CSci 127: Introduction to Computer Science

- This lecture will be recorded

Frequently Asked Questions

From lecture slips & recitation sections.

- **When is the final?**

Frequently Asked Questions

From lecture slips & recitation sections.

- **When is the final?**
  Monday December, 20, 9am-11am, Assembly Hall: 118 Hunter North

Frequently Asked Questions

From lecture slips & recitation sections.

- **When is the final?**
  Monday December, 20, 9am-11am, Assembly Hall: 118 Hunter North
- **What is the format?**

Frequently Asked Questions

From lecture slips & recitation sections.

- **When is the final?**
  Monday December, 20, 9am-11am, Assembly Hall: 118 Hunter North

- **What is the format?**
  Content and format will be similar to past paper exams.

Frequently Asked Questions

From lecture slips & recitation sections.

- **When is the final?**
  Monday December, 20, 9am-11am, Assembly Hall: 118 Hunter North

- **What is the format?**
  Content and format will be similar to past paper exams.

- **I have another final then. What do I do?**

Frequently Asked Questions

From lecture slips & recitation sections.

- **When is the final?**
  Monday December, 20, 9am-11am, Assembly Hall: 118 Hunter North

- **What is the format?**
  Content and format will be similar to past paper exams.

- **I have another final then. What do I do?**
  We are arranging an alternative time (most likely the previous Friday).

Frequently Asked Questions

From lecture slips & recitation sections.

- **When is the final?**
  Monday December, 20, 9am-11am, Assembly Hall: 118 Hunter North

- **What is the format?**
  Content and format will be similar to past paper exams.

- **I have another final then. What do I do?**
  We are arranging an alternative time (most likely the previous Friday).

- **Do I have to take the final?**

Frequently Asked Questions

From lecture slips & recitation sections.

- **When is the final?**
  Monday December, 20, 9am-11am, Assembly Hall: 118 Hunter North

- **What is the format?**
  Content and format will be similar to past paper exams.

- **I have another final then. What do I do?**
  We are arranging an alternative time (most likely the previous Friday).

- **Do I have to take the final?**
  Yes, you must pass the final (60 out of 100 points) to the pass the class.

Frequently Asked Questions

From lecture slips & recitation sections.

- **When is the final?**
  Monday December, 20, 9am-11am, Assembly Hall: 118 Hunter North

- **What is the format?**
  Content and format will be similar to past paper exams.

- **I have another final then. What do I do?**
  We are arranging an alternative time (most likely the previous Friday).

- **Do I have to take the final?**
  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?

Frequently Asked Questions

From lecture slips & recitation sections.

- **When is the final?**
  Monday December, 20, 9am-11am, Assembly Hall: 118 Hunter North

- **What is the format?**
  Content and format will be similar to past paper exams.

- **I have another final then. What do I do?**
  We are arranging an alternative time (most likely the previous Friday).

- **Do I have to take the final?**
  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 135/136: 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

Today's Topics

- **Recap: Folium**

- Indefinite loops

- Design Patterns: Max (Min)

- Design Challenge

Challenge:

What does this code do?

```python
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')
```
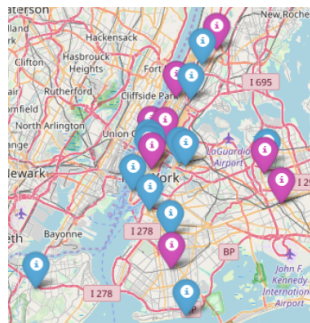
Folium example

What does this code do?

```python
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

What does this code do?

```python
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

- 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

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.

Lecture 10

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.
- An extra step:

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.
- An extra step:

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

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..

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.

```
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.

```
def getYear():




    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.

```
def getYear():
    num = 0




    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.

```
def getYear():
    num = 0
    while num <= 2000 or num >= 2021:


    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.

```python
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)
```

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:
    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.

