

On your way in...

Hand-in:

1. Homeworks

Pick-up:

1. POGIL Activity 1
2. POGIL Activity 3

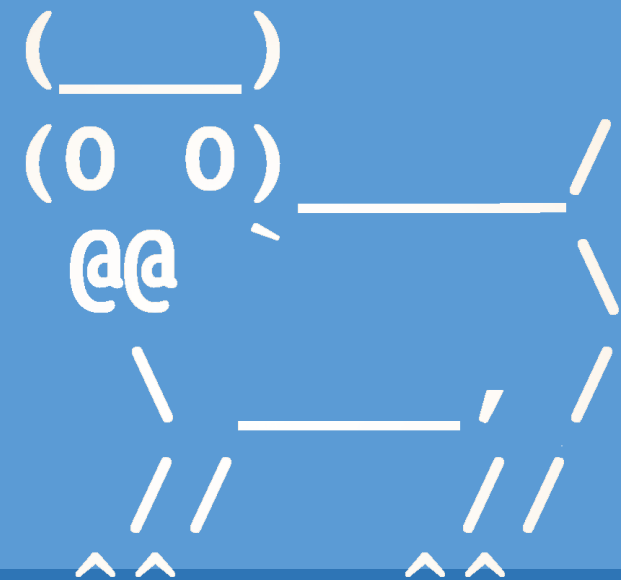


Welcome to CS 134!

Introduction to Computer Science

Iris Howley

-Starting Up-



Spring 2020



WHO AM I?

WHO AM I?

- Iris Howley
 - Prefer: Iris / Professor [Howley]
 - Pronouns: She / Her
- Background
 - BS: Computer Science, Drexel University
 - PhD in HCI, Carnegie Mellon
 - Joined Williams, 2017
- Teaching
 - “User-Centered Research & Evaluation” @CMU
 - “Prototyping User Interfaces” @CMU
 - CSCI11 eTextiles Winter Study
 - CSCI103 eTextiles – Fall 2019
 - CSCI376 – Spring 2018, Fall 2018, Fall 2019
 - CSCI134 Java & Python Versions (many times)

WHO AM I?

- Research Keywords
 - HCI, learning sciences, artificial intelligence, educational technology
- Research description:
 - I research how humans interact with artificial intelligence in educational contexts
- Example projects:
 - Explainables to teach users the algorithms underlying their ed tech
 - Natural Language Processing for identifying critical thinking in students' digital notes







WHO ARE YOU?

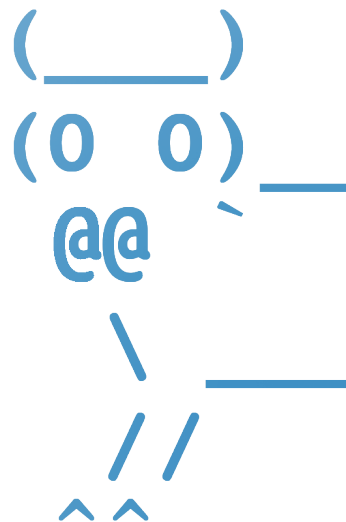
WHO ARE YOU?

- Name
- Year
- Pronouns
- **ONE BORING FACT ABOUT YOURSELF**

QUESTIONS?

Question: How to install python3 on my machine?

- Install python3
 - <https://www.python.org/downloads/>
- Run python3 on Unix (Macs, Linux, not Windows PCs)
 - You'll need to type "python3 `__name_of_file__`" to use python3



What do these 4 applications have in common?



Google Docs

What do these 4 applications have in common?

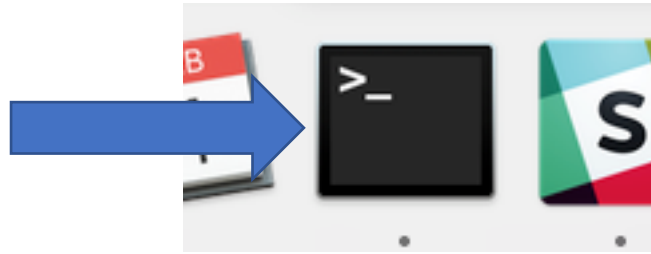


Google Docs

Similar...



