

CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

Welcome



Acknowledgments

Thank you to the amazing support of:



President Raab



Dean Polsky
Arts & Science



Judy Spitz
WiTNY

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Coordinator

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Early College
Initiative

Large
Lecture

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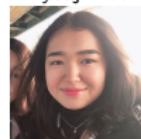


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Destiny Barbery



Hyeaji Lee



Ifte Ahmed



Joshua Natis



Kevin Wong



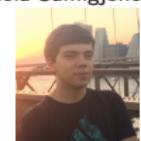
Leonardo Matone



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Lola Samigjonova



Mandy Yu



Matthew Rozanoff



Nixon Lazaro



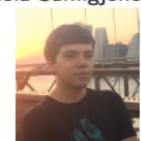
Owen Kunhardt



Patrick Chaca



Ryan Chevarria



Sadab Hafiz



Shantel Dixon



Stephanie Yung



Stephen Milani



Tyler Robinson



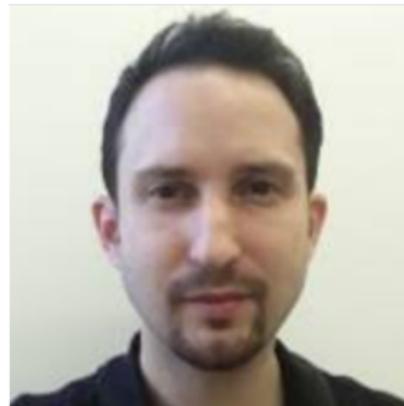
Yash Mahtani



Introductions: Advisors



Eric Schweitzer
Undergraduate Program
Coordinator



Justin Tojeira
Internships &
Upper Division

Syllabus

CSci 127: Introduction to Computer Science

*Catalog Description: 3 hours, 3 credits: This course presents an overview of computer science (CS) with an emphasis on **problem-solving and computational thinking through ‘coding’**: computer programming for beginners. Other topics include: organization of hardware, software, and how information is structured on contemporary computing devices. This course is pre-requisite to several introductory core courses in the CS Major. The course is also required for the CS minor. MATH 12500 or higher is strongly recommended as a co-req for intended Majors.*

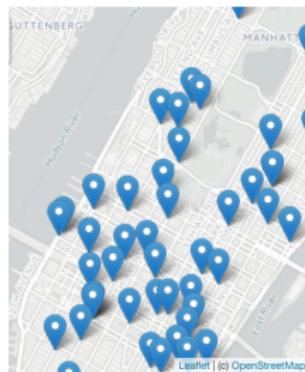
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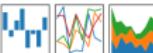
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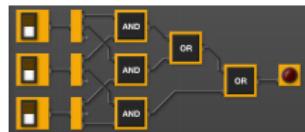
(Show syllabus webpage)

Syllabus: Topics

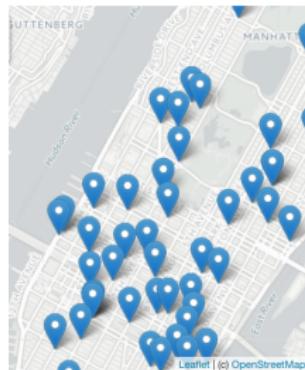


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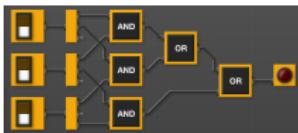
pandas    

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


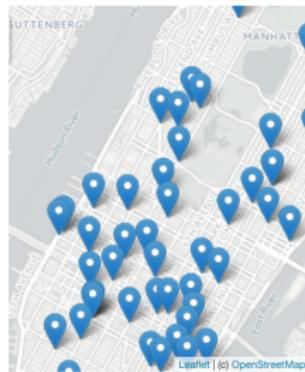
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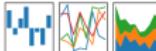
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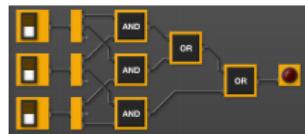


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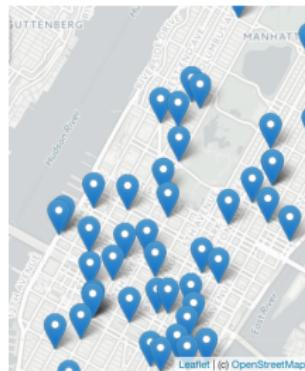


