

[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

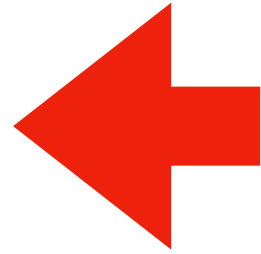
Learn about boolean logic

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

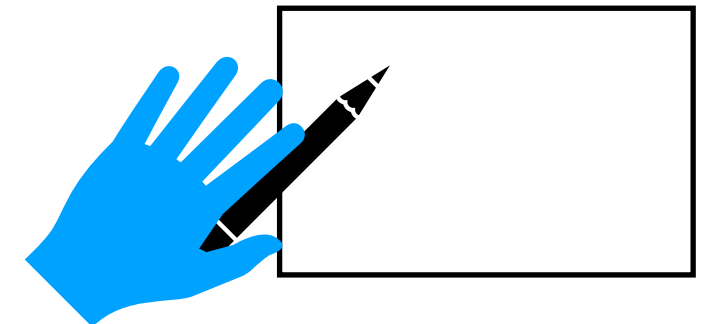
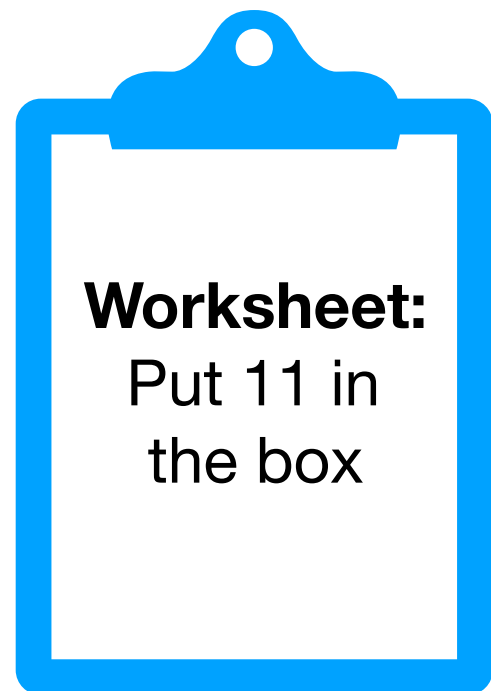
A program that runs a program

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

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You were an interpreter when you did the pseudocode worksheets!

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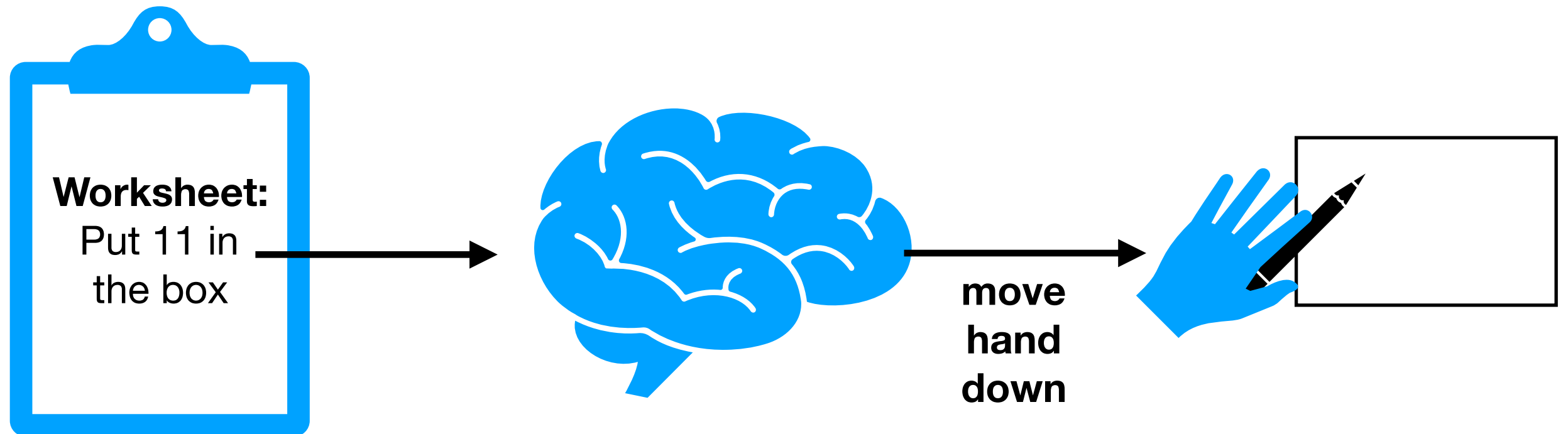


