[301] Programming

Tyler Caraza-Harter

Learning Objectives

Skills:

- Run Python
- Run PyCharm

Learn common Python operators:

- Mathematical (e.g., “+” and “-“)
- Comparison (e.g., “==” and “>”)
- Logical (e.g., “and” and “not”)

Learn about different data types:

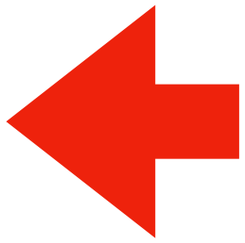
- int, float, str, bool

Learn about boolean logic

Note: Chapter 1 in your textbook accompanies this lecture. Most lectures now will be paired with readings from Think Python

Today's Outline

Software
- Interpreters
- Editors



Demos

Operator Precedence

Demos

Boolean Logic

Demos

What you need to write/run code

An interpreter

- Python 3 (not Python 2)
- We prefer you install Python 3 with Anaconda
  (Anaconda is not strictly necessary yet)

An editor

- Which one doesn't matter much
- PyCharm is a good choice, and is installed in the labs

Interpreter

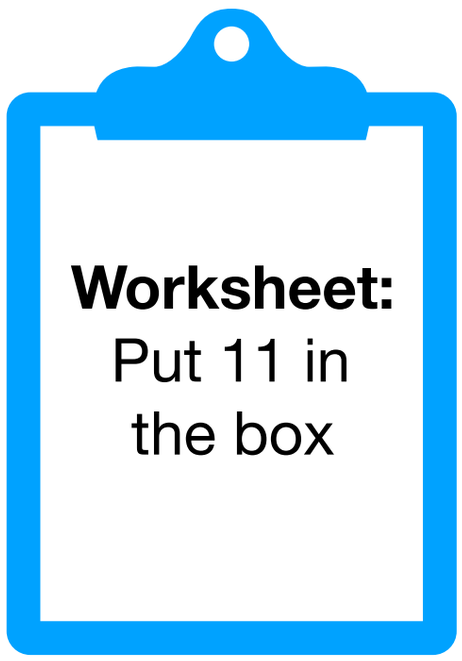
A program that runs a program

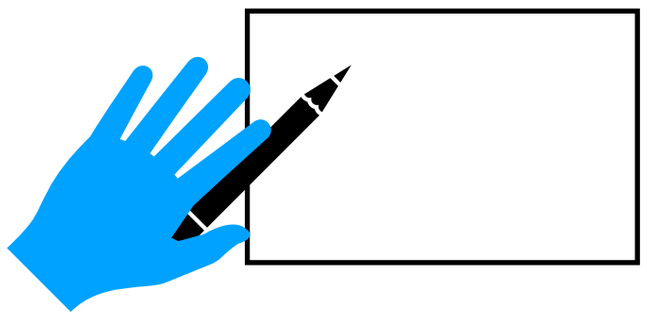
- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)

Interpreter

A program that runs a program

- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)





You were an interpreter when you did the pseudocode worksheets!

Interpreter

A program that runs a program

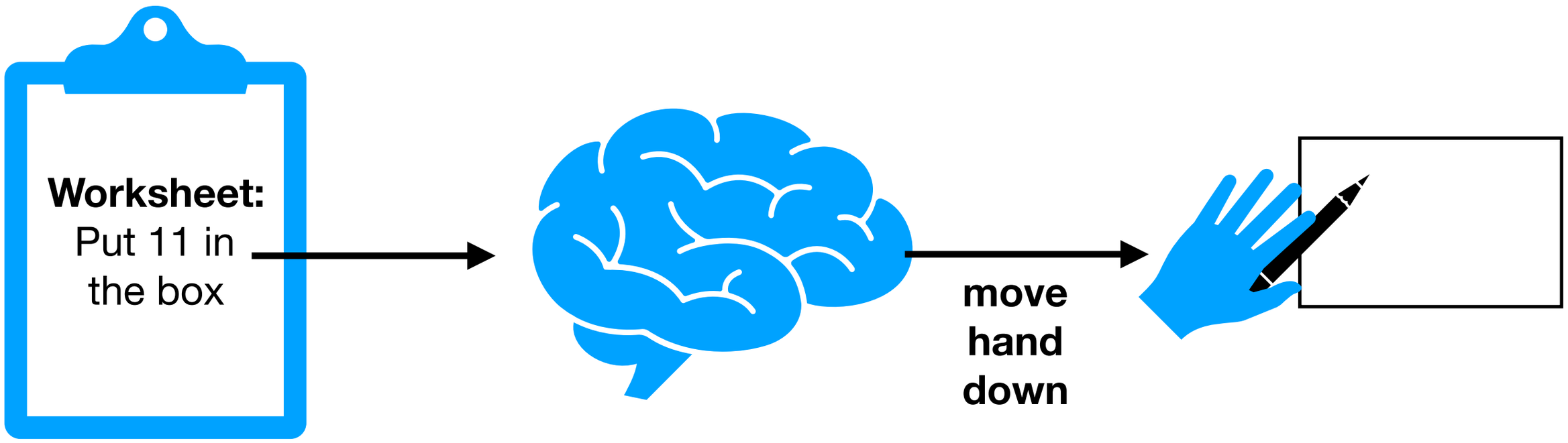
- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)

You were an interpreter when you did the pseudocode worksheets!