- Could execute the body of the loop zero times, 10 times, infinite number of times.

```python
#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)
```

- 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

```
#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 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)
```
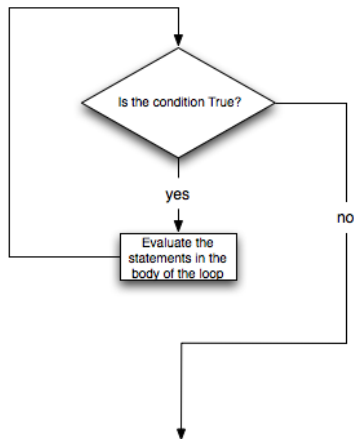
Challenge

Predict what this code does:

```python
#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

```python
#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`)

Lecture Quiz

- Log-in to Gradescope
- Find LECTURE 10 Quiz
- Take the quiz
- **You have 3 minutes**

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:

```python
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

```python
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)
```

(Demo with `pythonTutor`)

Max Design Pattern

- Set a variable to the smallest value.

```python
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,

```python
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,
  - If the current number is larger, update your variable.

```python
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,
  - If the current number is larger, update your variable.
- Print/return the largest number found.

```python
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,
- 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

```python
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,
- 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.

```python
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

```
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)
```

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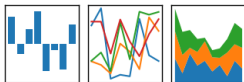
pandas
$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$

- In Pandas, lovely built-in functions:

Pandas: Minimum Values
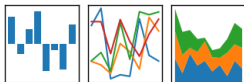
pandas
$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$

- In Pandas, lovely built-in functions:
  - `df.sort_values('First Name')` and
  - `df['First Name'].min()`

Pandas: Minimum Values
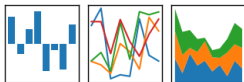
$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$

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

Design Question: Find first alphabetically
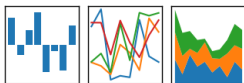
pandas

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

- What if you don't have a CSV and DataFrame, or data not ordered?

Design Question: Find first alphabetically
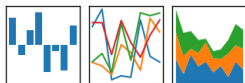
pandas

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

- What if you don't have a CSV and DataFrame, or data not ordered?
- Useful *Design Pattern*: min/max

Design Question: Find first alphabetically
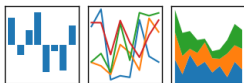
pandas

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

- 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"`).

Design Question: Find first alphabetically
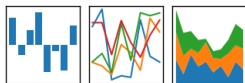
$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$

pandas

- 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:

Design Question: Find first alphabetically
