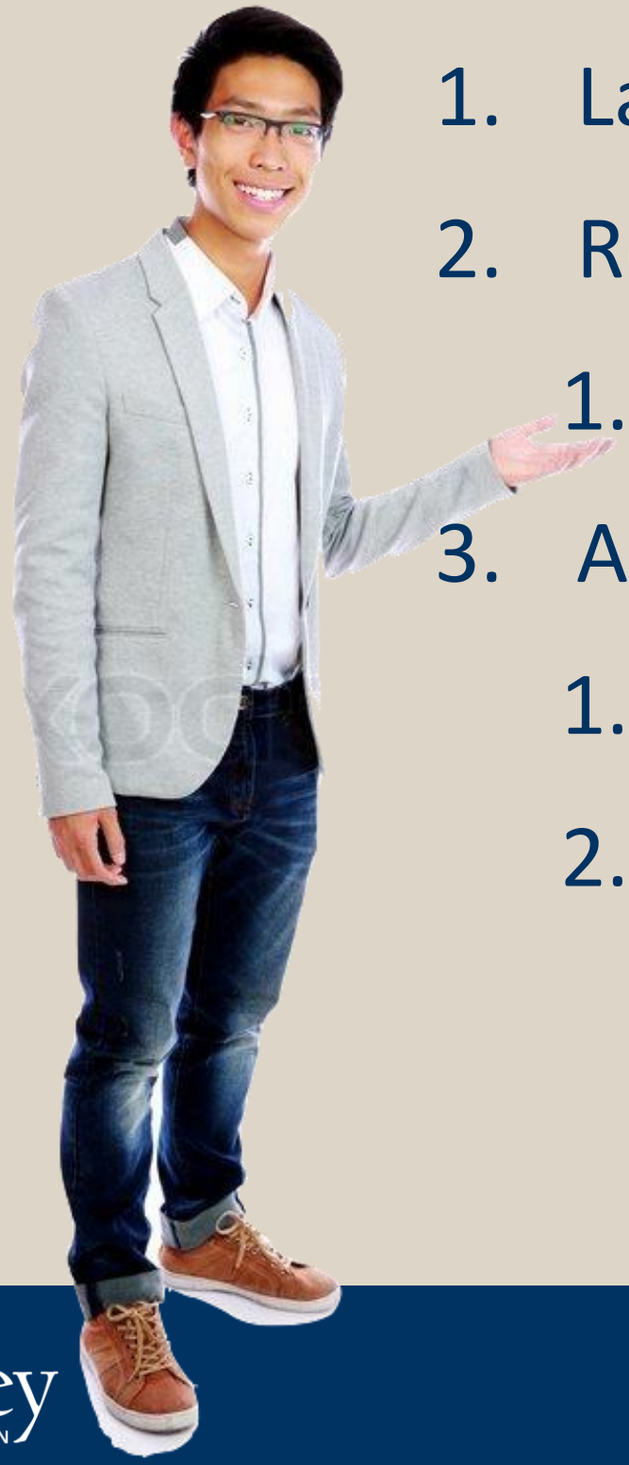
W200 - Week 2

Starting out with Python

Agenda



1. Last-week checkin
2. Review some main points: Running Python.
    1. Expressions, Objects, Variables
3. Activities:
    1. Strings, Control-of-Flow (if, while)
    2. Breakout room

Check-In

- How did it go setting up your environment? Works for you?
  The TAs check and feedback weekly assignments; instructors review, grade, feedback projects and exam. Assignments are posted on GitHub by the TAs on Monday/Tuesday evening.

- Python 3.x (3.6, 3.7) [no PyCharm or Spyder]

- GitHub [Your repo ready?]