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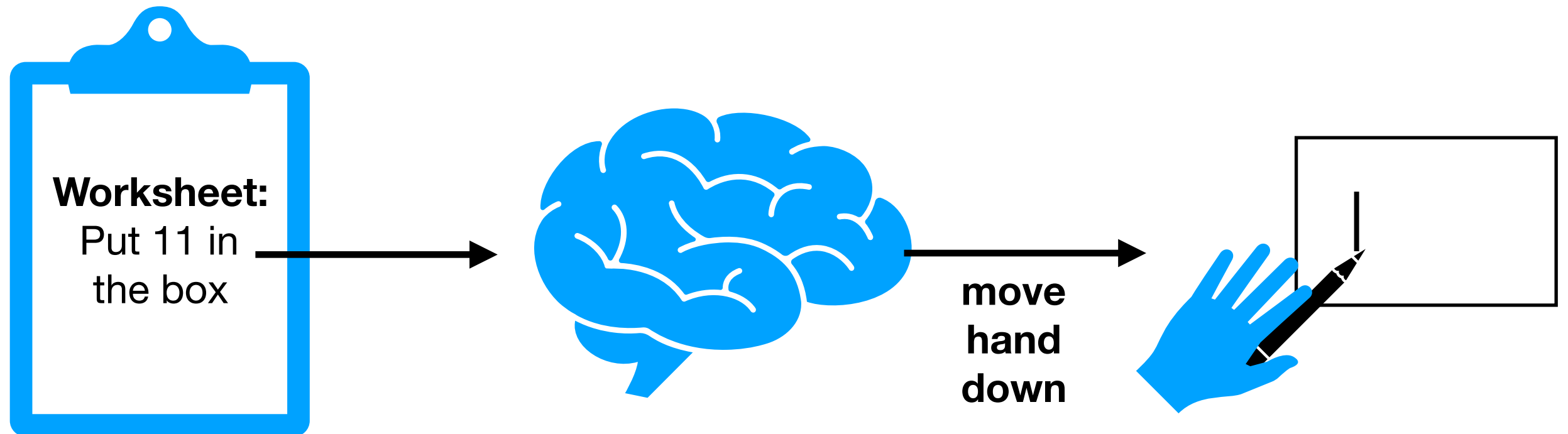


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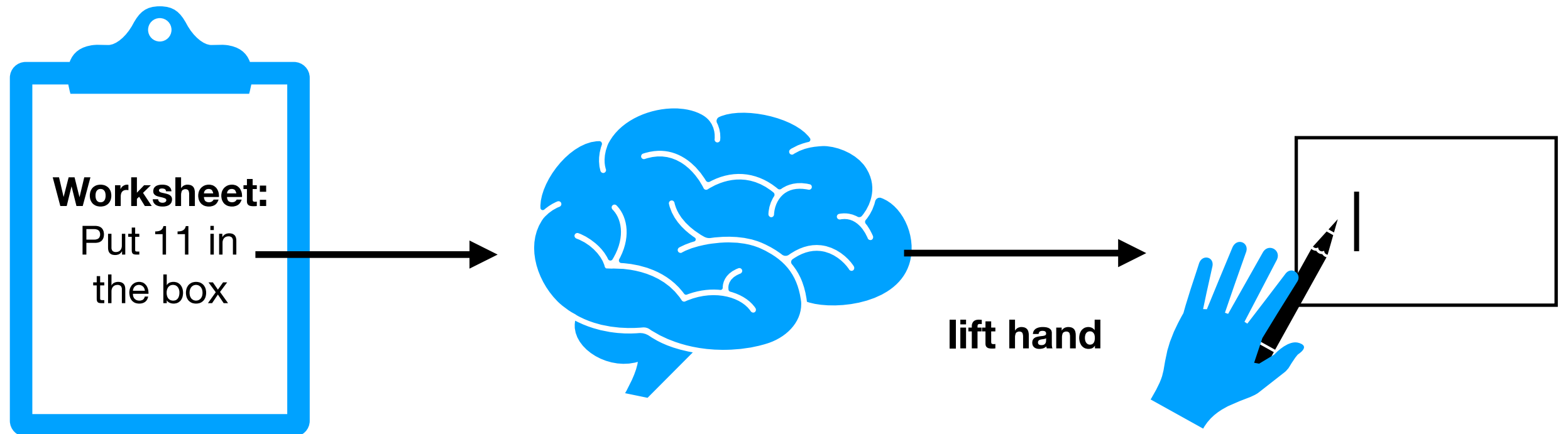


