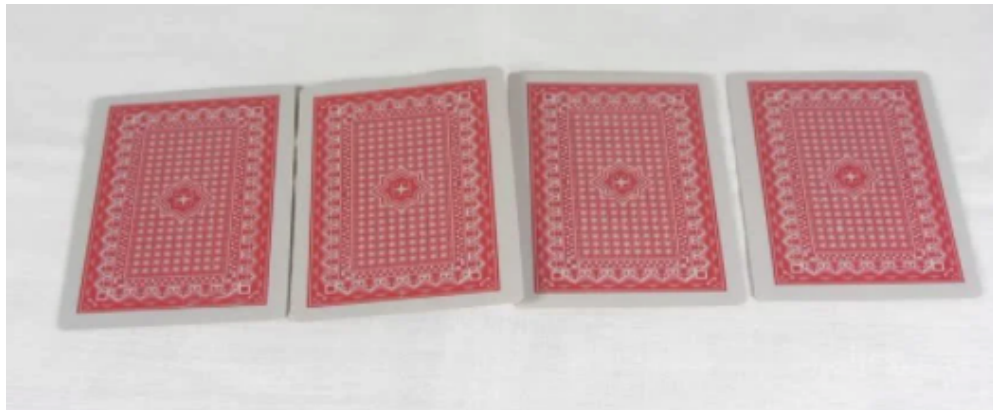


- A **design pattern** is a standard algorithm or approach for solving a common problem.
- The pattern is independent of the programming language.
- Can think of as a master recipe, with variations for different situations.

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:

```
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)
```

Python Tutor

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

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for n in nums:
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(Demo with pythonTutor)

Max Design Pattern

- Set a variable to the smallest value.

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- Loop through the list,
- If the current number is larger, update your variable.

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- Similar idea works for finding the minimum value.

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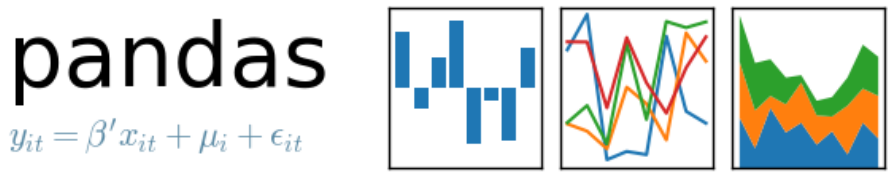
- Set a variable to the smallest value.
- Loop through the list,
- If the current number is larger, update your variable.
- Print/return the largest number found.
- Must look at entire list to determine max is found
- Similar idea works for finding the minimum value.
- Different from **Linear Search**: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

Pandas: Minimum Values



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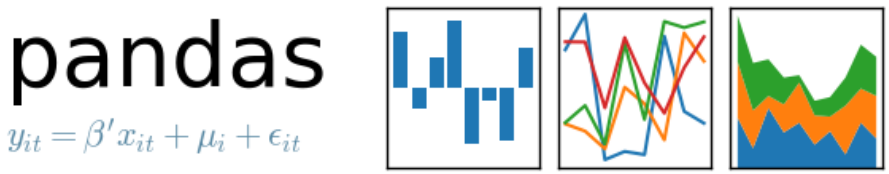

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  - `df.sort_values('First Name')` and
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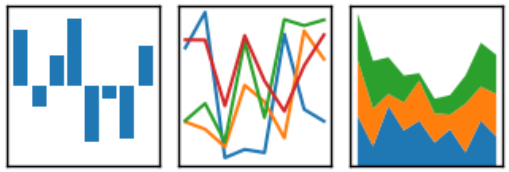
Pandas: Minimum Values

pandas

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



- In Pandas, lovely built-in functions:
  - `df.sort_values('First Name')` and
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- What if you don't have a CSV and DataFrame, or data not ordered?

Design Question: Find first alphabetically

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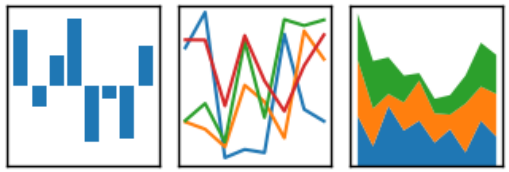

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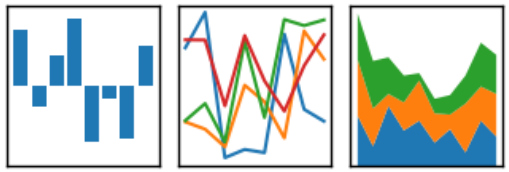

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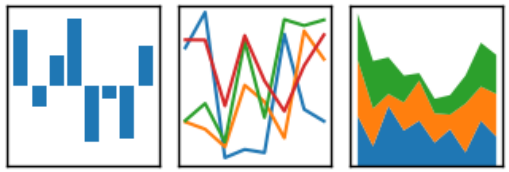

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  - Set a variable to worst value (i.e. `maxN = 0` or `first = "ZZ"`).