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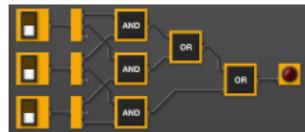
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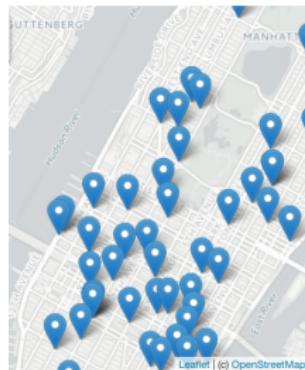
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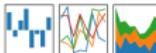


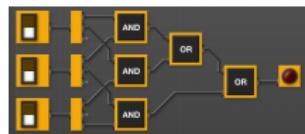
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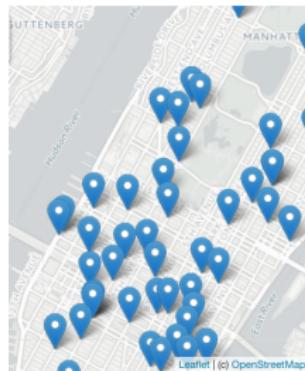


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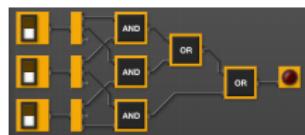
The text "pandas" is followed by the pandas logo, which consists of two overlapping square icons: one with a blue "p" and one with a green "d". Below this, a mathematical equation is shown: $y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$.

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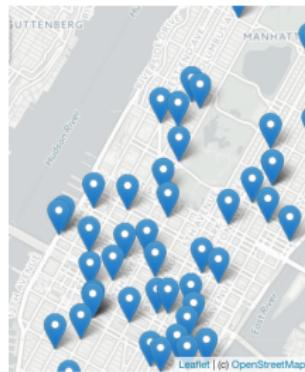


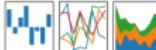
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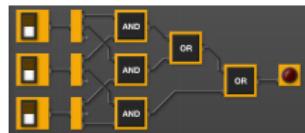
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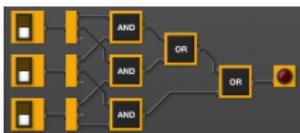
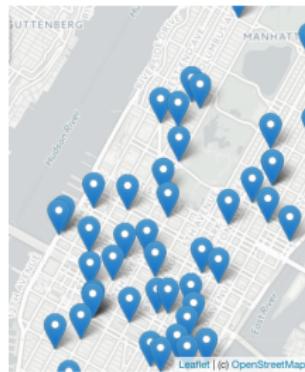
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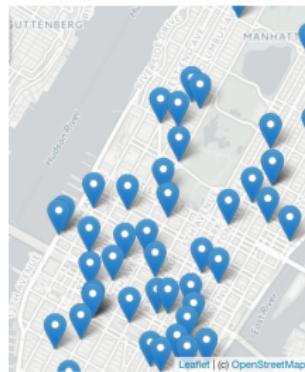
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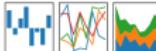
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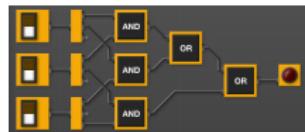


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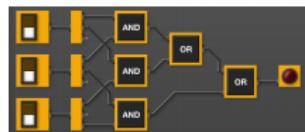
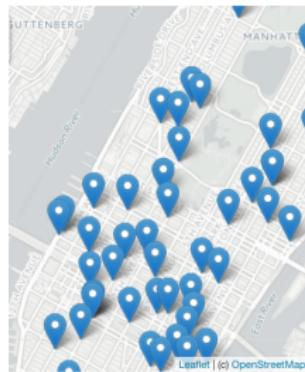


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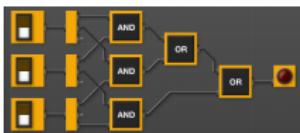
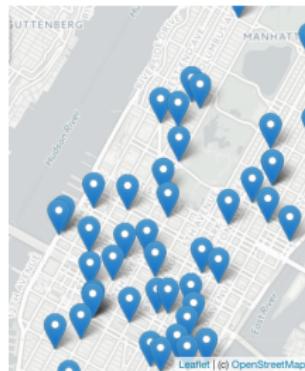
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 - ★ for C++.

Class Structure

Lecture:

- Tuesdays, 9:45-11:00am, 118 North.



First "computers"

ENIAC, 1945.