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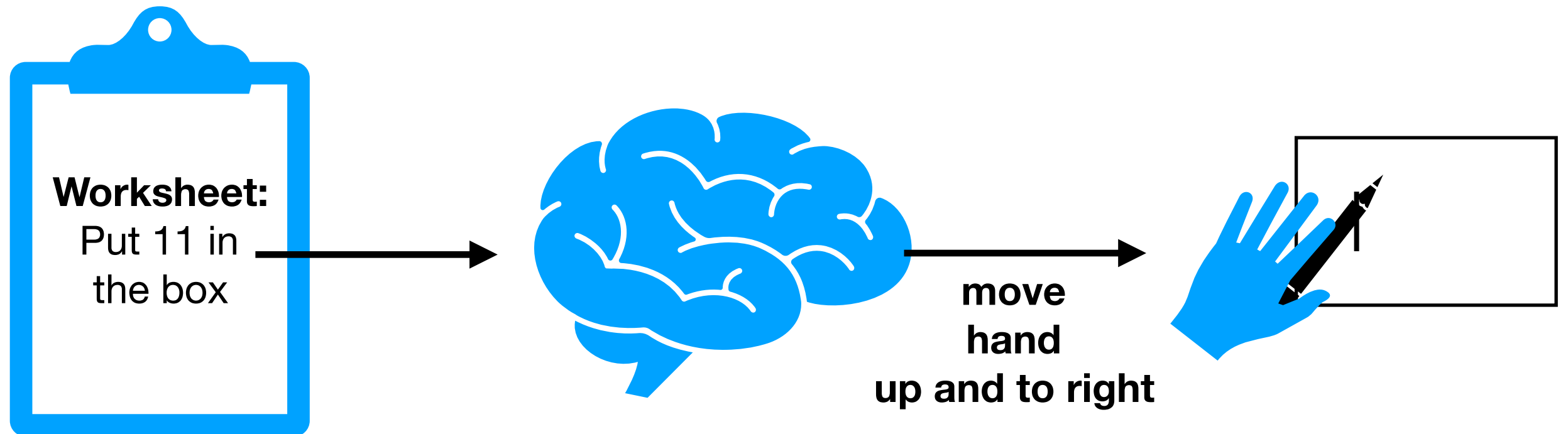


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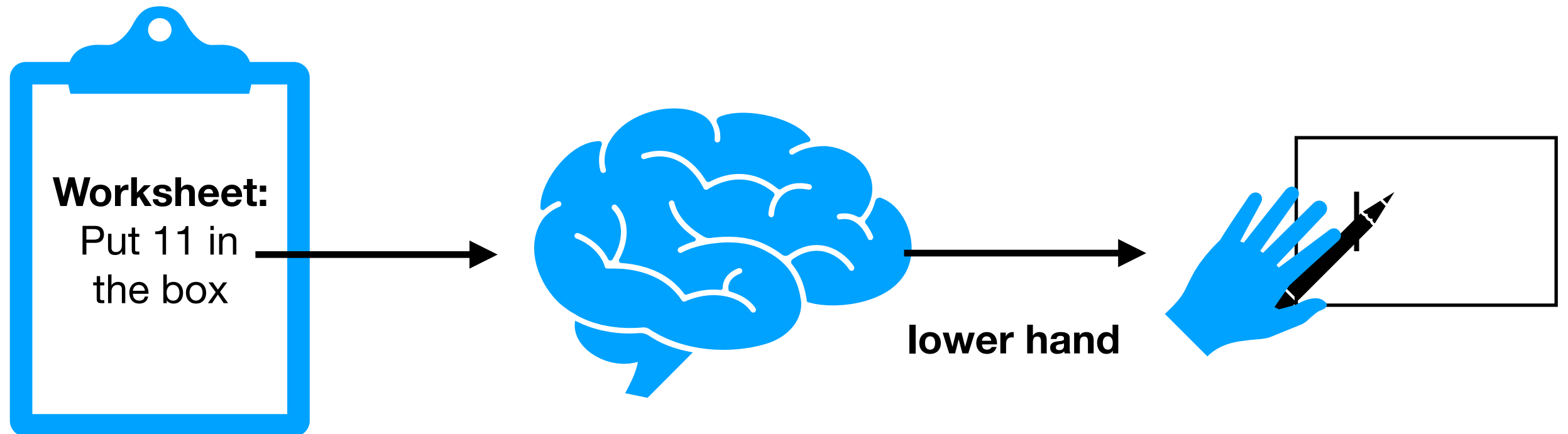