Interpreter

A program that runs a program

- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)

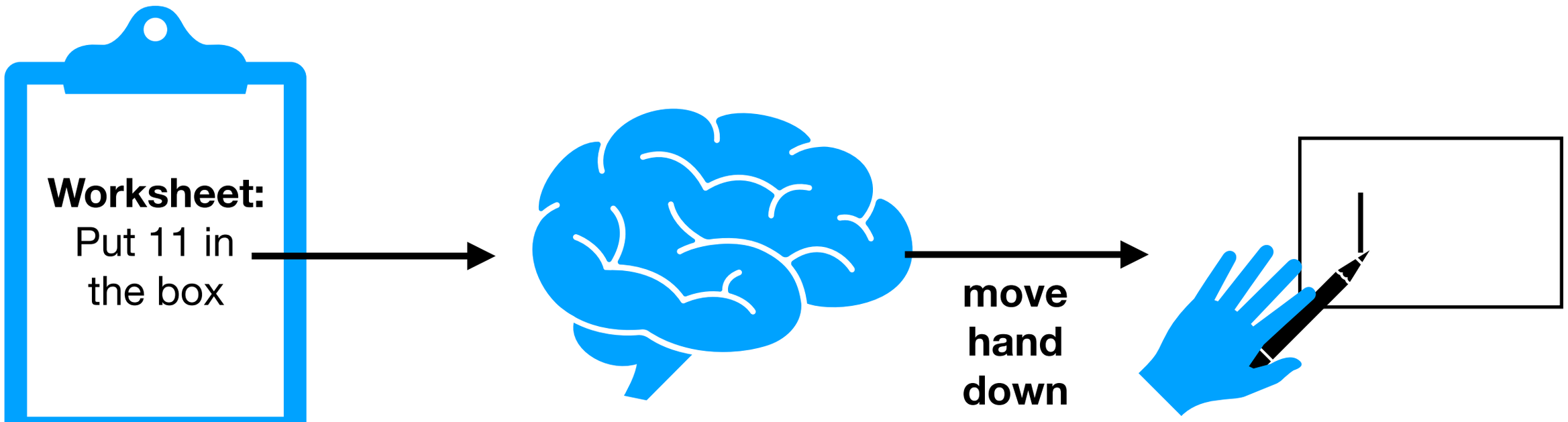


You were an interpreter when you did the pseudocode worksheets!

Interpreter

A program that runs a program

- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)

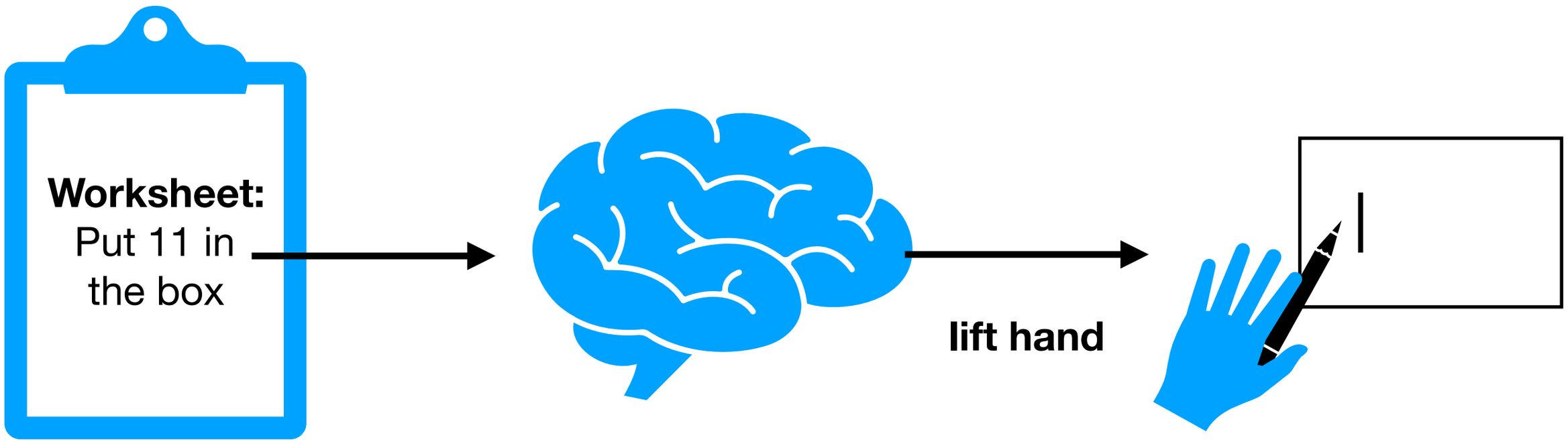


You were an interpreter when you did the pseudocode worksheets!