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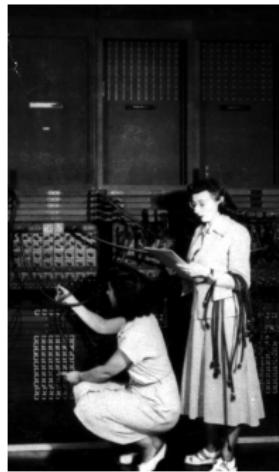
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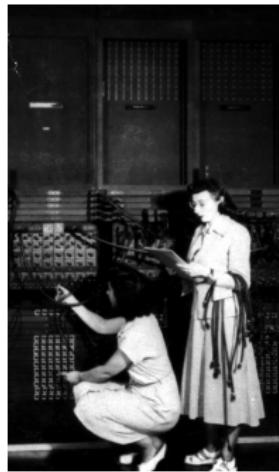
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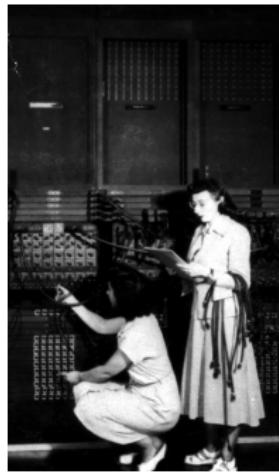
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Grading:

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We replace missing or low grades on lecture slips, lecture previews, quizzes, and code reviews with your final exam grade.

Lecture slips, previews, quizzes, and code reviews only help your grade.

- Do I have to pass the final to pass the course?

Yes. *To demonstrate mastery, you must pass the final exam.*

We will end most lectures with past final exam questions and review.

Philosophy (Or Why We Do What We Do)

Course Structure:

- Why 60 programs assignments? My friend only has to do 10.

Philosophy (Or Why We Do What We Do)

Course Structure:

- Why 60 programs assignments? My friend only has to do 10.
Traditionally, it's 10 long 'all-nighters' assignments.

Philosophy (Or Why We Do What We Do)

Course Structure:

- Why 60 programs assignments? My friend only has to do 10.

Traditionally, it's 10 long 'all-nighters' assignments.

While this mimics some jobs, students (particularly those new to programming) master skills better with smaller challenges.

Philosophy (Or Why We Do What We Do)

Course Structure:

- Why 60 programs assignments? My friend only has to do 10.
Traditionally, it's 10 long 'all-nighters' assignments.
While this mimics some jobs, students (particularly those new to programming) master skills better with smaller challenges.
- Why weekly quizzes instead of midterms?

Philosophy (Or Why We Do What We Do)

Course Structure:

- Why 60 programs assignments? My friend only has to do 10.
Traditionally, it's 10 long 'all-nighters' assignments.
While this mimics some jobs, students (particularly those new to programming) master skills better with smaller challenges.
- Why weekly quizzes instead of midterms?
Weekly quizzes increase pass rates and mastery of material.

Philosophy (Or Why We Do What We Do)

Course Structure:

- Why 60 programs assignments? My friend only has to do 10.
Traditionally, it's 10 long 'all-nighters' assignments.
While this mimics some jobs, students (particularly those new to programming) master skills better with smaller challenges.
- Why weekly quizzes instead of midterms?
Weekly quizzes increase pass rates and mastery of material.
Actively using knowledge increases your brain's ability to retain knowledge.

Philosophy (Or Why We Do What We Do)

Course Structure:

- Why 60 programs assignments? My friend only has to do 10.
Traditionally, it's 10 long 'all-nighters' assignments.
While this mimics some jobs, students (particularly those new to programming) master skills better with smaller challenges.
- Why weekly quizzes instead of midterms?
Weekly quizzes increase pass rates and mastery of material.
Actively using knowledge increases your brain's ability to retain knowledge.
- Why pre-testing (in the form of challenges and group work)? Why do we get asked (ungraded) questions on stuff we have never seen before?

Philosophy (Or Why We Do What We Do)

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While counter-intuitive, it gives a "mental scaffold" to store new material.
- I like working by myself. Why do I have to work in groups during class?
Active learning increases student performance.
Also, it provides excellent practice explaining technical ideas (i.e. tech interviews).

Philosophy (Or Why We Do What We Do)

Help:

- What's the best way to master the concepts in this course?

Philosophy (Or Why We Do What We Do)

Help:

- What's the best way to master the concepts in this course?
 - ▶ *Most efficient way: do the programs*

Philosophy (Or Why We Do What We Do)

Help:

- What's the best way to master the concepts in this course?
 - ▶ *Most efficient way: do the programs (more programs on old finals).*

Philosophy (Or Why We Do What We Do)

Help:

- What's the best way to master the concepts in this course?
 - ▶ *Most efficient way: do the programs (more programs on old finals).*
 - ▶ *Aim to complete programs when related ideas are covered in lab.*

Philosophy (Or Why We Do What We Do)

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- What's the best way to master the concepts in this course?
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 - ★ *huntercsci127help@gmail.com*

Introductions: Your Turn



- Introduce yourself to two classmates (that you have not met before).
- Write down names & interesting fact on lecture slip.