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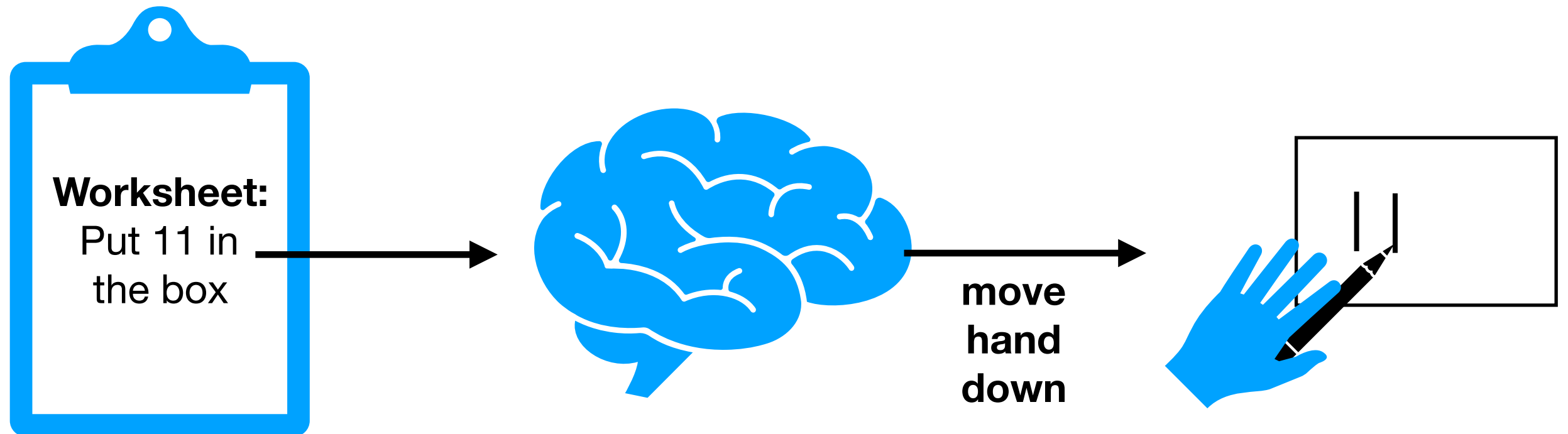


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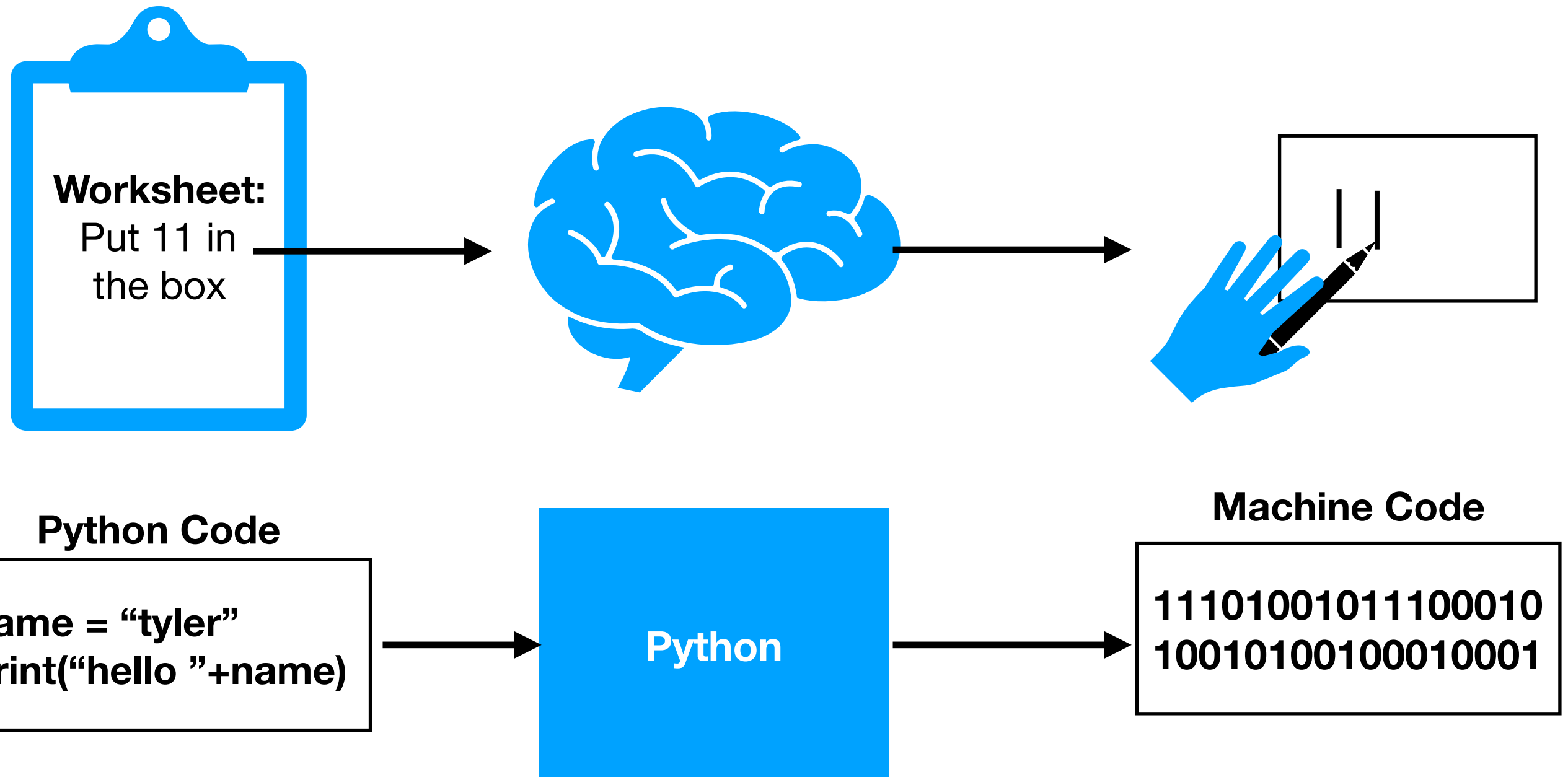