Terminal



Python

- Written into a **script** and then interpreted by Python
 - `python3 hello.py`
- **Interactive** mode
 - `python3`
 - `>>> print("hello!")`
- Terminal and Python are two separate apps!





Lab Logistics

We have lab today and tomorrow!

Attend your scheduled lab!

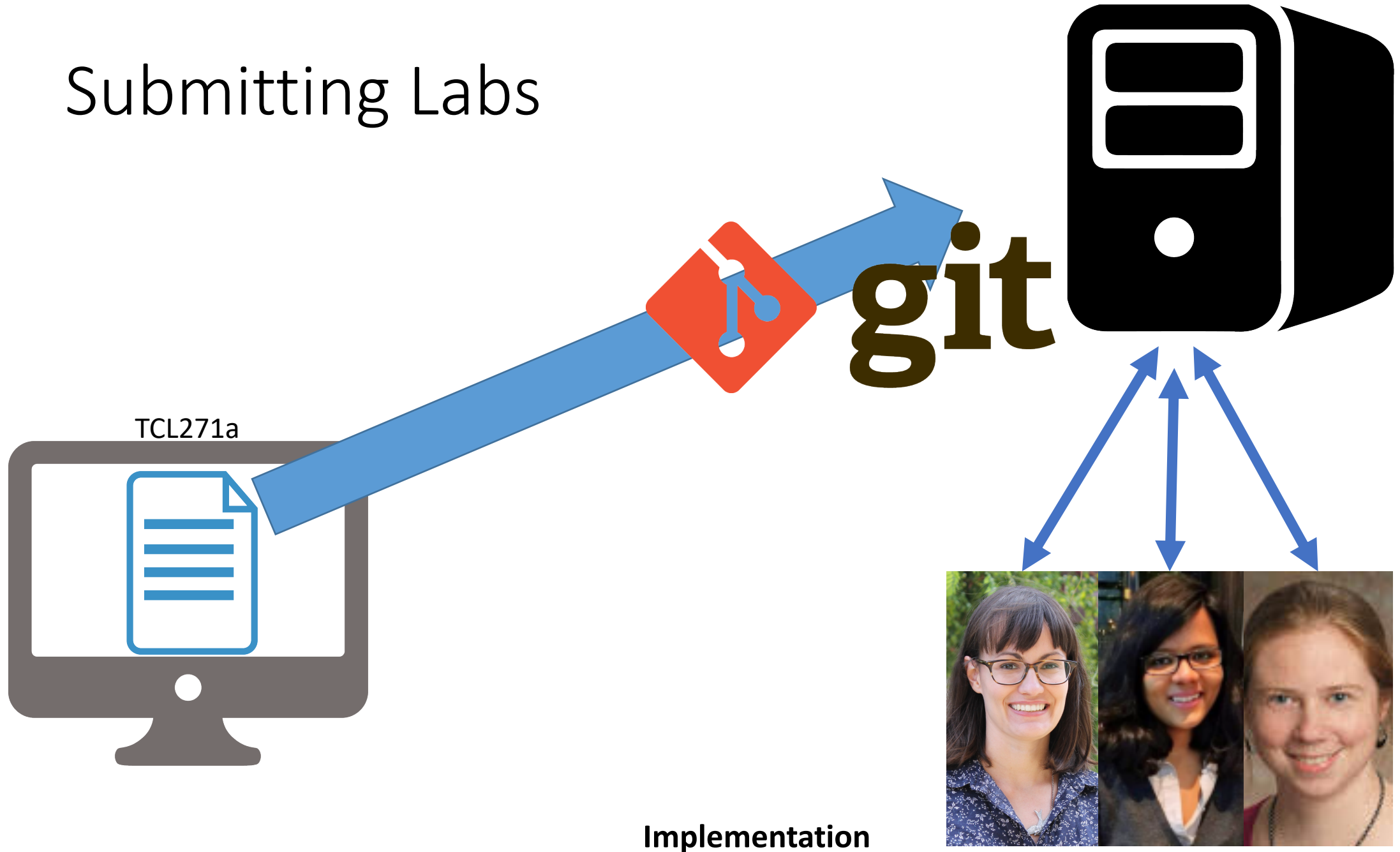


Lab Details

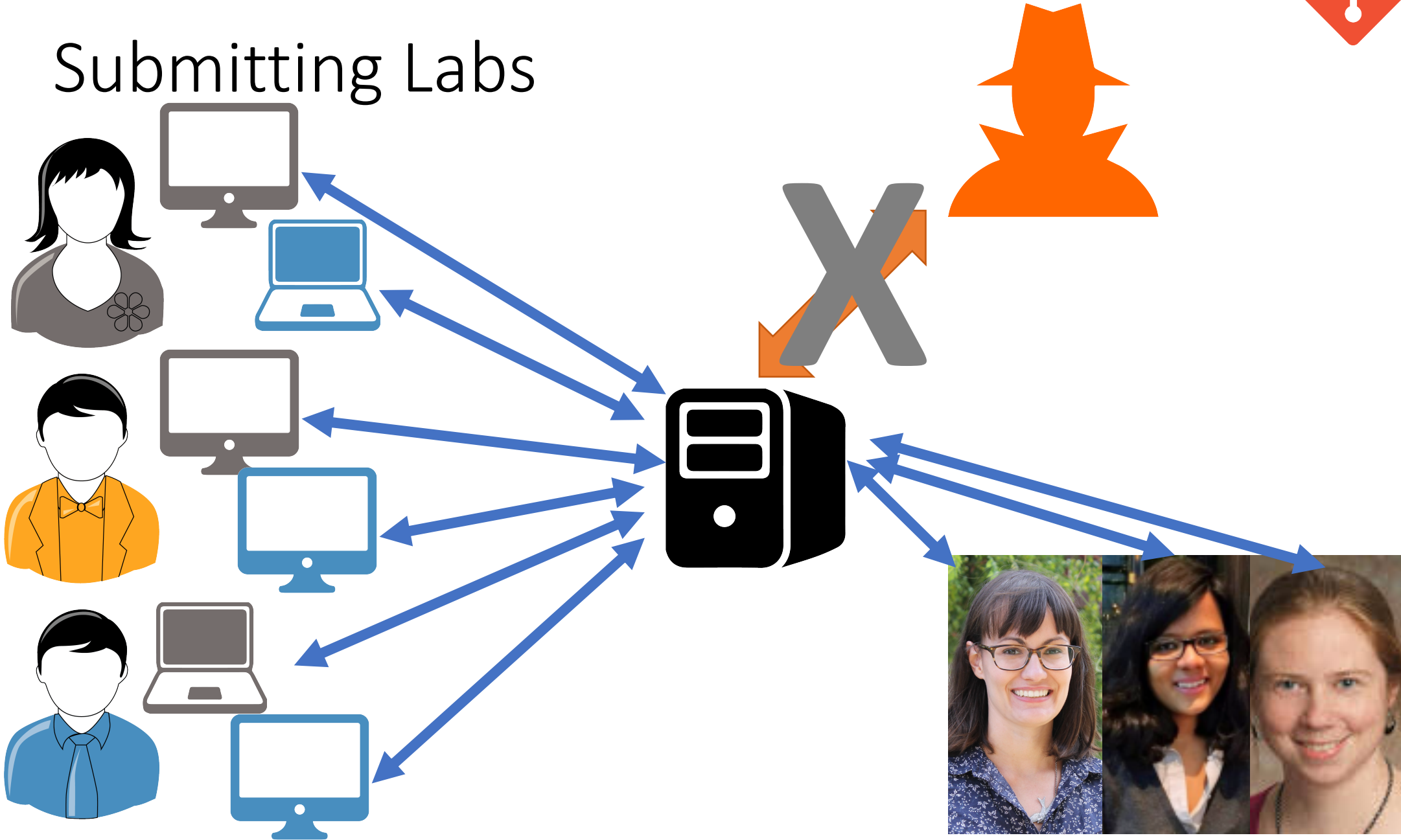
- Lab starts today!
 - Monday, 1-2:30p or 2:30-4p
 - Tuesday, same times
- The lab (TCL217) is locked!
 - 1-2-4-8-16 (think: 2^0 , 2^1 , 2^2 , 2^3 , 2^4)