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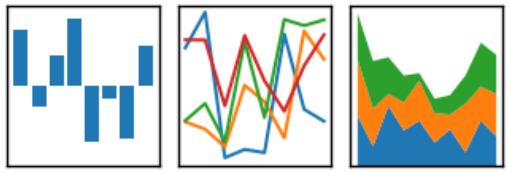

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  - For each item, X, in the list:

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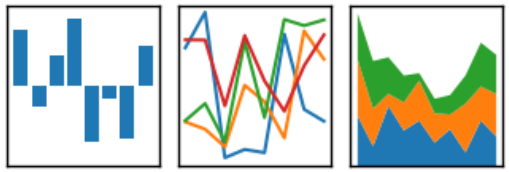

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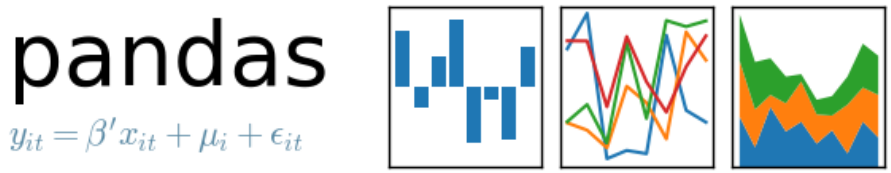

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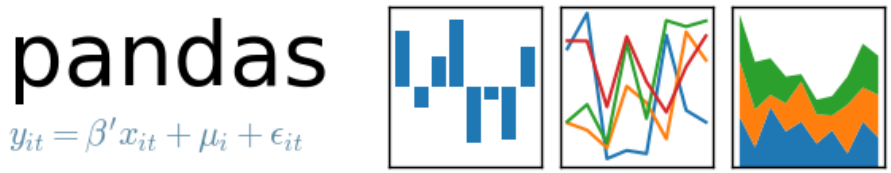
    - ★ Compare X to your variable.
    - ★ If better, update your variable to be X.

Design Question: Find first alphabetically



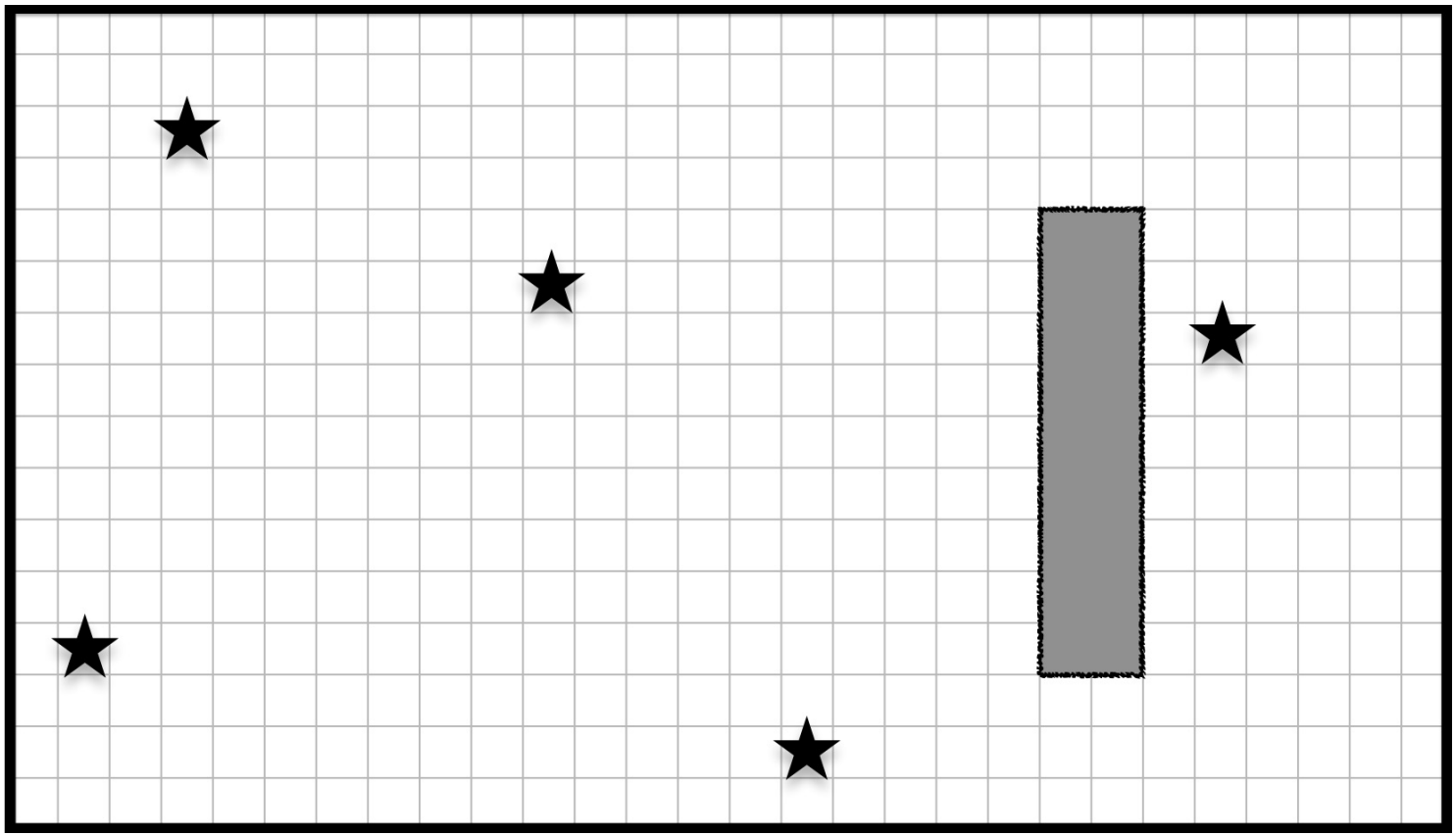
- What if you don't have a CSV and DataFrame, or data not ordered?
- Useful *Design Pattern*: min/max
  - Set a variable to worst value (i.e. `maxN = 0` or `first = "ZZ"`).
  - For each item, X, in the list:
    - ★ Compare X to your variable.
    - ★ If better, update your variable to be X.
  - Print/return 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):