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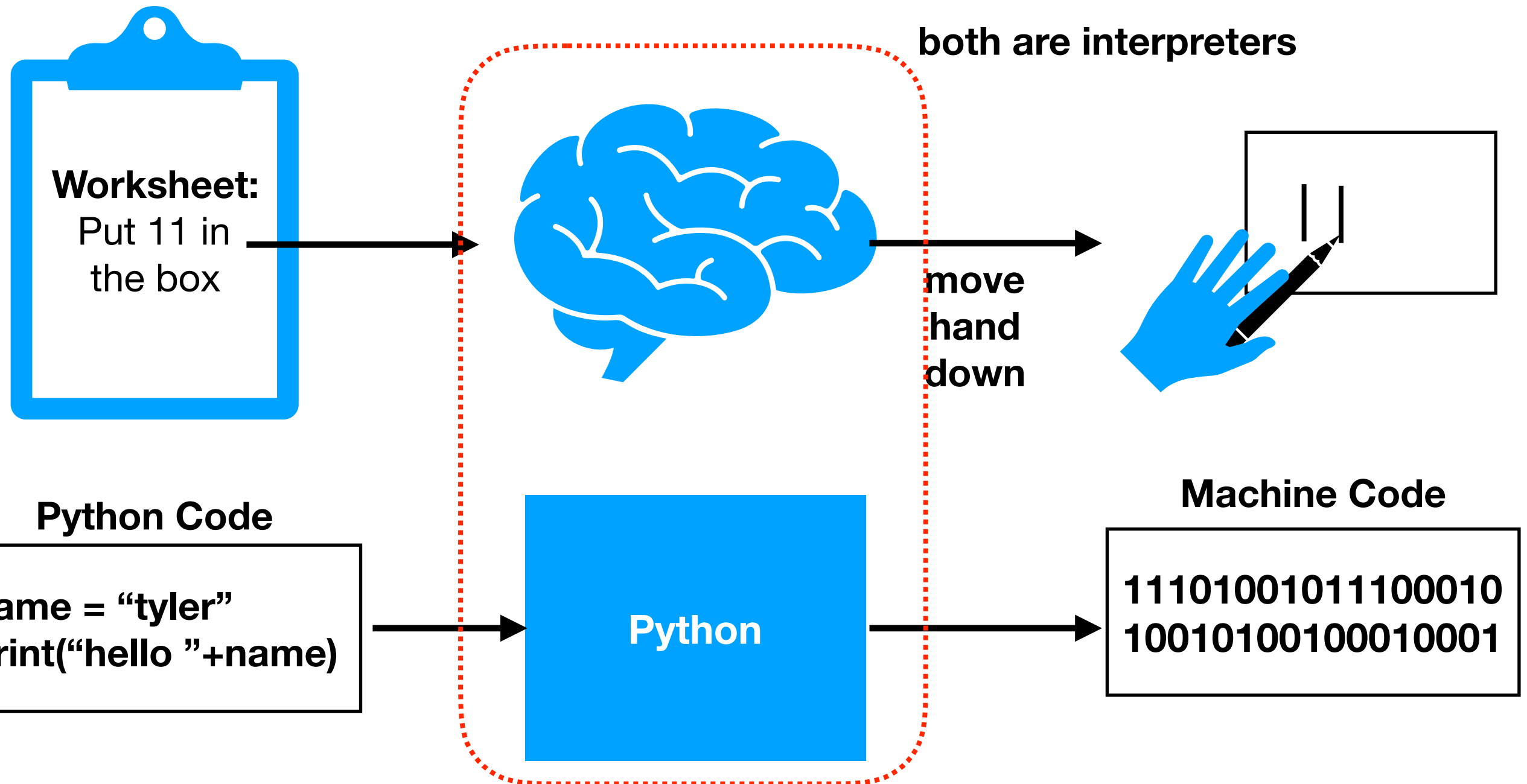
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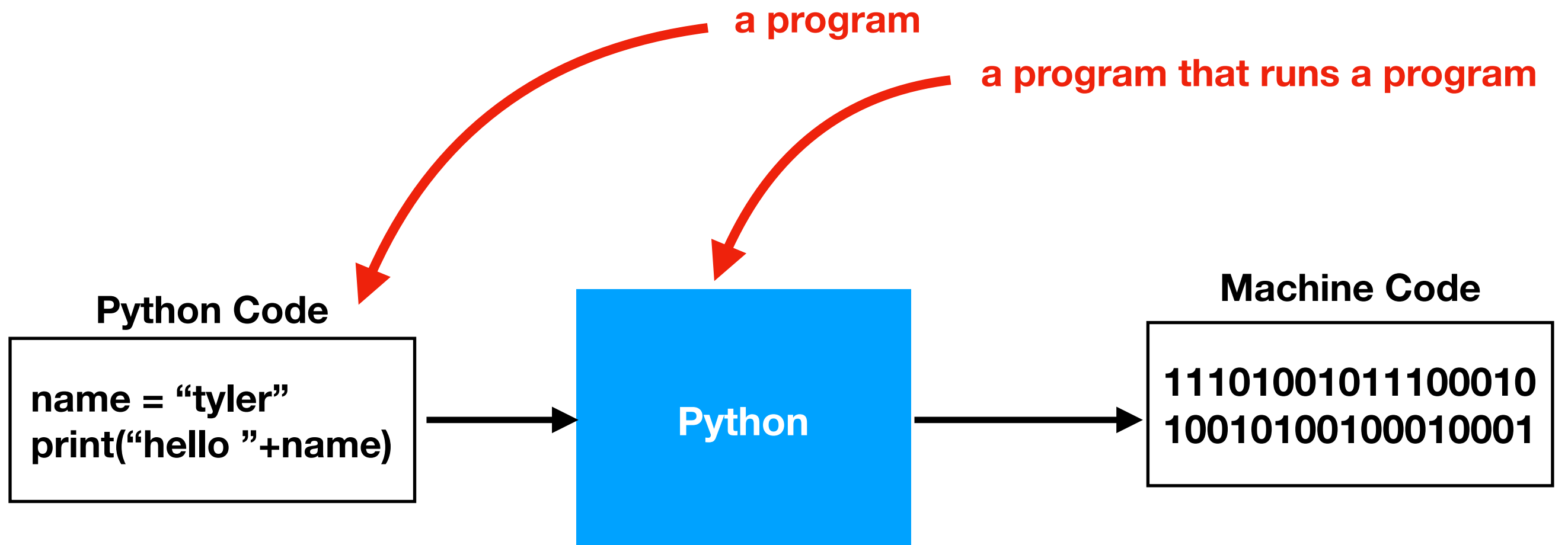
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Editor