Submitting Labs

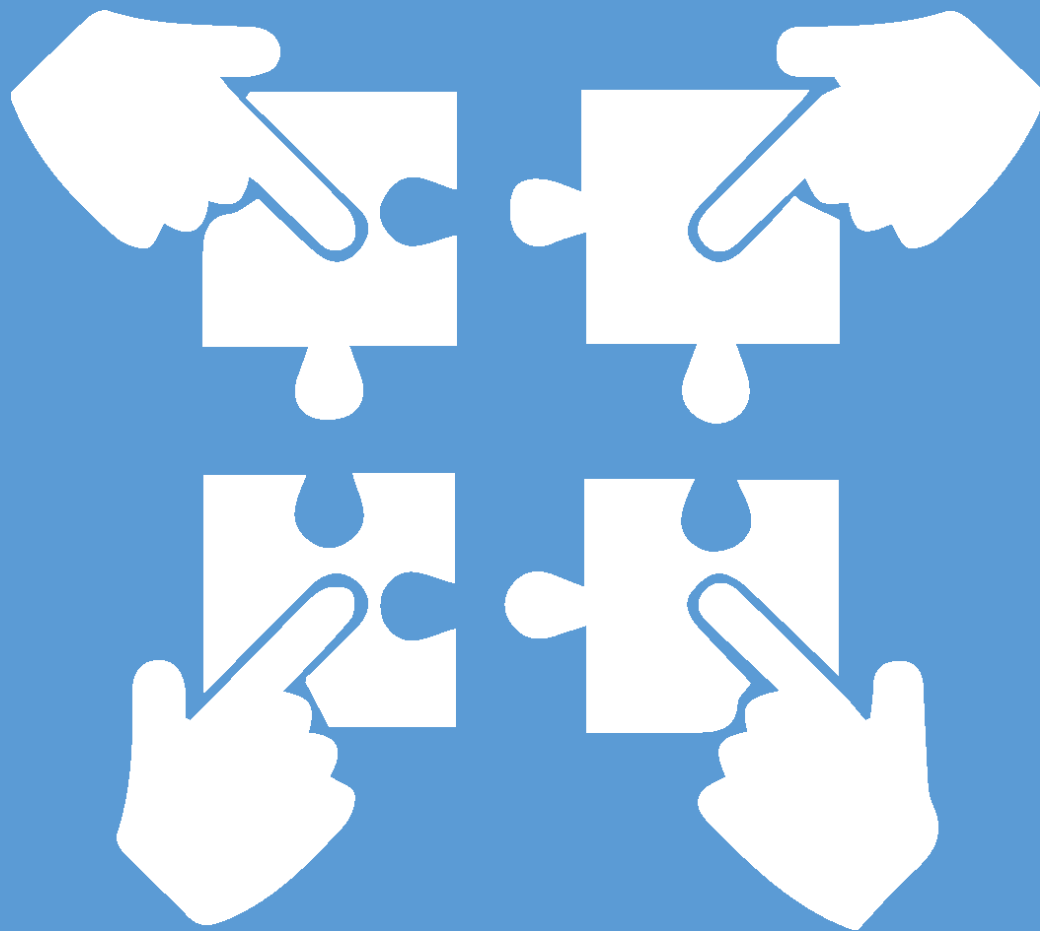


Submitting Labs



Using git lets you access your work from any machine with Internet + git

Git and Atom are tools that computer scientists use.



Process-Oriented Guided-Inquiry Learning
(POGIL)

The Goal:
To think like a computer
scientist.

POGIL: Activities

- Learning Objectives
- Critical Thinking Questions
- Application Questions

POGIL activities lead to longer term learning retention

[1] Vanags et al (2013). [“Process-oriented guided-inquiry learning improves long-term retention of information”](#)

POGIL

- Let's step through a sample POGIL activity together.
- Look at POGIL worksheet 01.

POGIL

2. What output will be produced from the following statements? Indicate if there is a problem.

- a. print("Hello, my name is Pat!") _____
- b. print(Hello, my name is Pat) _____
- c. print("Hello.\nMy name is Pat") _____

What caused the different output format for samples "a" and "c" in question 2?

POGIL

4. What do you think the following Python statements output? Enter the statements in the interactive mode of the Python interpreter (as a class) to verify your answers.

a. `print(2+5)`

b. `print(2*5)`

c. `print("2+5")`

d. `print("Age:", 20)`

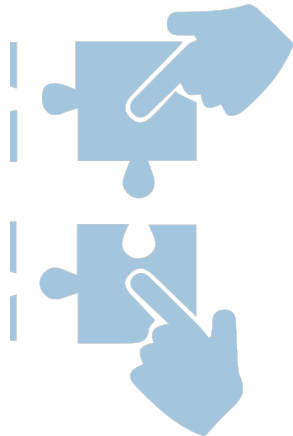
5. Examine the output for each statement in question 4.

a. What is the difference in the output for the statements in “a” and “c” of question 4?

b. What caused the difference?