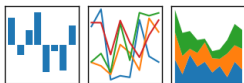
pandas

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

- 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.

Design Question: Find first alphabetically
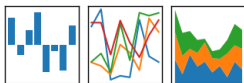
pandas

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

- 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.

Design Question: Find first alphabetically
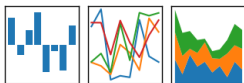
pandas
$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$

- 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

Collect all five stars (locations randomly generated):
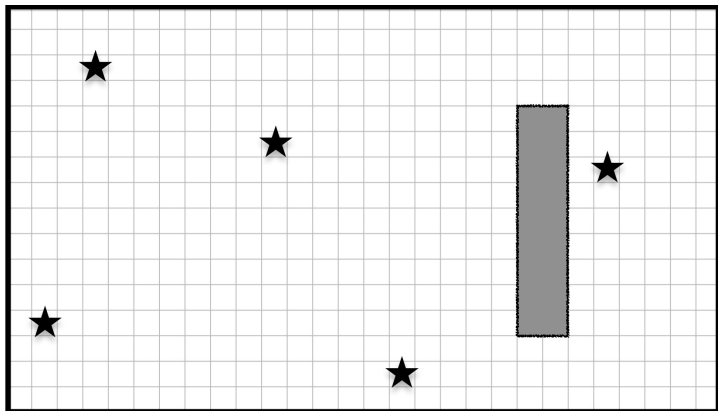
Design Challenge
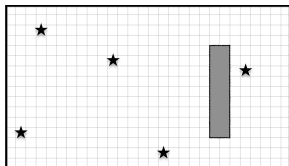
- Possible approaches:

Design Challenge

- Possible approaches:
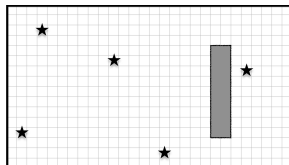 - Randomly wander until all 5 collected, or

Design Challenge
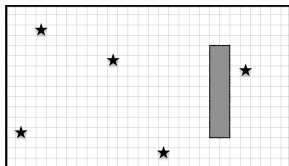
- Possible approaches:
  - Randomly wander until all 5 collected, or
  - Start in one corner, and systematically visit every point until 5 stars found (**Linear Search**).
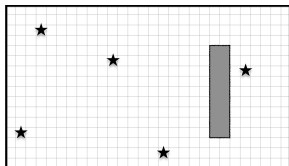
Design Challenge
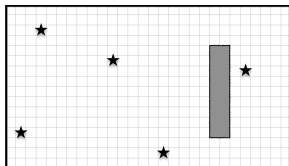
- Possible approaches:
  - ▶ Randomly wander until all 5 collected, or
  - ▶ Start in one corner, and systematically visit every point until 5 stars found (**Linear Search**).
- **Input:** The map of the 'world.'

Design Challenge
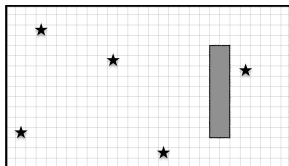
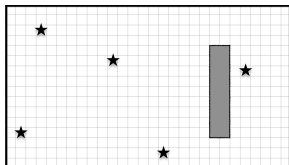
- Possible approaches:
  - Randomly wander until all 5 collected, or
  - Start in one corner, and systematically visit every point until 5 stars found (**Linear Search**).
- **Input:** The map of the 'world.'
- **Output:** Time taken and/or locations of the 5 stars.

Design Challenge
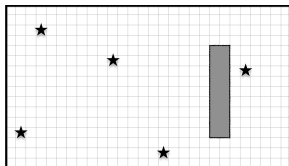
- Possible approaches:
  - Randomly wander until all 5 collected, or
  - Start in one corner, and systematically visit every point until 5 stars found (**Linear Search**).
- **Input:** The map of the 'world.'
- **Output:** Time taken and/or locations of the 5 stars.
- How to store locations? Use numpy array with -1 everywhere.

Design Challenge
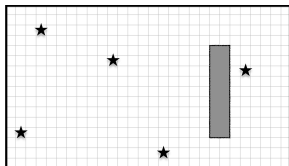
- Possible approaches:
  - Randomly wander until all 5 collected, or
  - Start in one corner, and systematically visit every point until 5 stars found (**Linear Search**).
- **Input:** The map of the 'world.'
- **Output:** Time taken and/or locations of the 5 stars.
- How to store locations? Use numpy array with -1 everywhere.
- Possible algorithms: while numStars < 5:

Design Challenge
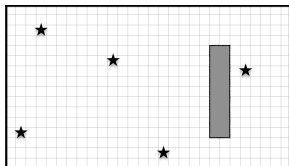
- Possible approaches:
    - ► Randomly wander until all 5 collected, or
    - ► Start in one corner, and systematically visit every point until 5 stars found (**Linear Search**).
- **Input:** The map of the 'world.'
- **Output:** Time taken and/or locations of the 5 stars.
- How to store locations? Use numpy array with -1 everywhere.
- Possible algorithms: while numStars < 5:
    - ► Move forward.

Design Challenge

- Possible approaches:
    - Randomly wander until all 5 collected, or