Interpreter

A program that runs a program

- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)

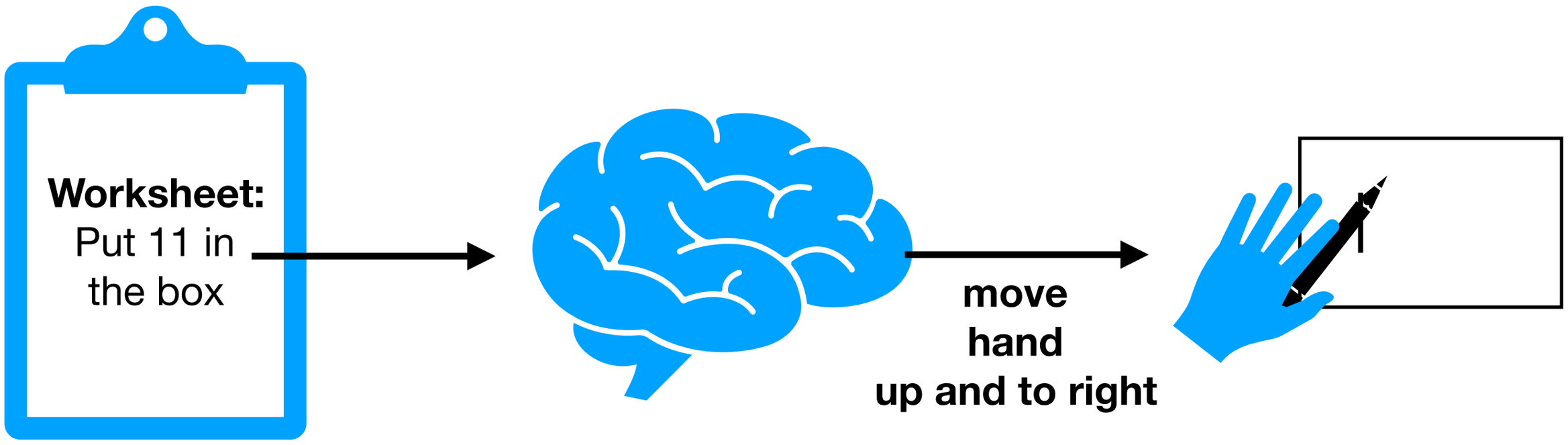


You were an interpreter when you did the pseudocode worksheets!

Interpreter

A program that runs a program

- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)

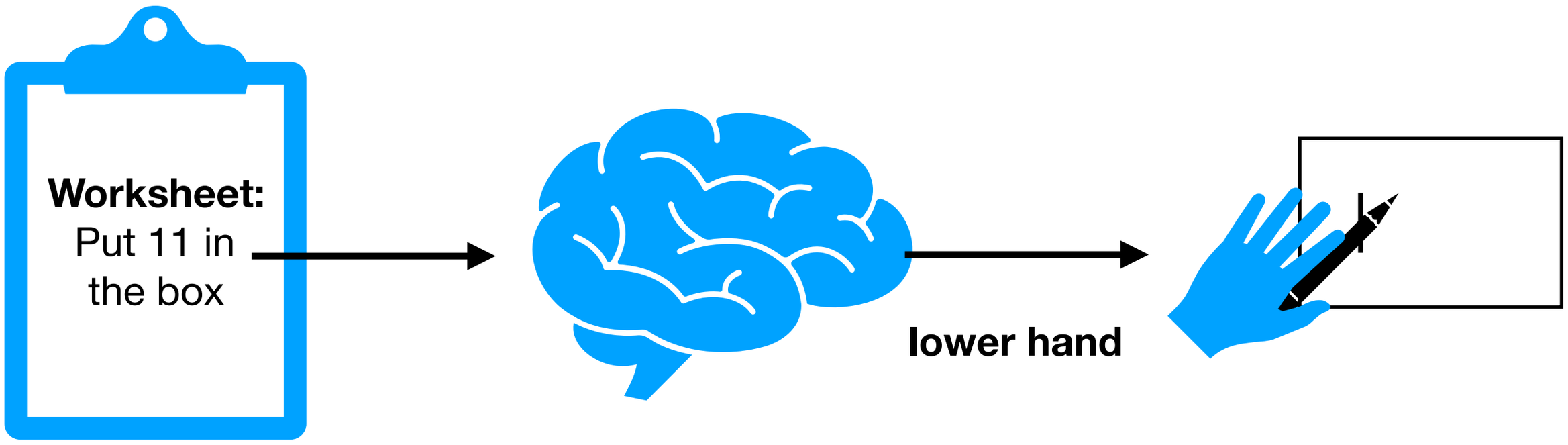


You were an interpreter when you did the pseudocode worksheets!

Interpreter

A program that runs a program

- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)