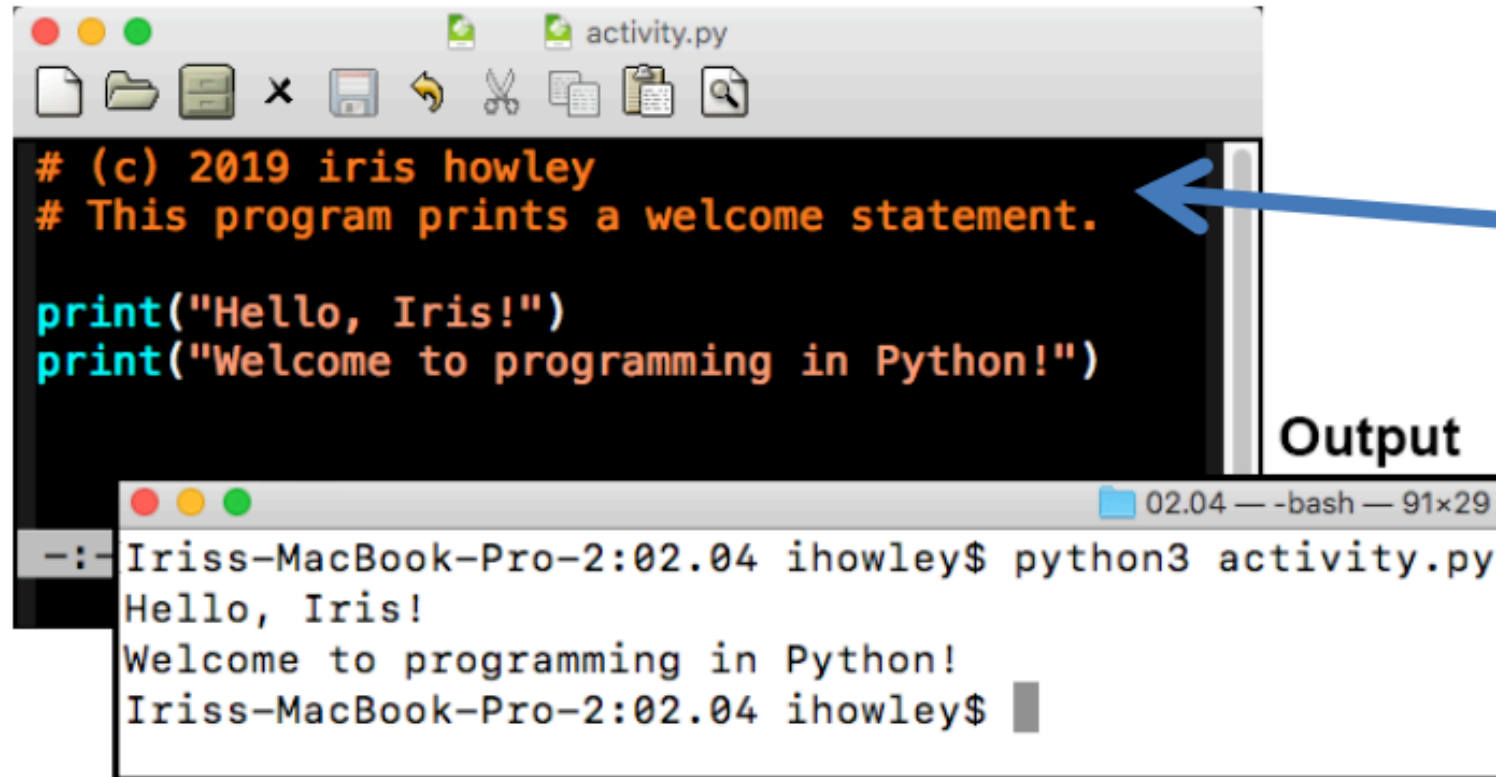
c. Which statements contain a *string literal*?

d. What does the comma (,) do in the print statement in part “d” of question 4? How does it affect the spacing of the output?