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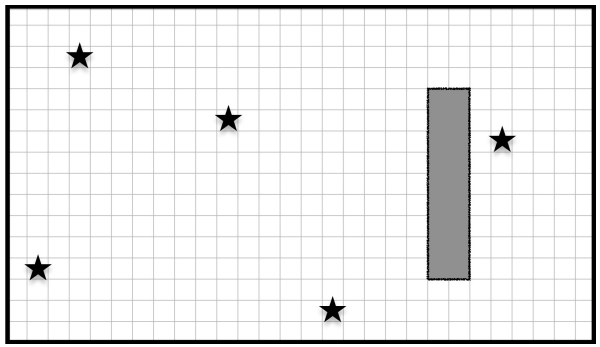

- Possible approaches:

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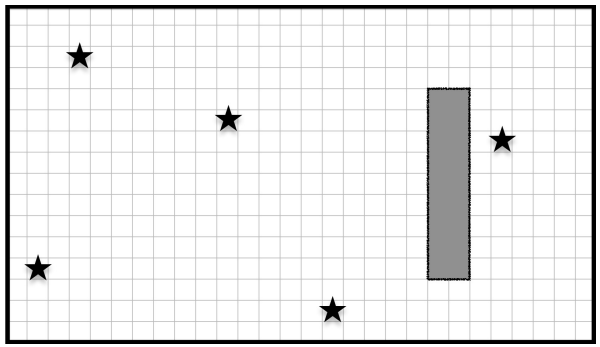

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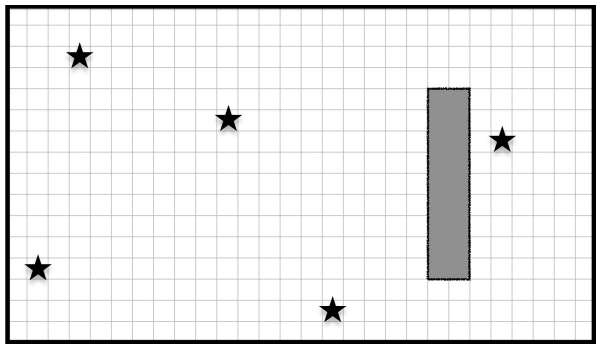

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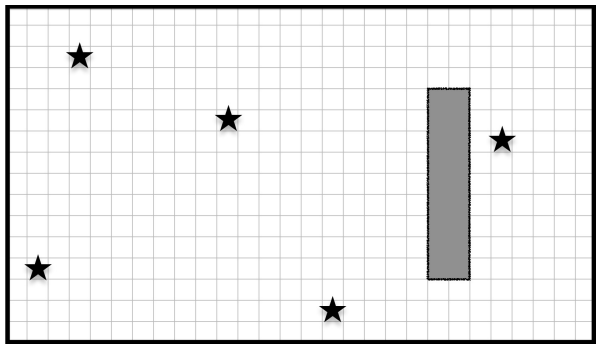

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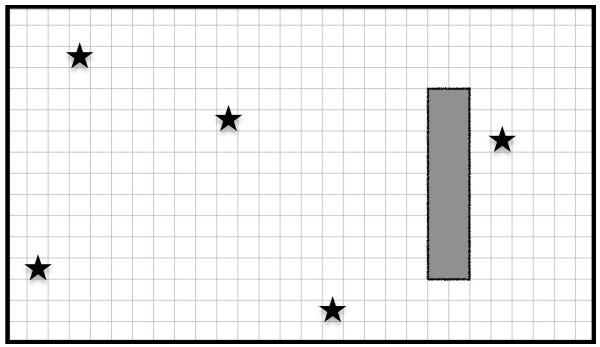