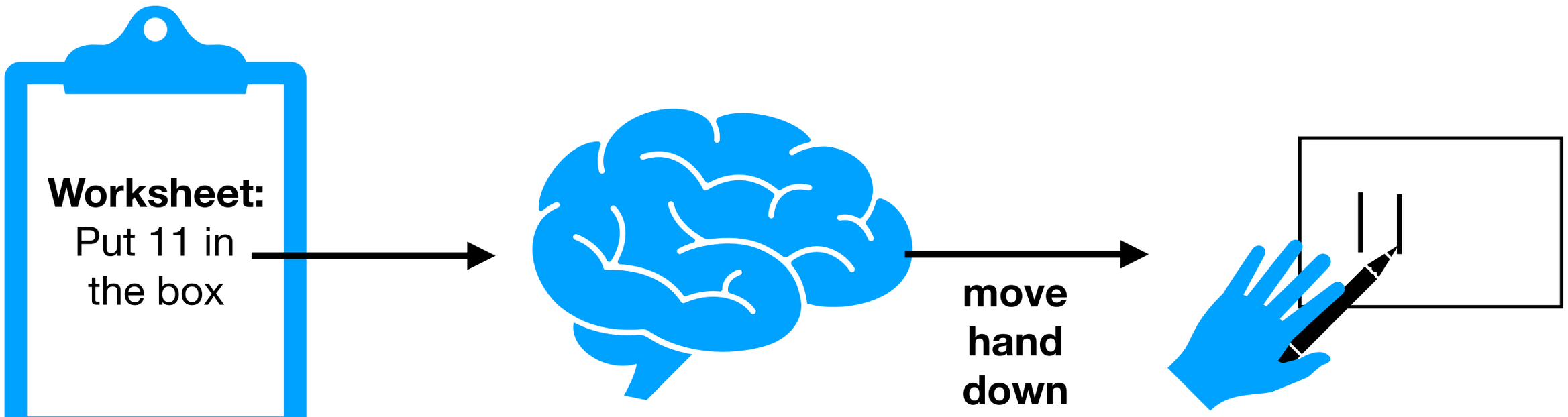


You were an interpreter when you did the pseudocode worksheets!

Interpreter

A program that runs a program

- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)

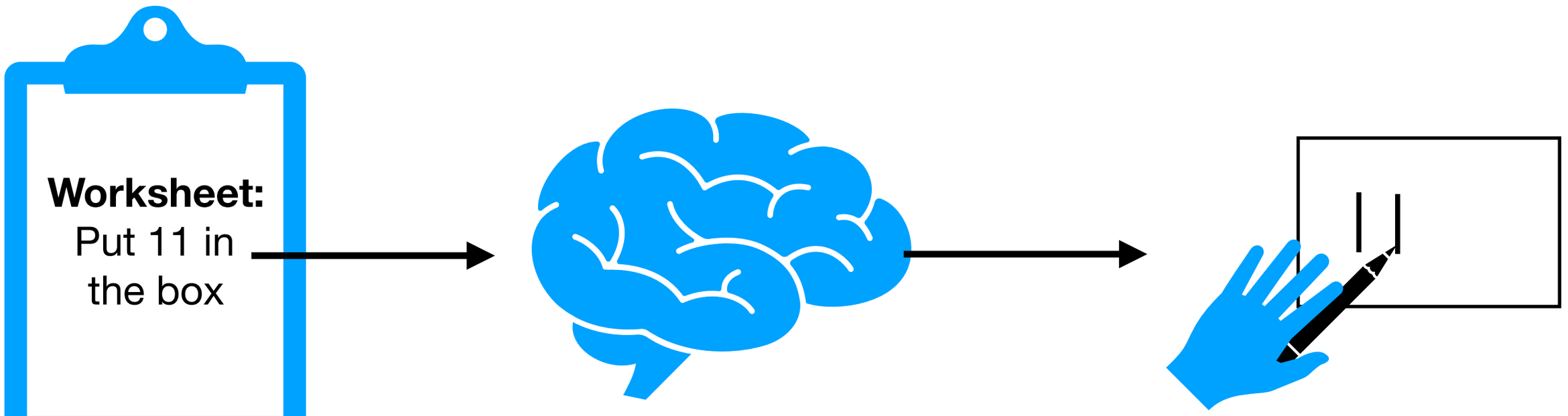


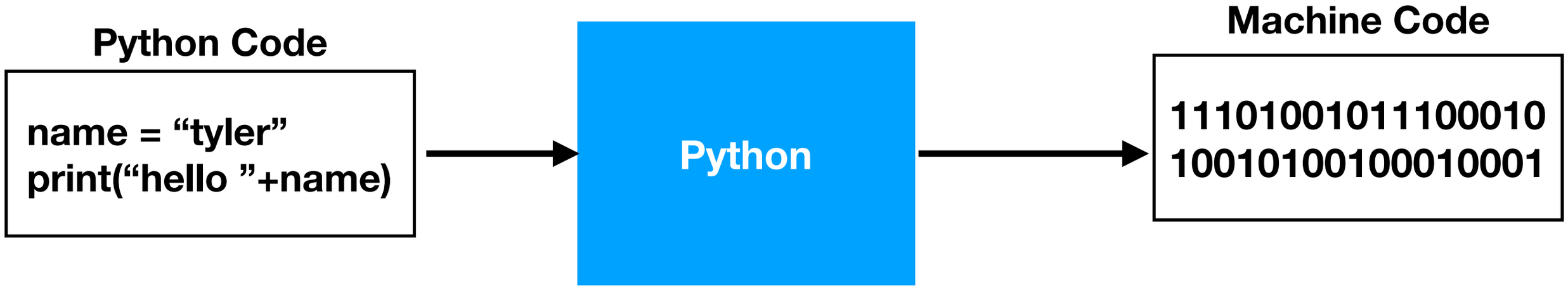
You were an interpreter when you did the pseudocode worksheets!