Today's Topics



- Introduction to Python
- Definite Loops (`for`-loops)
- Turtle Graphics
- Algorithms

Introduction to Python

- We will be writing programs— commands to the computer to do something.



Introduction to Python

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- A **programming language** is a stylized way of writing those commands.



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- Our first language, Python, is popular for its ease-of-use, flexibility, and extensibility.

Introduction to Python



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- The first lab goes into step-by-step details of getting Python running.

Introduction to Python



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- If you can write a logical argument or persuasive essay, you can write a program.
- Our first language, Python, is popular for its ease-of-use, flexibility, and extensibility.
- The first lab goes into step-by-step details of getting Python running.
- We'll look at the design and basic structure (no worries if you haven't tried it yet in lab).

First Program: Hello, World!



Demo in pythonTutor

First Program: Hello, World!

```
#Name: Thomas Hunter
```

```
#Date: September 1, 2017
```

```
#This program prints: Hello, World!
```

```
print("Hello, World!")
```

First Program: Hello, World!

```
#Name: Thomas Hunter           ← These lines are comments
#Date: September 1, 2017        ← (for us, not computer to read)
#This program prints: Hello, World!   ← (this one also)
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- Output to the screen is: Hello, World!

First Program: Hello, World!

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#Name: Thomas Hunter           ← These lines are comments
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#This program prints: Hello, World!   ← (this one also)

print("Hello, World!")          ← Prints the string "Hello, World!" to the screen
```

- Output to the screen is: Hello, World!
- Can replace Hello, World! with another string to be printed.

Variations on Hello, World!

```
#Name: L-M Miranda  
#Date: Hunter College HS '98  
#This program prints intro lyrics  
  
print('Get your education,')
```

Variations on Hello, World!

```
#Name: L-M Miranda
```

```
#Date: Hunter College HS '98
```

```
#This program prints intro lyrics
```

```
print('Get your education,')
```

*Spring18 here in Assembly Hall
Who is L-M Miranda?*



Variations on Hello, World!

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Variations on Hello, World!

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#This program prints intro lyrics
```

```
print('Get your education,')
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```
print("don't forget from whence you came, and")
```

Variations on Hello, World!

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print('Get your education,')  
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- Each print statement writes its output on a new line.

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- Each print statement writes its output on a new line.
- Results in three lines of output.

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print("don't forget from whence you came, and")  
print("The world's gonna know your name.")
```

- Each print statement writes its output on a new line.
- Results in three lines of output.
- Can use single or double quotes, just need to match.

Turtles Introduction

- A simple, whimsical graphics package for Python.



Turtles Introduction

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- Dates back to Logo Turtles in the 1960s.



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- (Demo from webpage)

Turtles Introduction



- A simple, whimsical graphics package for Python.
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- (Demo from webpage)
- (Fancier turtle demo)

Turtles Introduction

The screenshot shows a Python code editor interface. On the left, the code file 'main.py' contains the following Python script:

```
1 #A program that demonstrates turtles stamping
2
3 import turtle
4
5 taylor = turtle.Turtle()
6 taylor.color("purple")
7 taylor.shape("turtle")
8
9 for i in range(6):
10    taylor.forward(100)
11    taylor.stamp()
12    taylor.left(60)
```

The right side of the interface is divided into two panes: 'Result' and 'Instructions'. The 'Result' pane displays the output of the program, which is a regular hexagon drawn in purple. Each vertex of the hexagon has a small purple star-like stamp.

- Creates a turtle, called taylor.

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- Creates a turtle, called `taylor`.
- Changes the color (to purple) and shape (to turtle-shaped).

Turtles Introduction

The screenshot shows a Python code editor interface. On the left, the code file 'main.py' is open, containing the following Python script:

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9 for i in range(6):
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```

On the right, there are two tabs: 'Result' and 'Instructions'. The 'Result' tab is active, displaying the output of the program: a purple turtle shape that has drawn a regular hexagon on the screen, with each vertex marked by a purple star-like stamp.

- Creates a turtle, called `taylor`.
- Changes the color (to purple) and shape (to turtle-shaped).
- Repeats 6 times:

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On the right, the 'Result' tab displays the output of the program: a regular hexagon drawn in purple, with each vertex marked by a purple star-like stamp.