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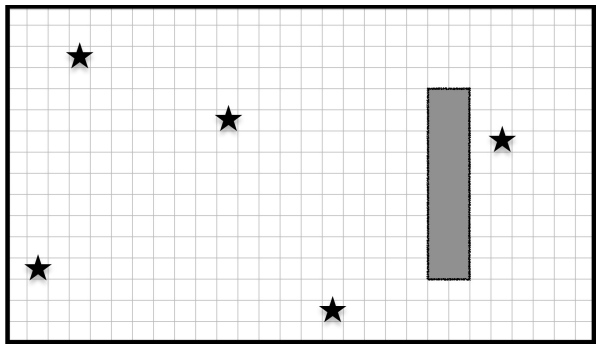

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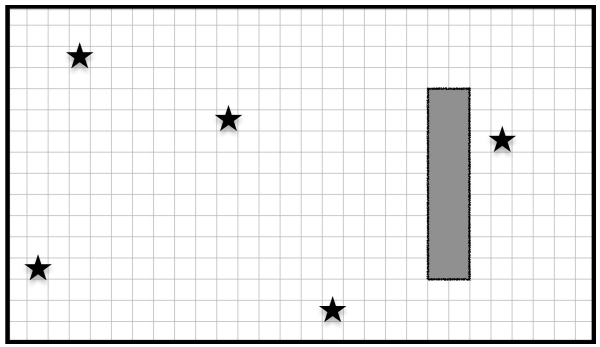

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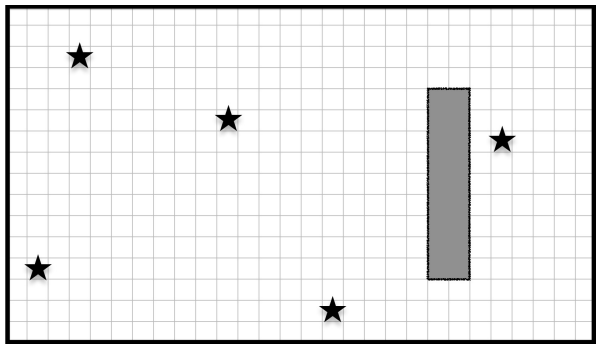

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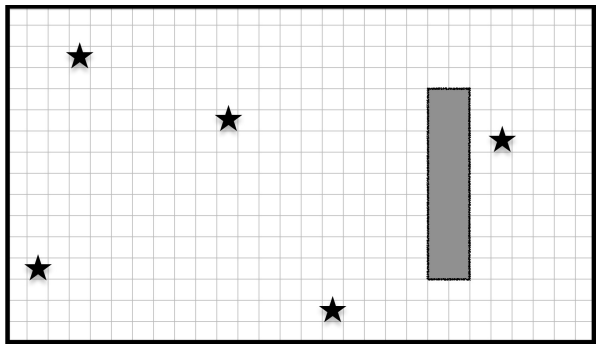

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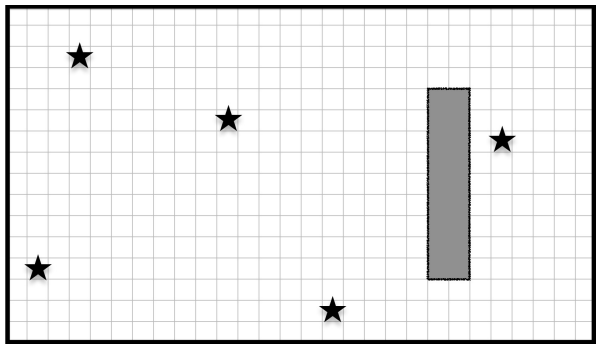

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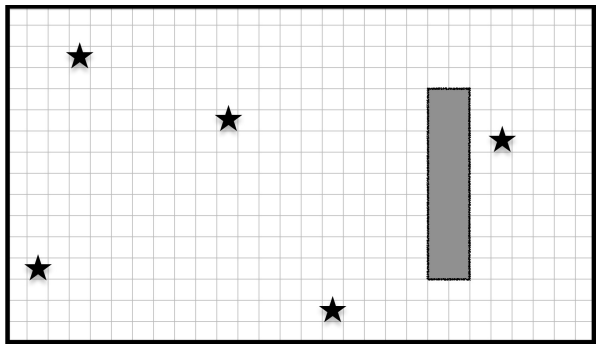

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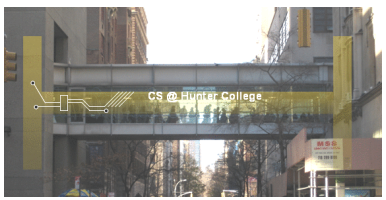
  - Otherwise, mark 2 in map that it's an empty square.