POGIL

See the program below + its output. What do the first two lines do?



The image shows two overlapping windows. The top window, titled 'activity.py', contains the following Python code:

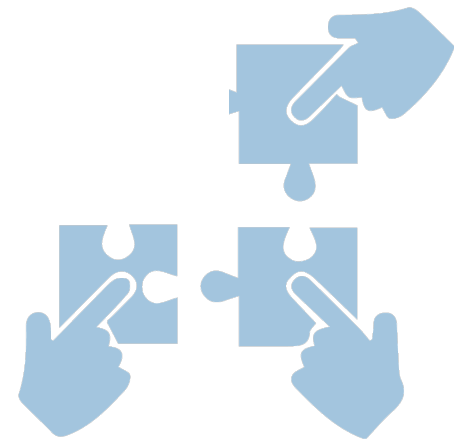
```
# (c) 2019 iris howley
# This program prints a welcome statement.

print("Hello, Iris!")
print("Welcome to programming in Python!")
```

A blue arrow points from the text 'What do the first two lines do?' to the first two lines of code. The bottom window, titled '02.04 — -bash — 91x29', shows the output of running the script:

```
Iriss-MacBook-Pro-2:02.04 ihowley$ python3 activity.py
Hello, Iris!
Welcome to programming in Python!
Iriss-MacBook-Pro-2:02.04 ihowley$
```

What would happen if we placed a
in front of `print("Hello, Iris!")`?

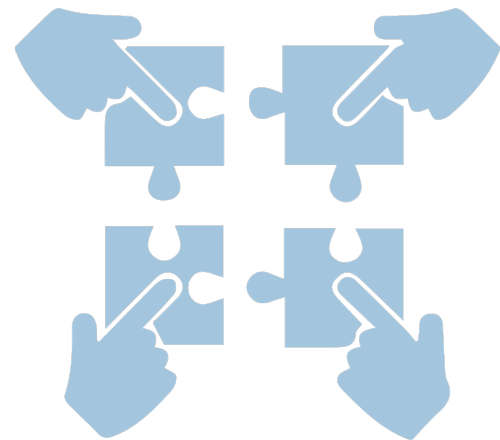


POGIL

- Let's look at POGIL activity 03
- We'll do question 1 as a class

What is the output for each statement?

```
print(16 + 3)
print(16 - 3)
print(16 * 3)
print(16 ** 3)
print(16 / 3)
print(16 // 3)
print(16 % 3)
```



POGIL

7. Let's take a look at a program that subtracts two numbers.

```
firstNumber = "17"  
secondNumber = "15"  
difference = firstNumber - secondNumber  
print("Difference = ", difference)
```

- a. What output do you expect? _____
- b. Execute the code. What is the actual output? _____
- c. Revise the program in the following manner:
- Between lines 2 and 3 add the following lines of code:
`num1 = int(firstNumber)`
`num2 = int(secondNumber)`
 - Next, replace the statement:
`difference = firstNumber - secondNumber`
with the statement:
`difference = num1 - num2`
 - Execute the program again. What output did you get? _____
- d. Explain the purpose of the function int() .

Variables, Types, Assignment, & Input



```
>>> print('hello name')
hello name
>>> print("hello\nname")
hello
name
>>> print("hello\t name")
hello name
>>> print(2+5)
7
>>> print(2*5)
10
>>> print("2+5")
2+5
>>> print("Age:", 20)
Age: 20
```

```
>>> print(16*3)
48
>>> print(16**3)
4096
>>> print(2**0)
1
>>> print(2**2)
4
>>> print(16/3)
5.333333333333333
>>> print(16//3)
5
>>> print(16%3)
1
>>> print(5%3)
2
>>> print("5 divided by 3 is", 5//3, "remainder", 5%3)
5 divided by 3 is 1 remainder 2
```

```
>>> print(1%2)
```

```
1
```

```
>>> print(2%2)
```

```
0
```

```
>>> print(-1%2)
```

```
1
```

```
>>> print(-5%2)
```

```
1
```

```
>>> print(-6%2)
```

```
0
```

```
>>> print(-5%3)
```

```
1
```

```
>>> name = input("whats your name?")
```

```
whats your name?iris
```

```
>>> print(name)
```

```
iris
```