    - Start in one corner, and systematically visit every point until 5 stars found (**Linear Search**).
- **Input:** The map of the 'world.'
- **Output:** Time taken and/or locations of the 5 stars.
- How to store locations? Use numpy array with -1 everywhere.
- Possible algorithms: while numStars < 5:
    - Move forward.
    - If wall, mark 0 in map, randomly turn left or right.

Design Challenge

- Possible approaches:
  - ▸ Randomly wander until all 5 collected, or
  - ▸ Start in one corner, and systematically visit every point until 5 stars found (**Linear Search**).
- **Input:** The map of the 'world.'
- **Output:** Time taken and/or locations of the 5 stars.
- How to store locations? Use numpy array with -1 everywhere.
- Possible algorithms: while numStars < 5:
  - ▸ Move forward.
  - ▸ If wall, mark 0 in map, randomly turn left or right.
  - ▸ If star, mark 1 in map and add 1 to numStars.

Design Challenge

- Possible approaches:
    - Randomly wander until all 5 collected, or
    - Start in one corner, and systematically visit every point until 5 stars found (**Linear Search**).
- **Input:** The map of the 'world.'
- **Output:** Time taken and/or locations of the 5 stars.
- How to store locations? Use numpy array with -1 everywhere.
- Possible algorithms: while numStars $<$ 5:
    - Move forward.
    - If wall, mark 0 in map, randomly turn left or right.
    - If star, mark 1 in map and add 1 to numStars.
    - 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

- 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.

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
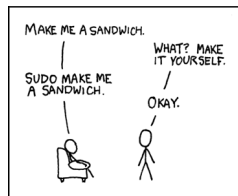
xkcd 149

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

Final Exam Prep: UNIX
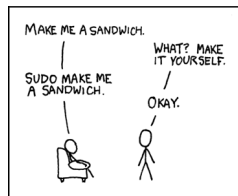
xkcd 149

- This course has three main themes:
  - ▸ Programming & Problem Solving
  - ▸ Organization of Hardware & Data

Final Exam Prep: UNIX
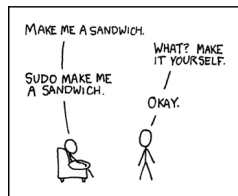
xkcd 149

- This course has three main themes:
  - ► Programming & Problem Solving
  - ► Organization of Hardware & Data
  - ► Design

Final Exam Prep: UNIX
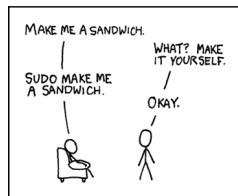
xkcd 149

- This course has three main themes:
  - ▶ Programming & Problem Solving
  - ▶ Organization of Hardware & Data
  - ▶ Design
- The operating system, Unix, is part of the second theme.

Final Exam Prep: UNIX
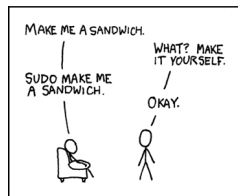
xkcd 149

- This course has three main themes:
  - ▶ Programming & Problem Solving
  - ▶ Organization of Hardware & Data
  - ▶ Design
- The operating system, Unix, is part of the second theme.
- Unix commands in the weekly on-line labs

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:
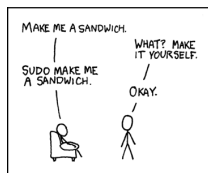
xkcd 149

Final Exam Prep: UNIX

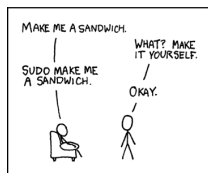Unix commands in the weekly on-line labs:

- *Lab 2:* `pwd`, `ls`, `mkdir`, `cd`

xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

- *Lab 2:* pwd, ls, mkdir, cd

- *Lab 3:* ls -l, cp, mv

xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

- *Lab 2:* pwd, ls, mkdir, cd
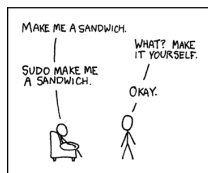
- *Lab 3:* ls -l, cp, mv