Recap



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

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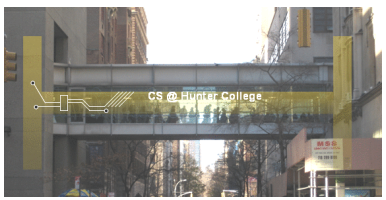

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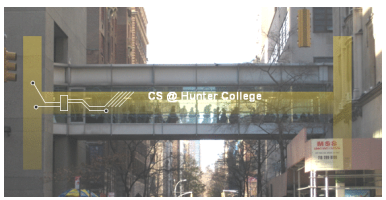

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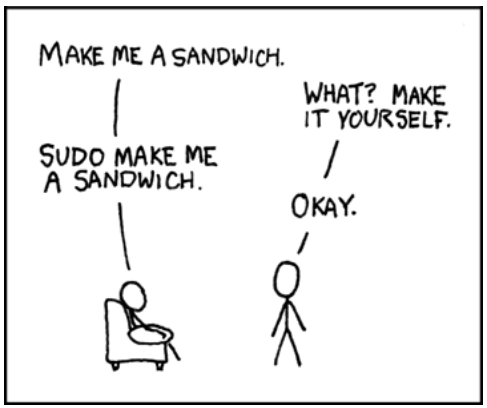
- More details on `while` loops for repeating commands for an indefinite number of times.
- Introduced the max/min and linear-search design pattern.

Final Exam Prep: UNIX



xkcd 149

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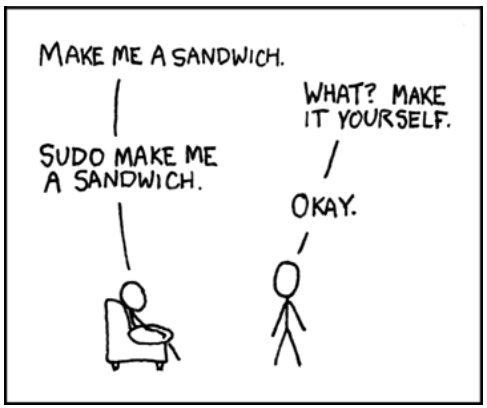
Final Exam Prep: UNIX



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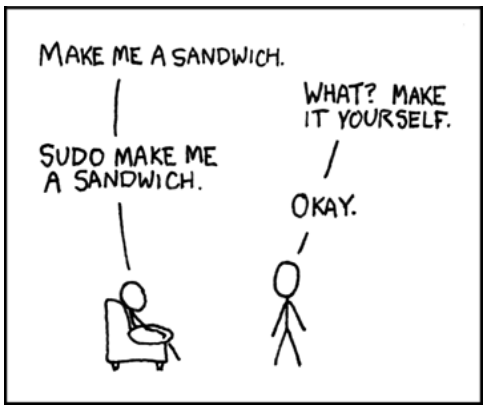

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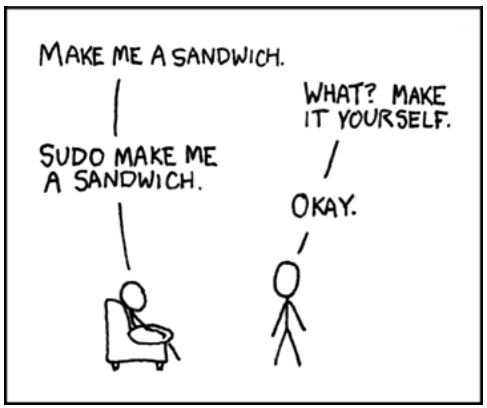

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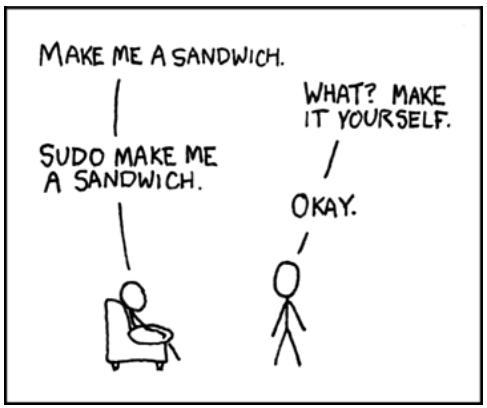
Final Exam Prep: UNIX



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- Unix commands in the weekly on-line labs

Final Exam Prep: UNIX

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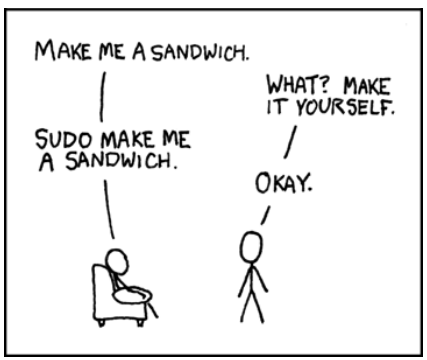

xkcd 149

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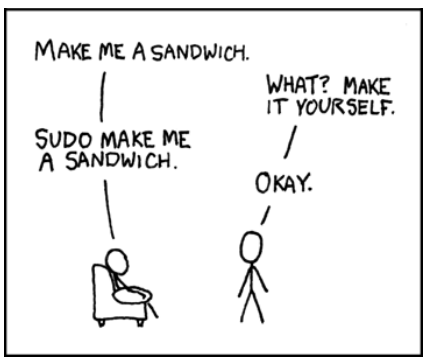