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

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Program for writing code and other simple files

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- Why does it matter what you use?

Editor

Program for writing code and other simple files

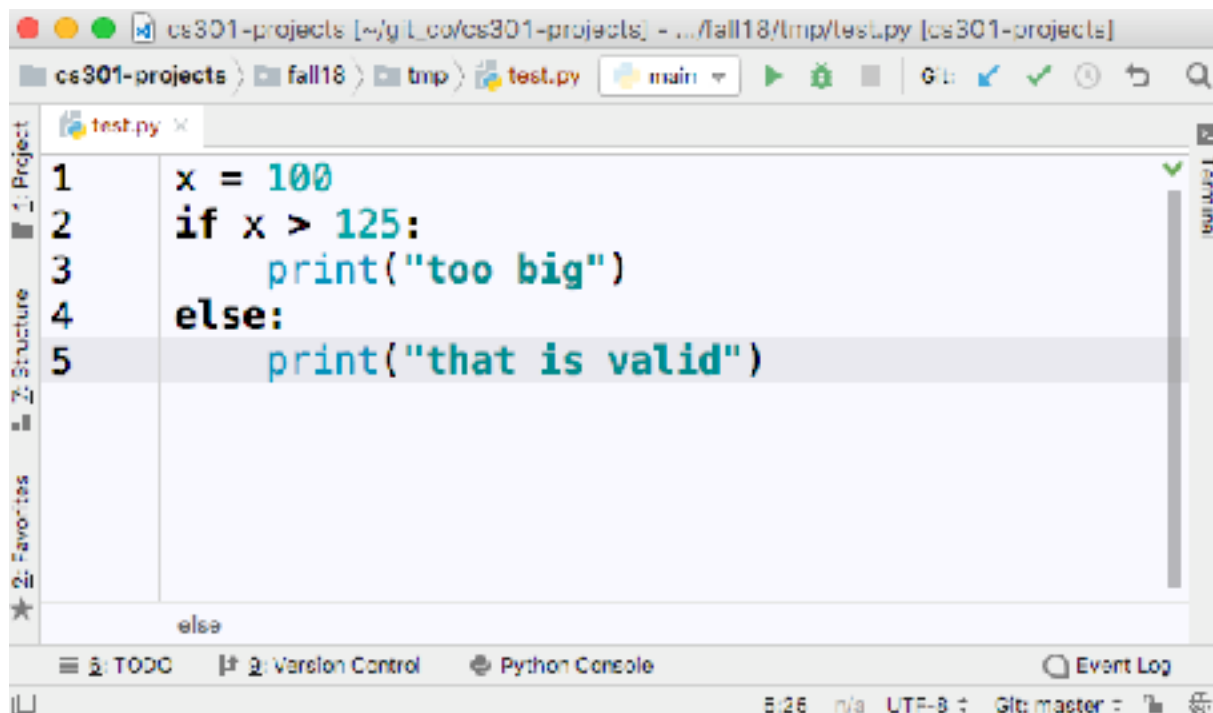
- Many different editors could be used to write the same code, just like many different web browsers could access the same site
- Why does it matter what you use?
 1. Some have a builtin terminal