Interpreter

A program that runs a program

- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)

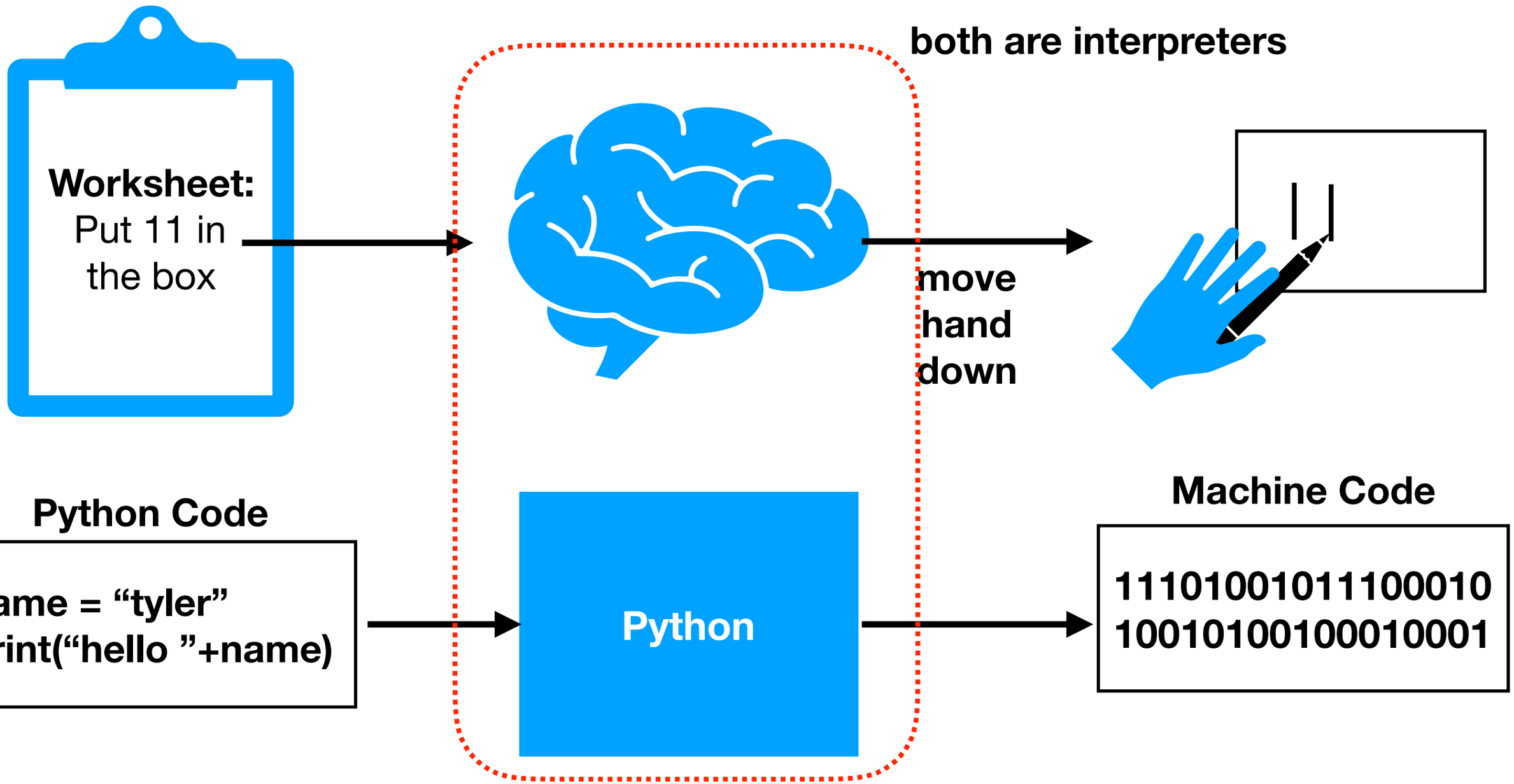




Interpreter

A program that runs a program

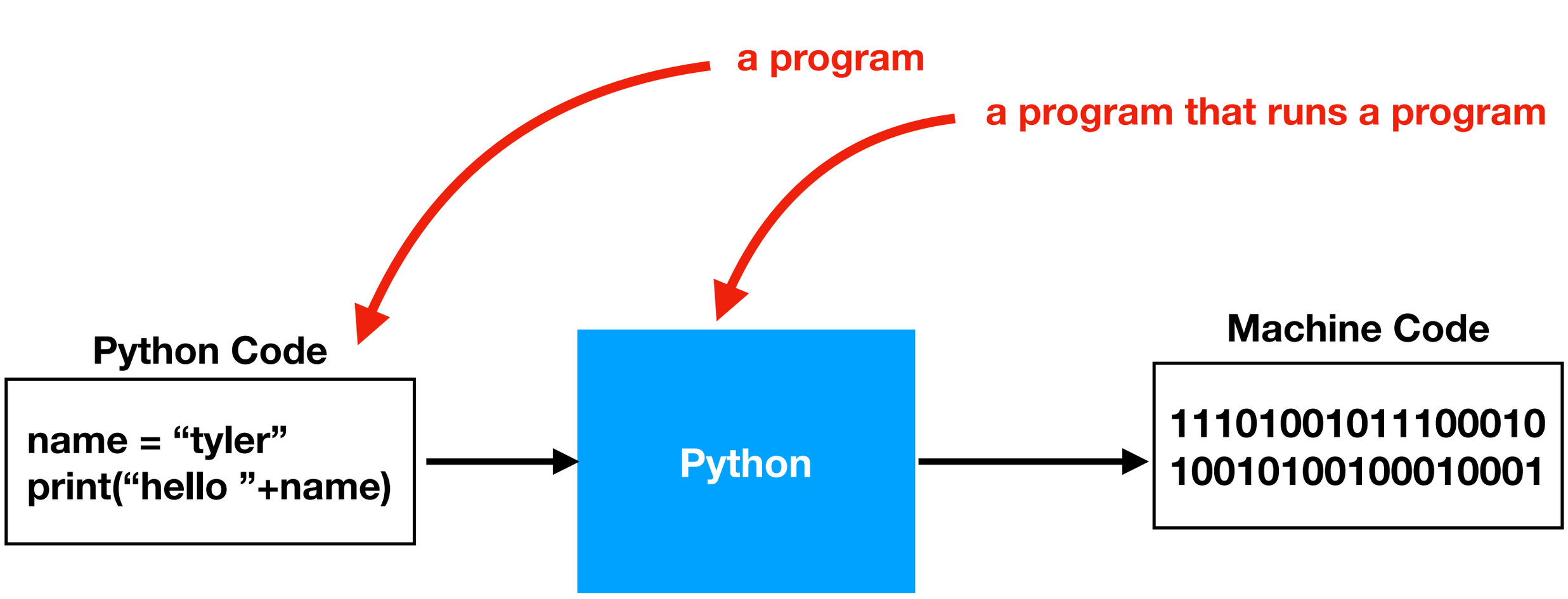
- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)