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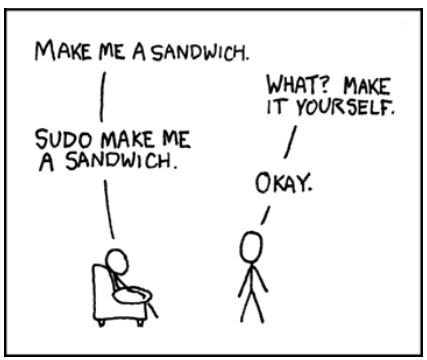

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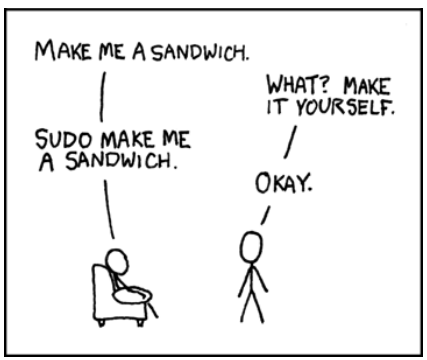

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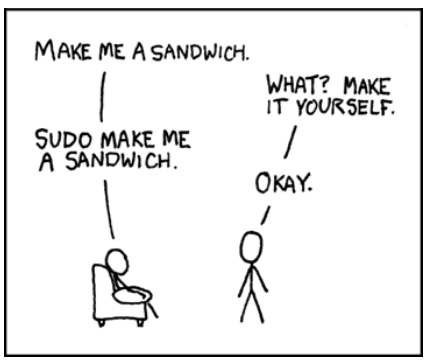

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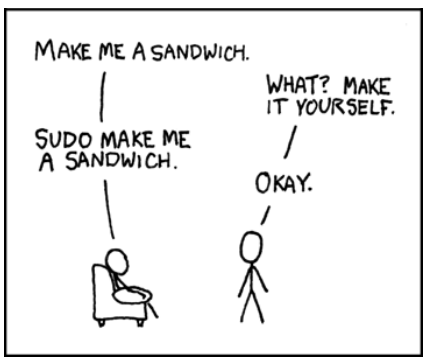

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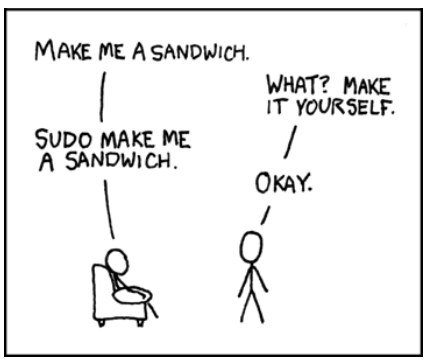

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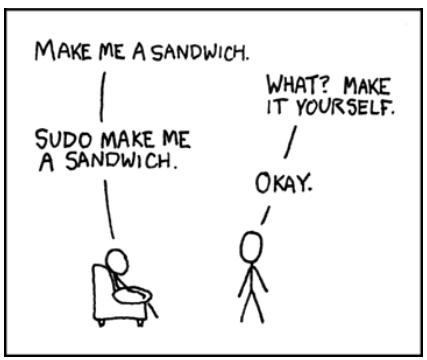

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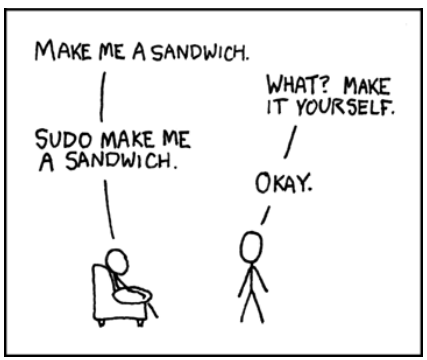

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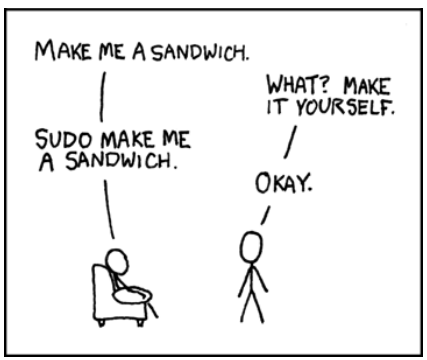

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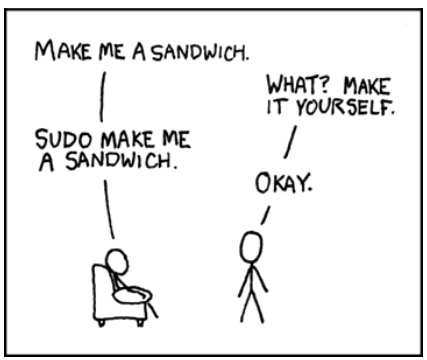

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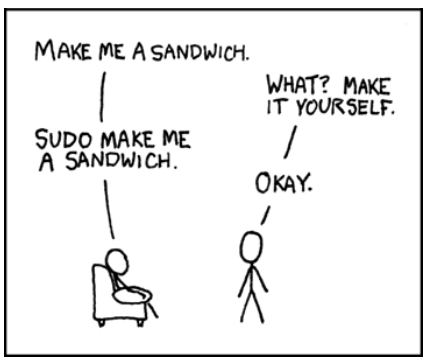