- Creates a turtle, called `taylor`.
- Changes the color (to purple) and shape (to turtle-shaped).
- Repeats 6 times:
 - ▶ Move forward; stamp; and turn left 60 degrees.

Turtles Introduction

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```

On the right, the 'Result' tab displays the output of the program: a purple turtle shape that has drawn a regular hexagon on the screen, with six purple star-like stamps at each vertex.

- Creates a turtle, called `taylor`.
- Changes the color (to purple) and shape (to turtle-shaped).
- Repeats 6 times:
 - ▶ Move forward; stamp; and turn left 60 degrees.
- Repeats any instructions **indented** in the "loop block"

Group Work

Working in pairs or triples:

- ① Write a program that will draw a 10-sided polygon.
- ② Write a program that will repeat the line:
I'm lookin' for a mind at work!
three times.

Decagon Program

The screenshot shows a Python code editor with a file named `main.py` containing the following code:

```
1 #A program that demonstrates turtles stamping
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9 for i in range(6):
10     taylor.forward(100)
11     taylor.stamp()
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```

The editor has a toolbar at the top with icons for file operations like Open, Save, and Run. Below the toolbar is a tab bar with `main.py` selected. To the right of the code area are two tabs: `Result` and `Instructions`. The `Result` tab displays a drawing of a regular hexagon drawn in purple. Each vertex of the hexagon is marked with a purple star-like stamp.

- Start with the hexagon program.

Decagon Program

The screenshot shows a code editor interface with a toolbar at the top. The file tab shows "main.py". The code in the editor is:

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9 for i in range(6):
10     taylor.forward(100)
11     taylor.stamp()
12     taylor.left(60)
```

The "Result" tab shows a purple hexagon drawn on a white background, with a purple star at each vertex where the turtle stamped.

- Start with the hexagon program.
- Has 10 sides (instead of 6), so change the `range(6)` to `range(10)`.

Decagon Program

The screenshot shows a code editor interface with a toolbar at the top. The file tab shows "main.py". The code in the editor is:

```
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```

The "Result" tab shows a purple hexagon drawn on a white background, with a purple star at each vertex.

- Start with the hexagon program.
- Has 10 sides (instead of 6), so change the `range(6)` to `range(10)`.
- Makes 10 turns (instead of 6),
so change the `taylor.left(60)` to `taylor.left(360/10)`.

Work Program

- ② Write a program that will repeat the line:
I'm lookin' for a mind at work!
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Work Program

- ② Write a program that will repeat the line:
`I'm lookin' for a mind at work!`
three times.
- Repeats three times, so, use `range(3)`:
`for i in range(3):`

Work Program

- ② Write a program that will repeat the line:
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three times.
- Repeats three times, so, use `range(3)`:
`for i in range(3):`
- Instead of turtle commands, repeating a print statement.

Work Program

- ② Write a program that will repeat the line:

I'm lookin' for a mind at work!

three times.

- Repeats three times, so, use range(3):

```
for i in range(3):
```

- Instead of turtle commands, repeating a print statement.

- Completed program:

```
# Your name here!
```

```
for i in range(3):
```

```
    print("I'm lookin' for a mind at work!")
```

What is an Algorithm?

From our textbook:

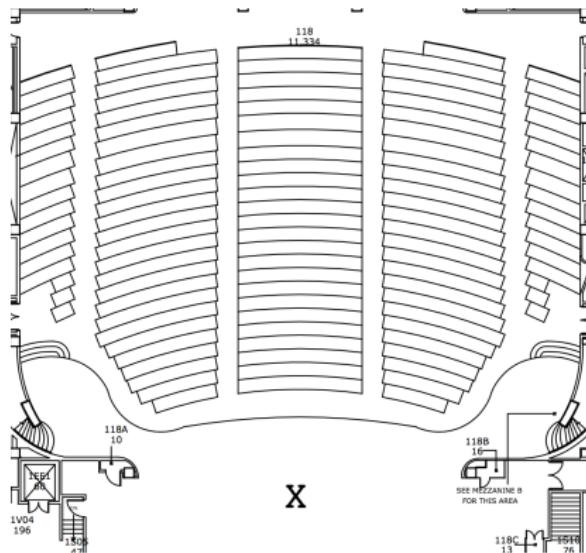
- An **algorithm** is a process or set of rules to be followed to solve a problem.

What is an Algorithm?

From our textbook:

- An **algorithm** is a process or set of rules to be followed to solve a problem.
- Programming is a skill that allows a computer scientist to take an algorithm and represent it in a notation (a program) that can be followed by a computer.

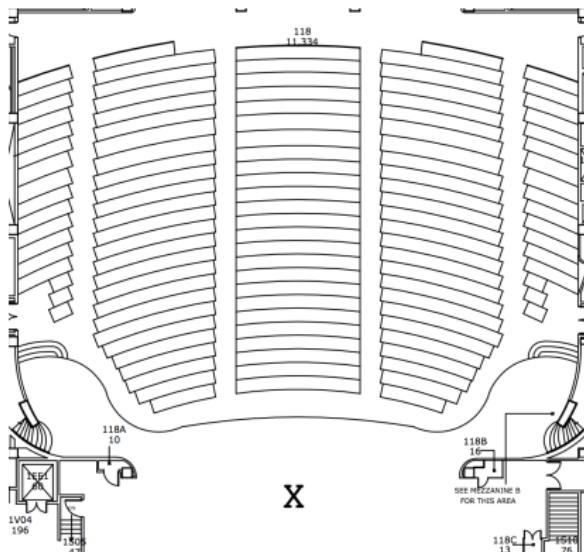
Group Work



Working in pairs or triples:

- ① On the floorplan, mark your current location.
- ② Write an algorithm (step-by-step directions) to get to X.

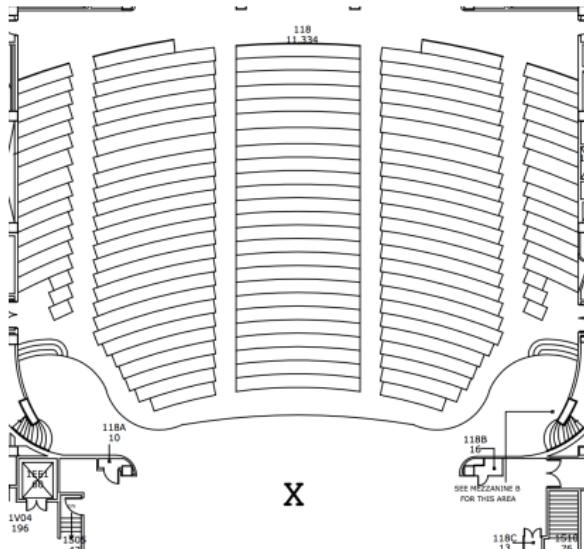
Group Work



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- ③ Basic Rules:

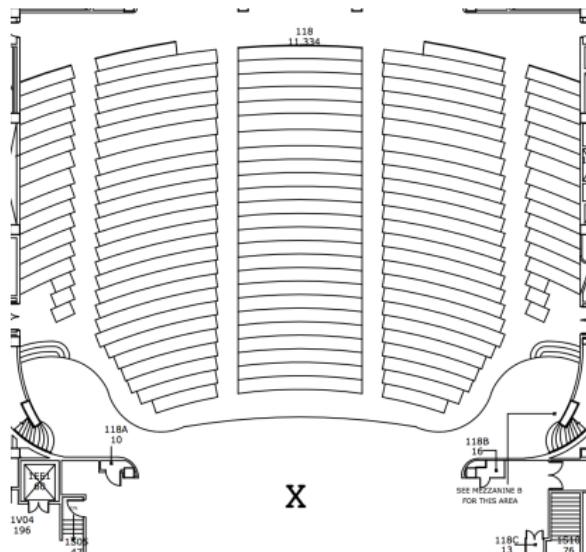
Group Work



Working in pairs or triples:

- ① On the floorplan, mark your current location.
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- ③ Basic Rules:
 - ▶ Use turtle commands.

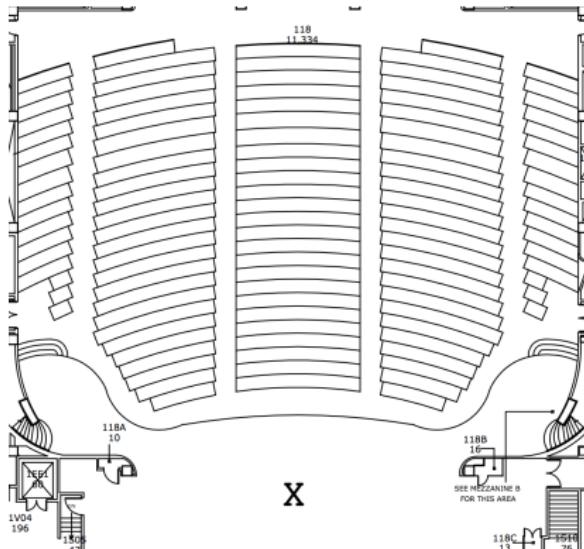
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Working in pairs or triples:

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 - ▶ Use turtle commands.
 - ▶ Do not run turtles into walls, chairs, obstacles, etc.

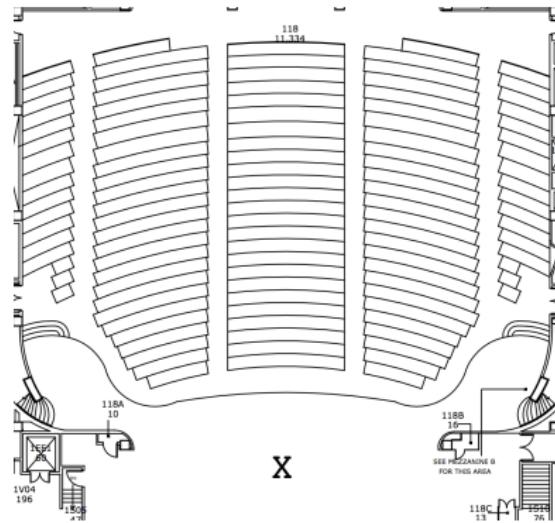
Group Work



Working in pairs or triples:

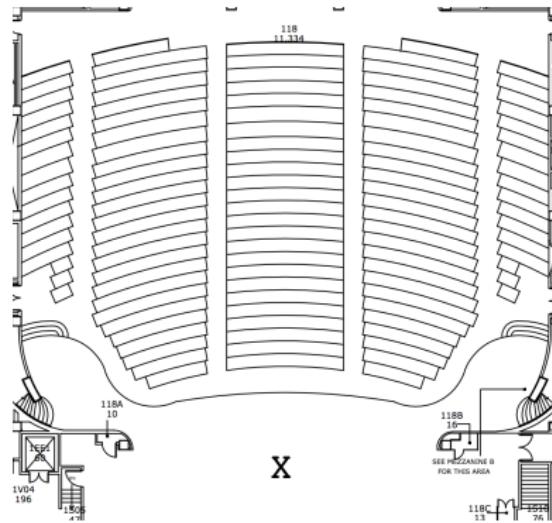
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- ② Write an algorithm (step-by-step directions) to get to X.
- ③ Basic Rules:
 - ▶ Use turtle commands.
 - ▶ Do not run turtles into walls, chairs, obstacles, etc.
 - ▶ Turtles cannot climb walls, must use stairs.

Group Work



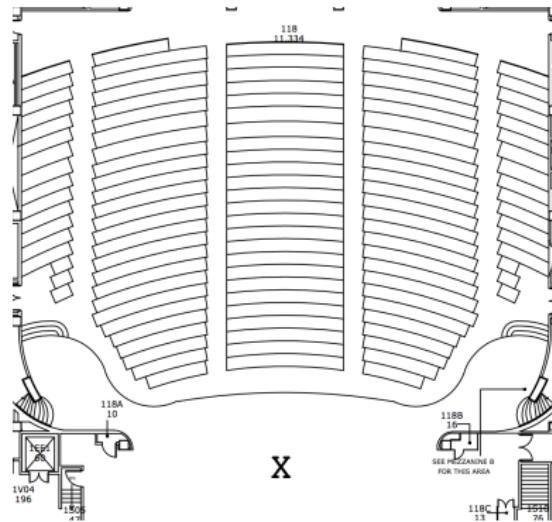
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Group Work



- Have one person in your group be the “turtle.”
- Follow the directions to get to X.

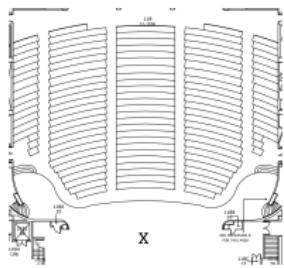
Group Work



- Have one person in your group be the “turtle.”
- Follow the directions to get to X.
- Annotate any changes needed to the directions (i.e. debug your work).

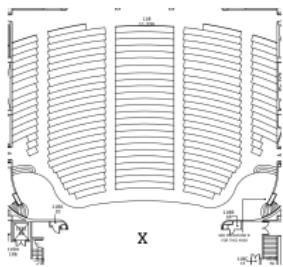
Recap

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



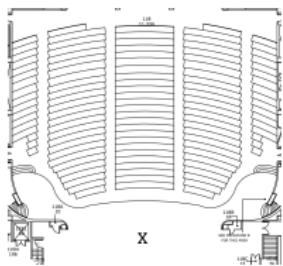
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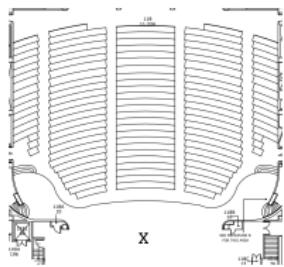


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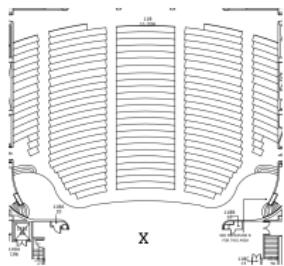