Interpreter

A program that runs a program

- Translates something human likes (nice Python code) to something the machine likes (ONEs and ZEROs)



Editor

Program for writing code and other simple files

- Many different editors could be used to write the same code, just like many different web browsers could access the same site

Editor

Program for writing code and other simple files

- Many different editors could be used to write the same code, just like many different web browsers could access the same site
- Why does it matter what you use?

Editor

Program for writing code and other simple files

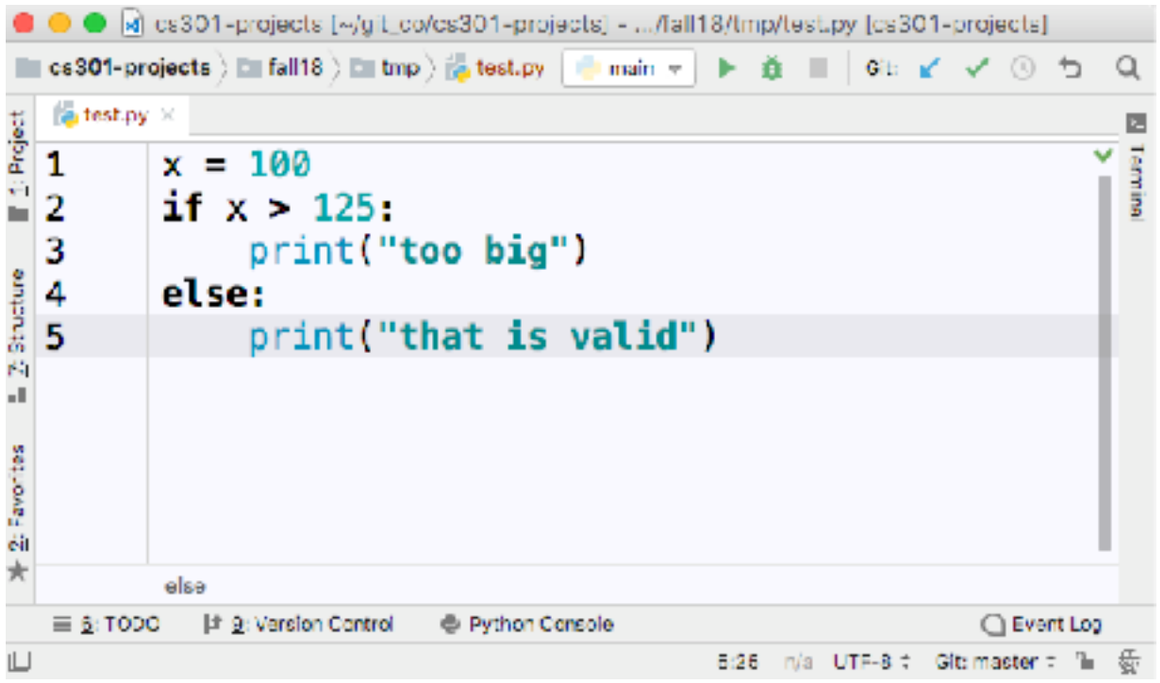
- Many different editors could be used to write the same code, just like many different web browsers could access the same site
- Why does it matter what you use?
    1. Some have a builtin terminal