- *Lab 4:* cd ../ (relative paths)

xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

- *Lab 2:* pwd, ls, mkdir, cd

- *Lab 3:* ls -l, cp, mv

- *Lab 4:* cd ../ (relative paths)

- *Lab 5:* cd /usr/bin (absolute paths), cd ~
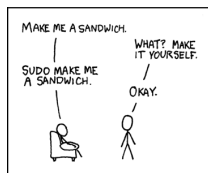

xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

- *Lab 2:* pwd, ls, mkdir, cd
- *Lab 3:* ls -l, cp, mv
- *Lab 4:* cd ../ (relative paths)
- *Lab 5:* cd /usr/bin (absolute paths), cd ~
- *Lab 6:* Scripts, chmod

MAKE ME A SANDWICH.

WHAT? MAKE IT YOURSELF.

SUDO MAKE ME A SANDWICH.

OKAY.

xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

- *Lab 2:* pwd, ls, mkdir, cd
- *Lab 3:* ls -l, cp, mv
- *Lab 4:* cd ../ (relative paths)
- *Lab 5:* cd /usr/bin (absolute paths), cd ~
- *Lab 6:* Scripts, chmod
- *Lab 7:* Running Python from the command line

xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

- *Lab 2:* pwd, ls, mkdir, cd
- *Lab 3:* ls -l, cp, mv
- *Lab 4:* cd ../ (relative paths)
- *Lab 5:* cd /usr/bin (absolute paths), cd ∼
- *Lab 6:* Scripts, chmod
- *Lab 7:* Running Python from the command line
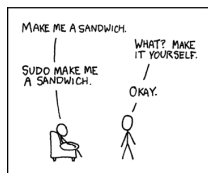- *Lab 8:* git from the command line

xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

- *Lab 2:* pwd, ls, mkdir, cd
- *Lab 3:* ls -l, cp, mv
- *Lab 4:* cd ../ (relative paths)
- *Lab 5:* cd /usr/bin (absolute paths), cd ~
- *Lab 6:* Scripts, chmod
- *Lab 7:* Running Python from the command line
- *Lab 8:* git from the command line
- *Lab 9:* ls *.py (wildcards)

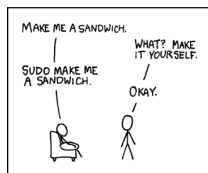xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

- *Lab 2:* pwd, ls, mkdir, cd
- *Lab 3:* ls -l, cp, mv
- *Lab 4:* cd ../ (relative paths)
- *Lab 5:* cd /usr/bin (absolute paths), cd $\sim$
- *Lab 6:* Scripts, chmod
- *Lab 7:* Running Python from the command line
- *Lab 8:* git from the command line
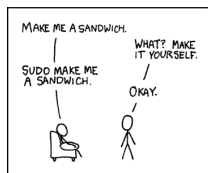- *Lab 9:* ls *.py (wildcards)
- *Lab 10:* More on scripts, vim

MAKE ME A SANDWICH.

WHAT? MAKE IT YOURSELF.

SUDO MAKE ME A SANDWICH.

OKAY.

xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

- *Lab 2:* pwd, ls, mkdir, cd
- *Lab 3:* ls -l, cp, mv
- *Lab 4:* cd ../ (relative paths)
- *Lab 5:* cd /usr/bin (absolute paths), cd ~
- *Lab 6:* Scripts, chmod
- *Lab 7:* Running Python from the command line
- *Lab 8:* git from the command line
- *Lab 9:* ls *.py (wildcards)
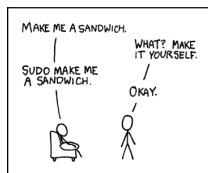- *Lab 10:* More on scripts, vim
- *Lab 11:* ls | wc -c (pipes), grep, wc

MAKE ME A SANDWICH.

WHAT? MAKE IT YOURSELF.

SUDO MAKE ME A SANDWICH.

OKAY.

xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

- *Lab 2:* pwd, ls, mkdir, cd
- *Lab 3:* ls -l, cp, mv
- *Lab 4:* cd ../ (relative paths)
- *Lab 5:* cd /usr/bin (absolute paths), cd ~
- *Lab 6:* Scripts, chmod
- *Lab 7:* Running Python from the command line
- *Lab 8:* git from the command line
- *Lab 9:* ls *.py (wildcards)
- *Lab 10:* More on scripts, vim
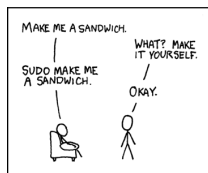- *Lab 11:* ls | wc -c (pipes), grep, wc
- *Lab 12:* file, which

MAKE ME A SANDWICH.

WHAT? MAKE IT YOURSELF.

SUDO MAKE ME A SANDWICH.

OKAY.

xkcd 149

Final Exam Prep: UNIX