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

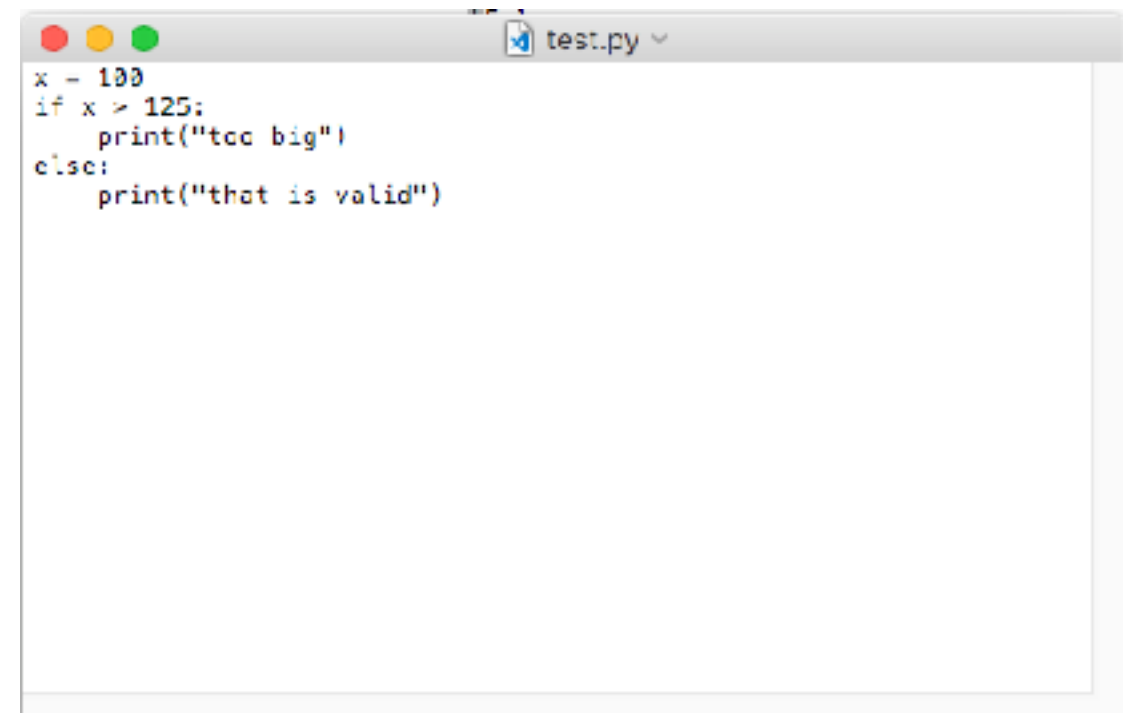
PyCharm



```
1 x = 100
2 if x > 125:
3     print("too big")
4 else:
5     print("that is valid")
```

The screenshot shows the PyCharm IDE interface. The main editor window displays the code from the previous block with syntax highlighting: keywords like 'if', 'else', and 'print' are in blue, and strings are in red. The code is numbered 1 through 5. The interface includes a sidebar on the left with 'Project', 'Structure', and 'Favorites' views, and a bottom toolbar with 'TODO', 'Version Control', 'Python Console', and 'Event Log' buttons. The status bar at the bottom shows '8:26 n/a UTF-8 Git: master'.

TextEdit



```
x = 100
if x > 125:
    print("too big")
else:
    print("that is valid")
```

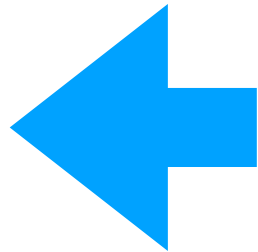
The screenshot shows the TextEdit application window. The code is displayed in a plain, monospaced font without any syntax highlighting. The window title is 'test.py'. The interface is minimal, with standard macOS window controls (red, yellow, green buttons) at the top left.