Editor

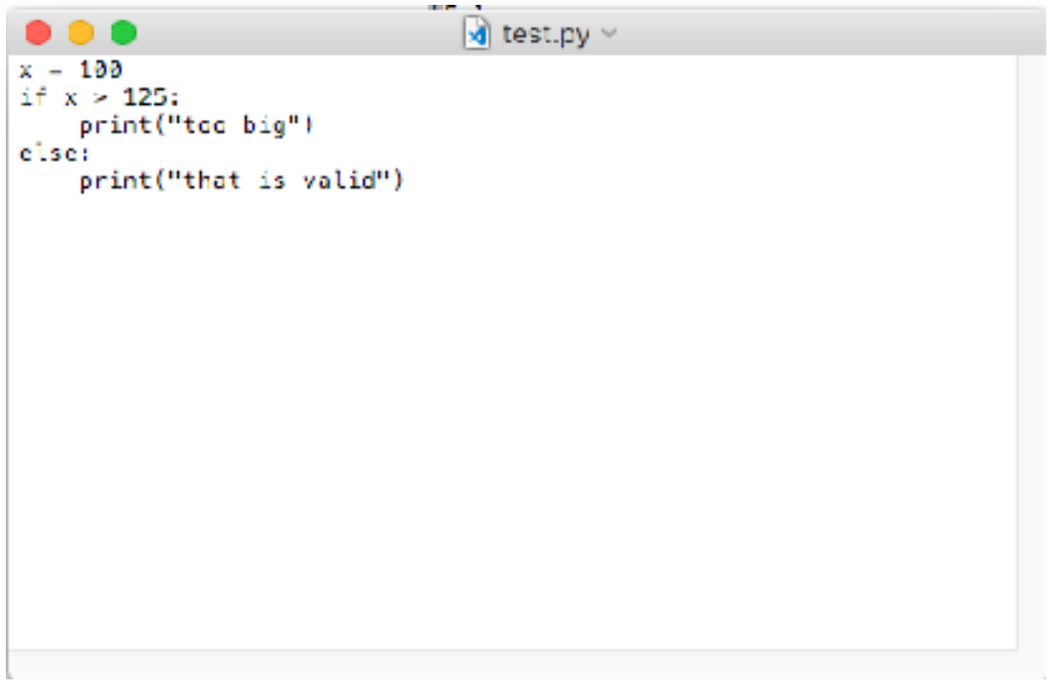
Program for writing code and other simple files

- Many different editors could be used to write the same code, just like many different web browsers could access the same site
- Why does it matter what you use?
    1. Some have a builtin terminal
    2. They add helpful color to your code

PyCharm



TextEdit

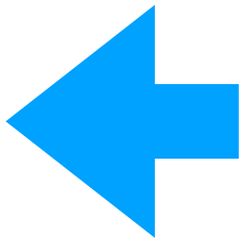


Today's Outline

Software

- Interpreters
- Editors

Demos



Operator Precedence

Demos

Boolean Logic

Demos

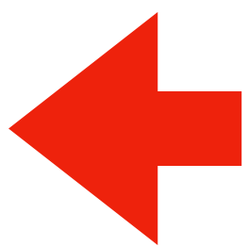
Today's Outline

Software

- Interpreters
- Editors

Demos

Operator Precedence



Demos

Boolean Logic

Demos

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** ~~(1/2)~~

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** ~~(1/2)~~
3 * 3 + 2 * 2 + 16 ** (**0.5**)

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)
3 * 3 + 2 * 2 + ~~16 ** (0.5)~~

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)
3 * 3 + 2 * 2 + ~~16 ** (0.5)~~
3 * 3 + 2 * 2 + **4**

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)
3 * 3 + 2 * 2 + 16 ** (0.5)
~~3 * 3~~ + 2 * 2 + 4

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)
3 * 3 + 2 * 2 + 16 ** (0.5)
~~3 * 3~~ + 2 * 2 + 4
9 + 2 * 2 + 4

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)
3 * 3 + 2 * 2 + 16 ** (0.5)
3 * 3 + 2 * 2 + 4
9 + ~~2 * 2~~ + 4

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)
3 * 3 + 2 * 2 + 16 ** (0.5)
3 * 3 + 2 * 2 + 4
9 + ~~2 * 2~~ + 4
9 + **4** + 4

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)
3 * 3 + 2 * 2 + 16 ** (0.5)
3 * 3 + 2 * 2 + 4
9 + 2 * 2 + 4
~~9 + 4~~ + 4

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)
3 * 3 + 2 * 2 + 16 ** (0.5)
3 * 3 + 2 * 2 + 4
9 + 2 * 2 + 4
~~9 + 4~~ + 4
13 + 4

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)
3 * 3 + 2 * 2 + 16 ** (0.5)
3 * 3 + 2 * 2 + 4
9 + 2 * 2 + 4
9 + 4 + 4
~~13 + 4~~

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Order of Simplification

Python works by simplifying, applying one operator at a time

3 * 3 + 2 * 2 + 16 ** (1/2)
3 * 3 + 2 * 2 + 16 ** (0.5)
3 * 3 + 2 * 2 + 4
9 + 2 * 2 + 4
9 + 4 + 4
~~13 + 4~~
17

Rules

- First work within parentheses
- Do higher precedence first
- Break ties left to right

Operator Precendence

What is it?	Python Operator
exponents	**
signs	+x, -x
multiply/divide	*, /, //, %
add/subtract	+, -
comparison	==, !=, <, <=, >, >=
boolean stuff	not
…	and
…	or

simplify first

simplify last

these are the ones you should be learning at this point in the semester
(there are a few more not covered now)

Operator Precendence

	What is it?	Python Operator	
Mathematical	exponents	**	**simplify first**
	signs	+x, -x	
	multiply/divide	*, /, //, %	
	add/subtract	+, -	
	comparison	==, !=, <, <=, >, >=	
Logic	boolean stuff	not	
	…	and	
	…	or	**simplify last**

these are the ones you should be learning at this point in the semester
(there are a few more not covered now)