Unix commands in the weekly on-line labs:

xkcd 149

- *Lab 2:* pwd, ls, mkdir, cd
- *Lab 3:* ls -l, cp, mv
- *Lab 4:* cd ../ (relative paths)
- *Lab 5:* cd /usr/bin (absolute paths), cd $\sim$
- *Lab 6:* Scripts, chmod
- *Lab 7:* Running Python from the command line
- *Lab 8:* git from the command line
- *Lab 9:* ls *.py (wildcards)
- *Lab 10:* More on scripts, vim
- *Lab 11:* ls | wc -c (pipes), grep, wc
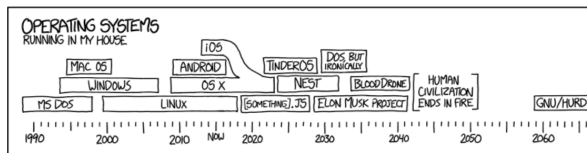- *Lab 12:* file, which
- *Lab 13:* man, more, w
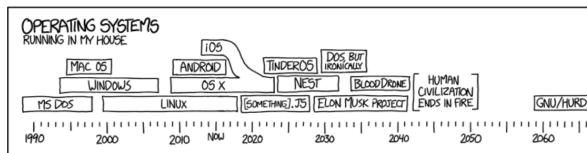
Practice Quiz & Final Questions

xkcd #1508

- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).
- Lightning rounds:
  - ▶ write as much you can for 60 seconds;
  - ▶ followed by answer; and
  - ▶ repeat.
- Past exams are on the webpage (under Final Exam Information).

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.
- Pull out something to write on (not to be turned in).
- Lightning rounds:
    - write as much you can for 60 seconds;
    - followed by answer; and
    - repeat.
- Past exams are on the webpage (under Final Exam Information).
- Theme: Unix commands! (Spring 19 Version 3, #1.b)
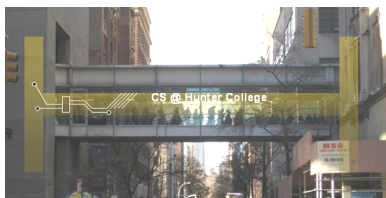
Weekly Reminders!

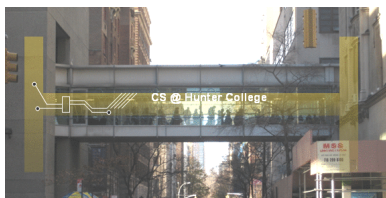Before next lecture, don't forget to:

- Work on this week's Online Lab

Weekly Reminders!

Before next lecture, don't forget to:

- Work on this week's Online Lab
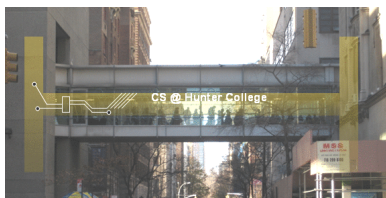- Schedule an appointment to take the Quiz in lab 1001E Hunter North

Weekly Reminders!

Before next lecture, don't forget to:

- Work on this week's Online Lab
- Schedule an appointment to take the Quiz in lab 1001E Hunter North
- If you haven't already, schedule an appointment to take the Code Review (**one every two weeks**) in lab 1001E Hunter North
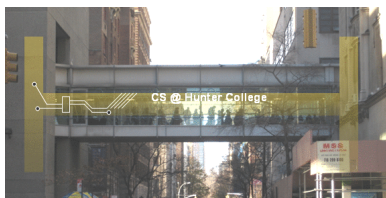
Weekly Reminders!

Before next lecture, don't forget to:

- Work on this week's Online Lab
- Schedule an appointment to take the Quiz in lab 1001E Hunter North
- If you haven't already, schedule an appointment to take the Code Review (**one every two weeks**) in lab 1001E Hunter North
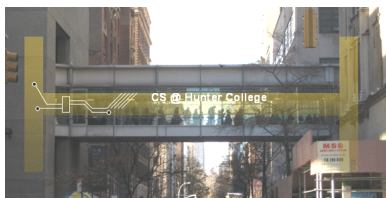- Submit this week's 5 programming assignments (programs 46-50)

Weekly Reminders!

Before next lecture, don't forget to:

- Work on this week's Online Lab
- Schedule an appointment to take the Quiz in lab 1001E Hunter North
- If you haven't already, schedule an appointment to take the Code Review (**one every two weeks**) in lab 1001E Hunter North
- Submit this week's 5 programming assignments (programs 46-50)
- If you need help, schedule an appointment for Tutoring in lab 1001E 11am-5pm

Weekly Reminders!

Before next lecture, don't forget to:

- Work on this week's Online Lab
- Schedule an appointment to take the Quiz in lab 1001E Hunter North
- If you haven't already, schedule an appointment to take the Code Review (**one every two weeks**) in lab 1001E Hunter North
- Submit this week's 5 programming assignments (programs 46-50)
- If you need help, schedule an appointment for Tutoring in lab 1001E 11am-5pm
- Take the Lecture Preview on Blackboard on Monday (or no later than 10am on Tuesday)