Today's Outline

Software

- Interpreters
- Editors

Demos



Operator Precedence

Demos

Boolean Logic

Demos

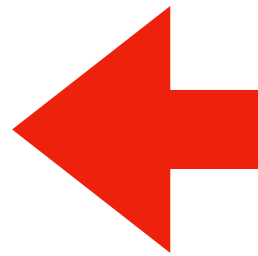
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Order of Simplification

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

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

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

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$$3 * 3 + 2 * 2 + 4$$

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$$\cancel{3 * 3} + 2 * 2 + 4$$

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

$$3 * 3 + 2 * 2 + 16 ** (0.5)$$

$$~~3 * 3~~ + 2 * 2 + 4$$

$$9 + 2 * 2 + 4$$

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$$9 + 4 + 4$$

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$$3 * 3 + 2 * 2 + 4$$

$$9 + 2 * 2 + 4$$

$$~~9 + 4 + 4~~$$

$$**13** + 4$$

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$$3 * 3 + 2 * 2 + 4$$

$$9 + 2 * 2 + 4$$

$$9 + 4 + 4$$

$$~~13 + 4~~$$

17

Rules

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

Operator Precedence

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 Precedence

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

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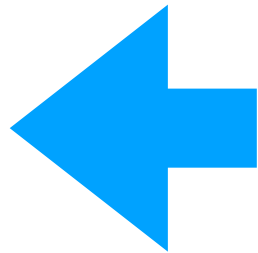
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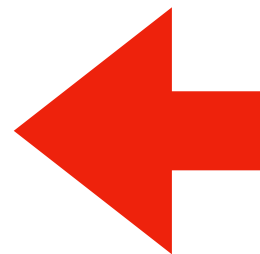
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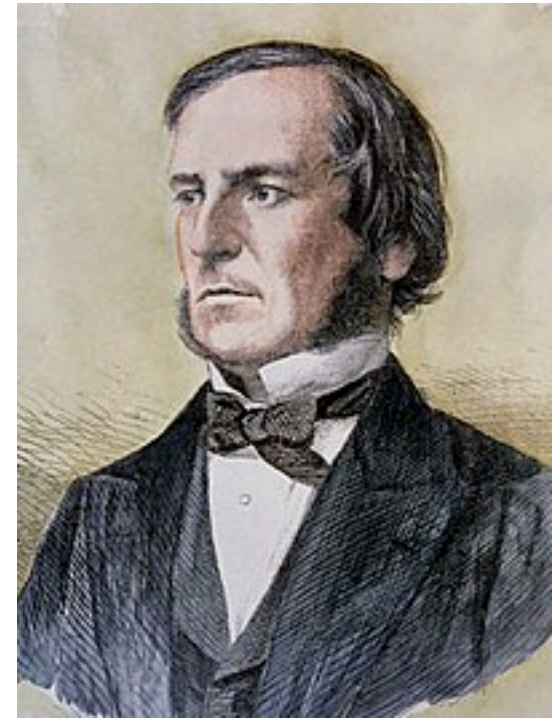


Demos

Boolean Logic

The logic of truth:

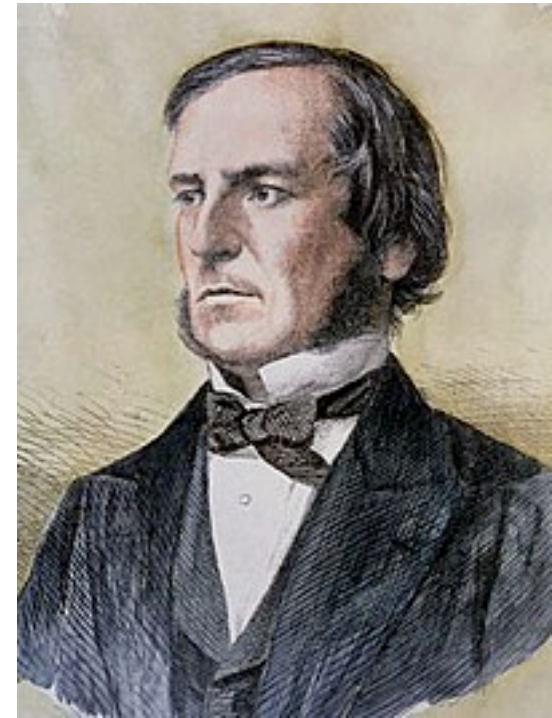
- Named after George Boole
- Two values: True and False
- Three operators: **and, or, and not**



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	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**
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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
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NOT

	False	True
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NOT

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TRUE!

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AND

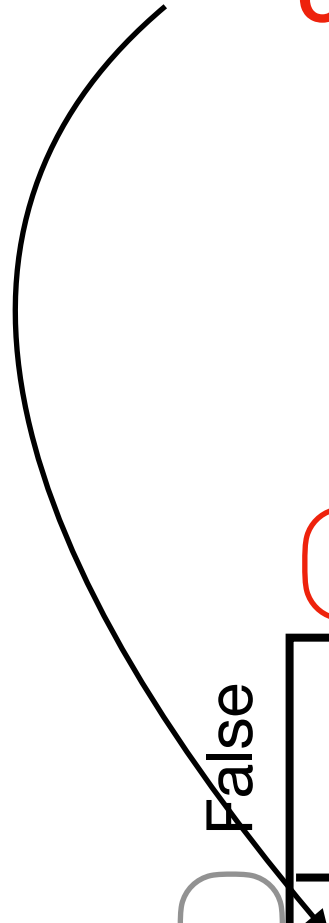
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