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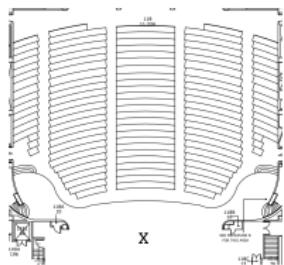
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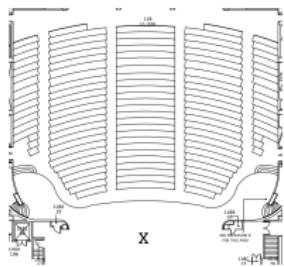
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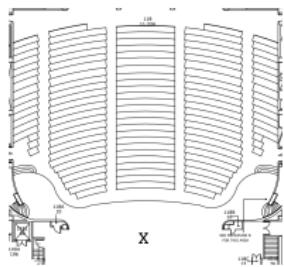
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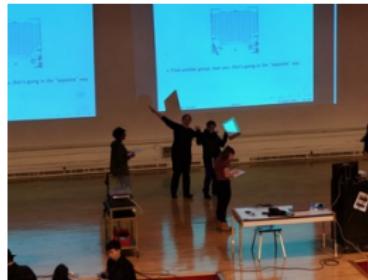
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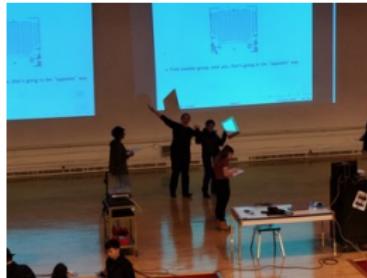
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- Pass your lecture slips to the aisle for the UTA's to collect.

Practice Quiz & Final Questions



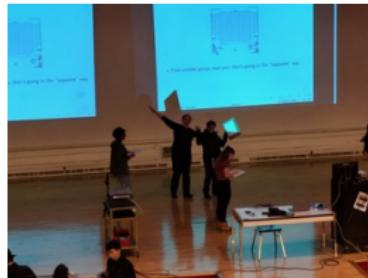
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Practice Quiz & Final Questions



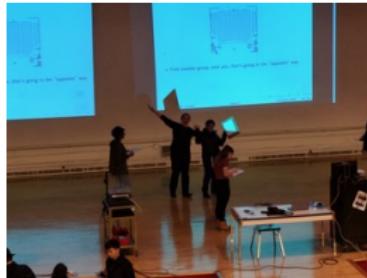
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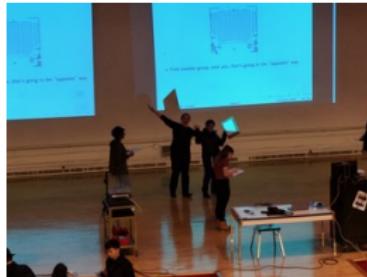
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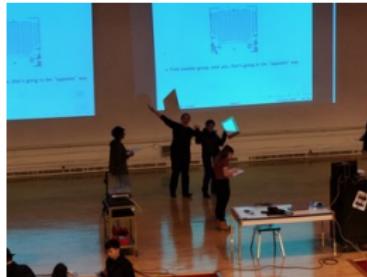
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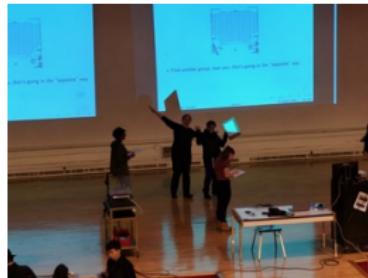
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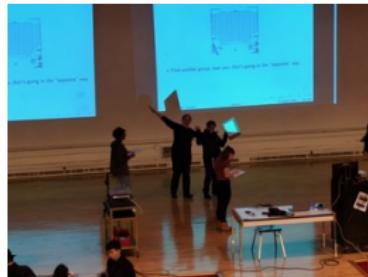
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Writing Boards



- Return writing boards as you leave...