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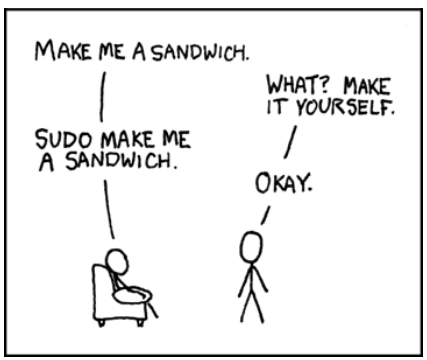

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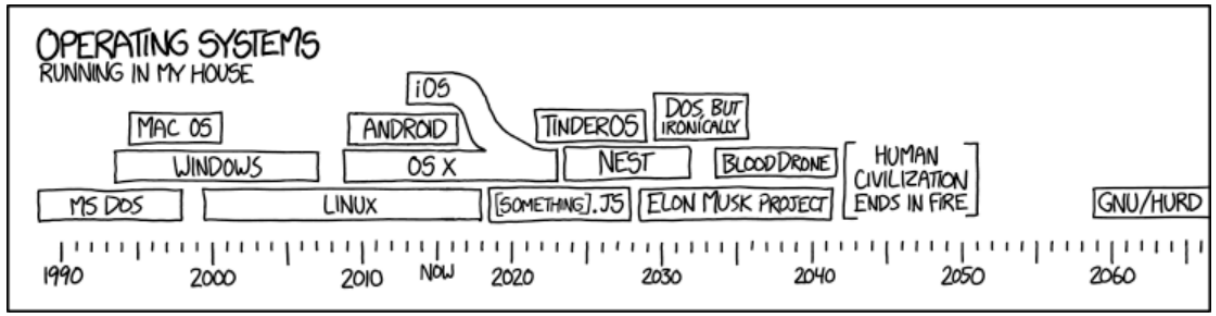
Practice Quiz & Final Questions



xkcd #1508

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- Past exams are on the webpage (under Final Exam Information).

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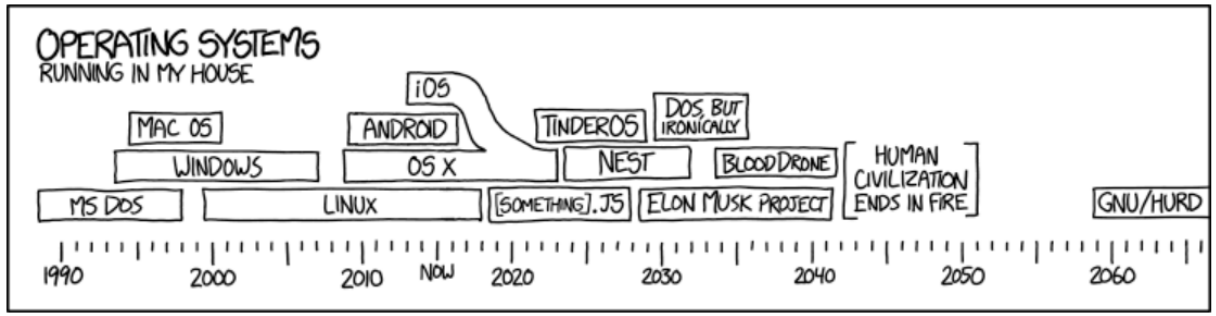

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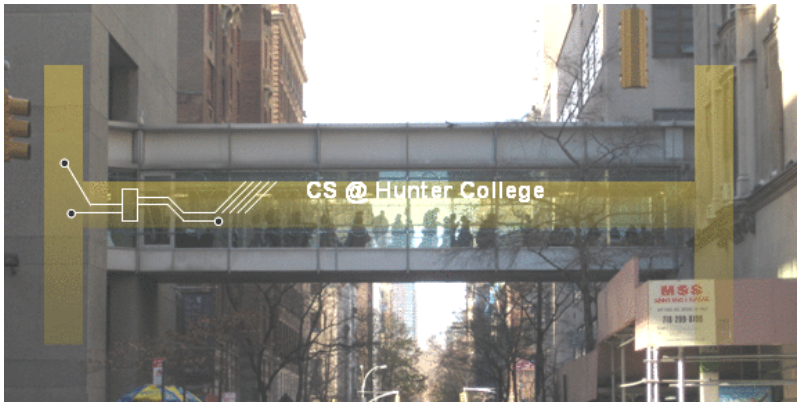
- Theme: Unix commands! (Spring 19 Version 3, #1.b)

Weekly Reminders!



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Weekly Reminders!