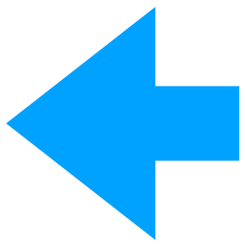
Today's Outline

Software
- Interpreters
- Editors

Demos

Operator Precedence

Demos



Boolean Logic

Demos

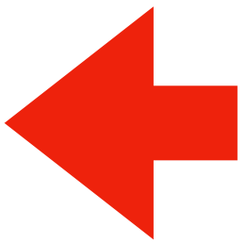
Today's Outline

Software
- Interpreters
- Editors

Demos

Operator Precedence

Demos

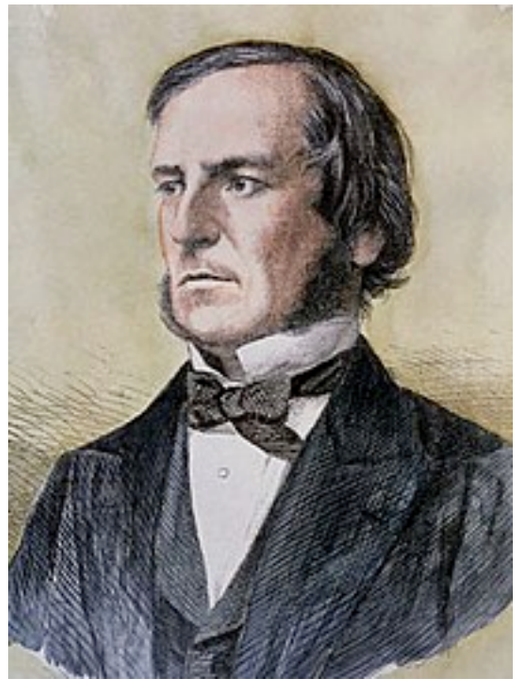
Boolean Logic 

Demos

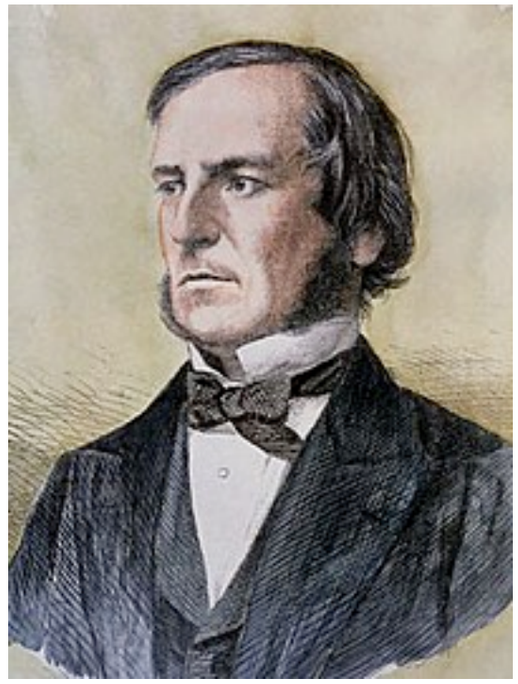
Boolean Logic

The logic of truth:

- Named after George Boole
- Two values: True and False
- Three operators: and, or, and not



Boolean Logic



The logic of truth:

- Named after George Boole
- Two values: True and False
- Three operators: and, or, and not

AND

	False	**True**
False	False	False
True	False	**True**

OR

	False	**True**
False	False	**True**
True	**True**	**True**

NOT

False	**True**
True	False

It's a Saturday AND
we're in CS 301

AND

	False	**True**
False	False	False
True	False	**True**

OR

	False	**True**
False	False	**True**
True	**True**	**True**

NOT

False	**True**
True	False

It's a Saturday **AND** we're in CS 301

AND

	False	True
False	False	False
True	False	**True**

OR

	False	True
False	False	**True**
True	**True**	**True**

NOT

False	True
True	False

It's a Saturday AND
we're in CS 301

AND

	False	True
False	False	False
True	False	**True**

OR

	False	True
False	False	**True**
True	**True**	**True**

NOT

False	True
True	False

FALSE!

It's a Saturday AND we're in CS 301

AND

	False	**True**
False	False	False
True	False	**True**

OR

	False	**True**
False	False	**True**
True	**True**	**True**

NOT

False	**True**
True	False

Project 1 is due next week
OR I'll eat my hat

AND

	False	**True**
False	False	False
True	False	**True**

OR

	False	**True**
False	False	**True**
True	**True**	**True**

NOT

False	**True**
True	False

Project 1 is due next week
OR I'll eat my hat

AND

	False	**True**
False	False	False
True	False	**True**

OR

	False	**True**
False	False	**True**
True	**True**	**True**

NOT

False	**True**
True	False

TRUE!

Project 1 is due next week

OR **I'll eat my hat**

AND

	False	**True**
False	False	False
True	False	**True**

OR

	False	**True**
False	False	**True**
True	**True**	**True**

NOT

False	**True**
True	False

Today's Outline

Software
- Interpreters
- Editors

Demos

Operator Precedence

Demos

Boolean Logic

Demos