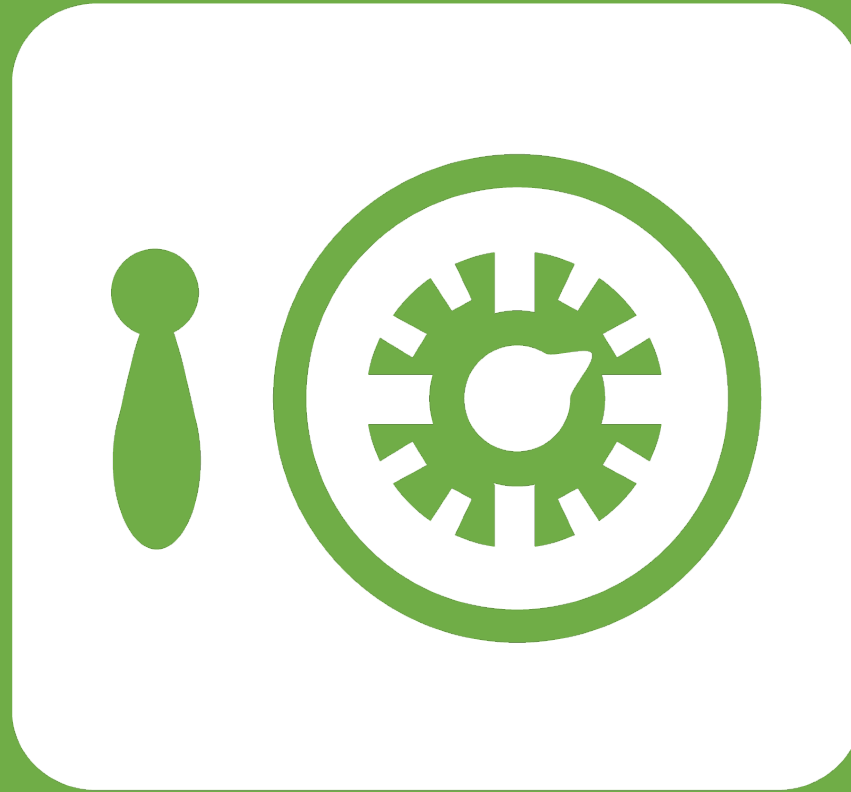
```
>>> num = input("numerator?")
numerator?5
>>> div = input("divisor?")
divisor?3
>>> print(num)
5
>>> print(div)
3
>>> print(num/div)
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: unsupported operand type(s) for /: 'str' and 'str'
>>> print(int(num)/int(div))
1.6666666666666667
>>> num = 3
>>> type(num)
<class 'int'>
>>> print("4+6")
4+6
>>> print(4+6)
10
>>> div = 5
>>> type(div)
<class 'int'>
```