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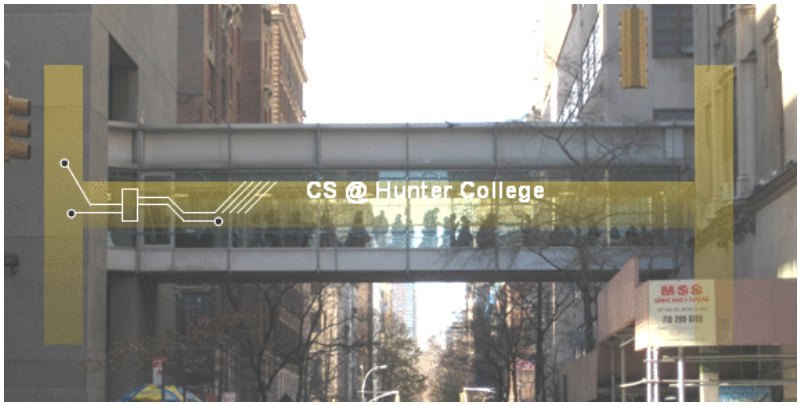
Weekly Reminders!



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- If you need help, schedule an appointment for Tutoring in lab 1001G 11:30am-5pm

Weekly Reminders!

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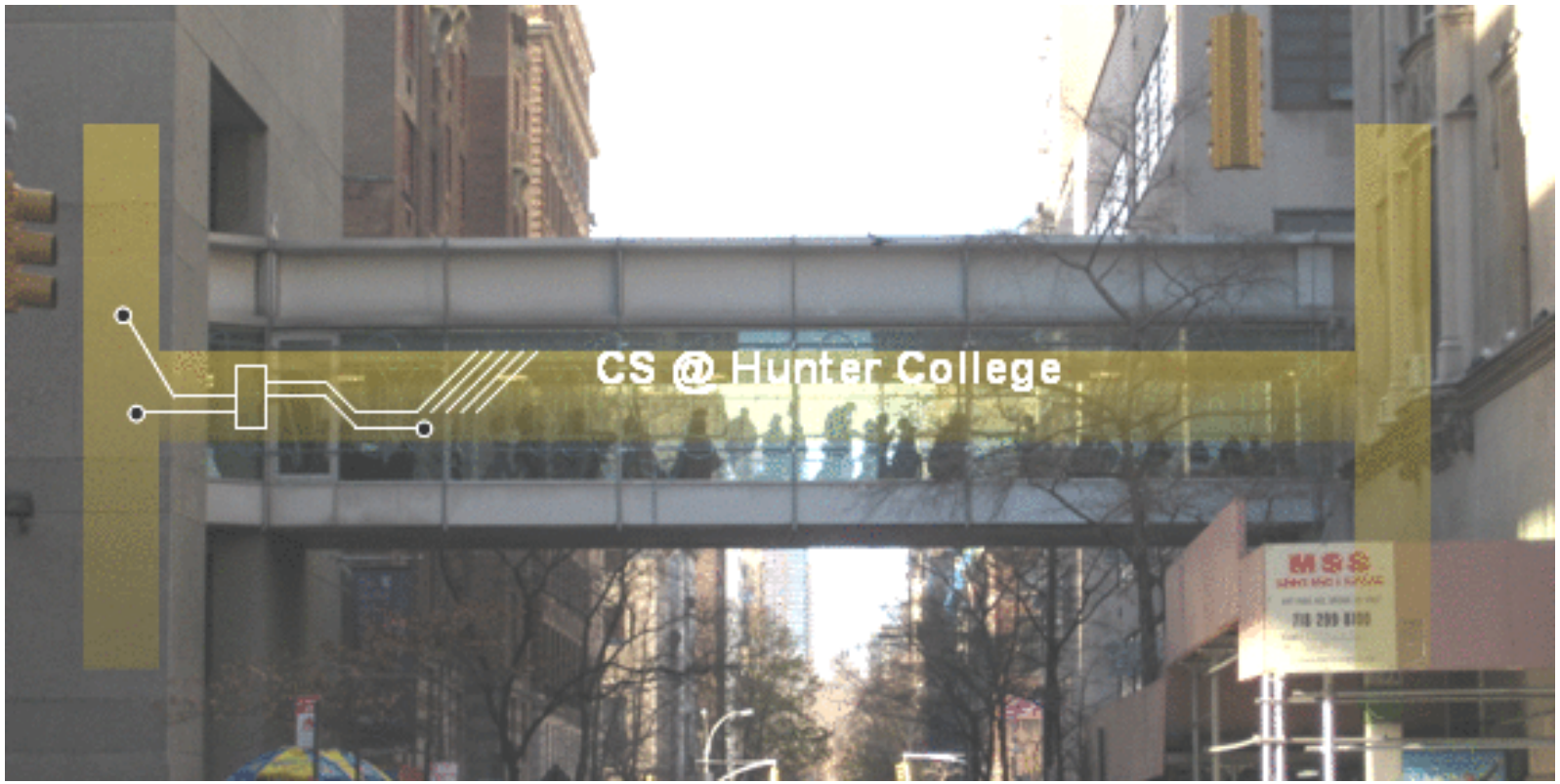
- Submit this week's 5 programming assignments **(programs 46-50)**
- If you need help, schedule an appointment for Tutoring in lab 1001G 11:30am-5pm
- Take the Lecture Preview on Blackboard on Monday (or no later than 10:15am on Tuesday)

Lecture Slips & Writing Boards



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