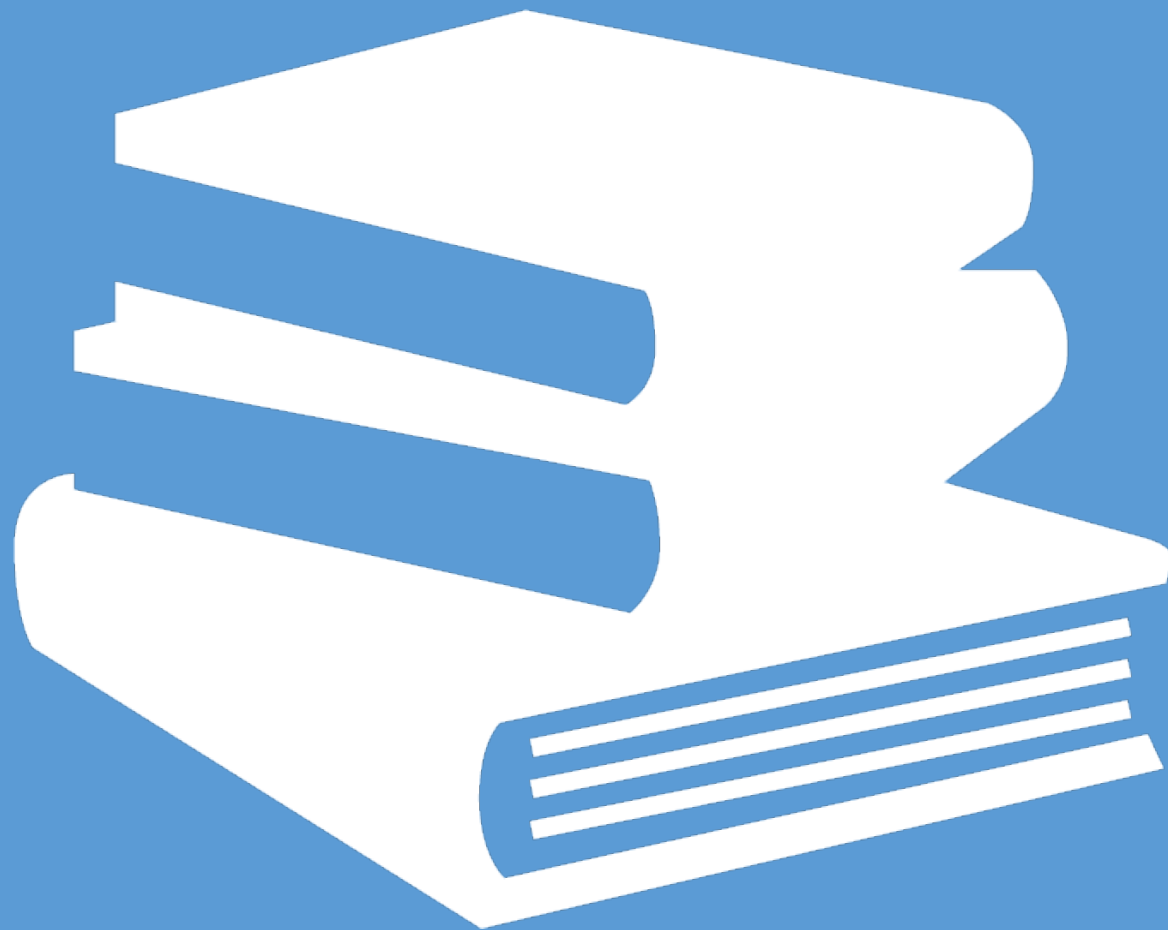
```
>>> print(str(num) , "+", str(div) )
3 + 5
>>> name = "iris" + "howley"
>>> print(name)
irishowley
>>> num = int(input("numerator?"))
numerator?555555
>>> type(num)
<class 'int'>
>>> name = "iris"
>>> print(name*20)
irisirisirisirisirisirisirisirisirisirisirisirisirisiris
irisirisirisirisirisirisirisirisirisirisirisirisirisiris
```

```
>>> number = 0
>>> number = number + 1
>>> print(number)
1
>>> number = number + 1
>>> print(number)
2
>>> number = number + 1
>>> print(number)
3
>>> number += 1
>>> print(number)
4
>>> number -= 10
>>> print(number)
-6
>>> number *= 10
>>> print(number)
-60
```

QUESTIONS?



Leftover Slides



The Readings

From *Think Python*

It turns out that `class` is one of Python's **keywords**. The interpreter uses keywords to recognize the structure of the program, and they cannot be used as variable names.

Python 3 has these keywords:

<code>False</code>	<code>class</code>	<code>finally</code>	<code>is</code>	<code>return</code>
<code>None</code>	<code>continue</code>	<code>for</code>	<code>lambda</code>	<code>try</code>
<code>True</code>	<code>def</code>	<code>from</code>	<code>nonlocal</code>	<code>while</code>
<code>and</code>	<code>del</code>	<code>global</code>	<code>not</code>	<code>with</code>
<code>as</code>	<code>elif</code>	<code>if</code>	<code>or</code>	<code>yield</code>
<code>assert</code>	<code>else</code>	<code>import</code>	<code>pass</code>	
<code>break</code>	<code>except</code>	<code>in</code>	<code>raise</code>	

Computing Quadratic Formula

• $ax^2 + bx + c$  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Open emacs

```
a = float(input('Enter the x**2 coefficient: '))
```

```
b =
```

```
c =
```

```
rootPart = b*b - 4*a*c
```

```
rootPart = rootPart ** 0.5
```

```
root1 = (-b + rootPart)/(2*a)
```

```
root2 = (-b - rootPart)/(2*a)
```

```
print(root1)
```

```
print(root2)
```