- Bash [http://hyperpolyglot.org/unix-shells]

- Jupyter

Found or created something cool?
Share it in the Playground

Syllabus & Schedule

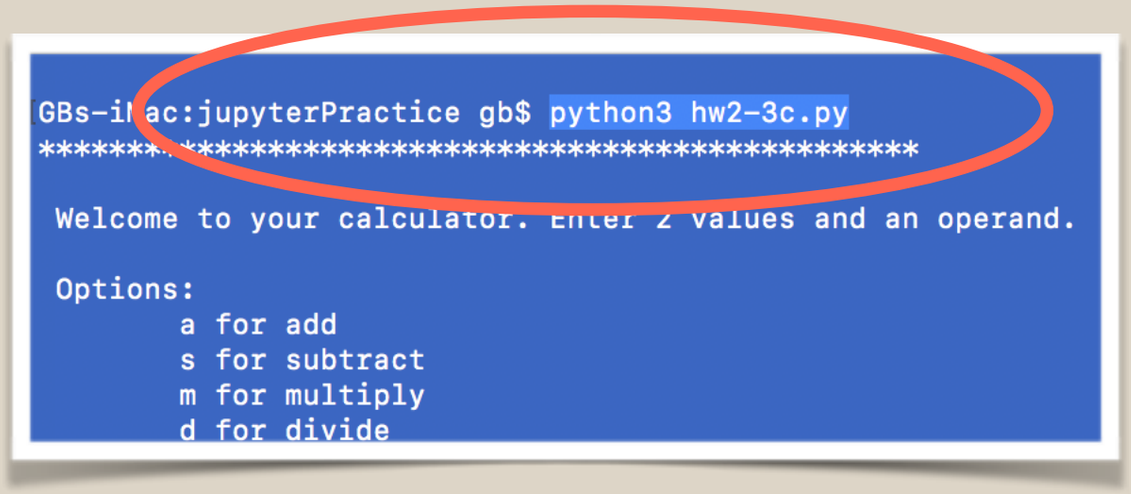
Python for Data Science: Fall 2018						All due dates are tentative and may be changed by instructors. Homework due dates are 11:59pm PST the night before live session.					
Mon	Tues	Weds	Thurs	Async Unit	Sync Week	Async to Review (Prior to Class)	Projects (20% each)	Exams (10% each)	HW Assigned (30% total)	HW Due	Notes
Sep 3	Sep 4	Sep 5	Sep 6	1	1	Introduction to Programming, the Command Line, and Source Control			unit 1		A make-up class will be scheduled for Monday class.*
Sep 6											[This is the make-up for Monday 4 pm session.]
Sep 10	Sep 11	Sep 12	Sep 13	2	2	Starting Out with Python			unit 2	unit 1	
Sep 17	Sep 18	Sep 19	Sep 20	3	3	Sequence Types and Dictionaries			unit 3	unit 2	9/17/2018 - Last day to add or drop a class
Sep 24	Sep 25	Sep 26	Sep 27	4	4	More About Control and Algorithms			unit 4	unit 3	
Oct 1	Oct 2	Oct 3	Oct 4	5	5	Functions			unit 5	unit 4	
Oct 8	Oct 9	Oct 10	Oct 11	6	6	Complexity	Project 1 Assigned		scrabble	unit 5	
Oct 15	Oct 16	Oct 17	Oct 18	7	7	Classes			unit 7	scrabble	
Oct 22	Oct 23	Oct 24	Oct 25	8	8	Object-Oriented Programming	Project 1 Final Proposal Due	Exam 1 Start	x	unit 7	
Oct 29	Oct 30	Oct 31	Nov 1	9	9	Working With Text and Binary Data		Exam 1 Due	x		
Nov 5 - 9 Fall Break & Immersion											
Nov 12	Nov 13	Nov 14	Nov 15	10	10	NumPy	Project 1 Presentations		unit 9 / HW10		A make-up class will be scheduled for Monday Class
Nov 19	Nov 20	Nov 21	**Nov 22**	11	11	Data Analysis With Pandas	Project 2 Assigned		unit 10 / HW11	unit 9 / HW10	A make-up class will be scheduled for the Thursday Classes
Nov 26	Nov 27	Nov 28	Nov 29	12	12	Plotting and Visualization	Project 2 Proposal Due		unit 11 / HW12	unit 10 / HW11	
Dec 3	Dec 4	Dec 5	Dec 6	13	13	Pandas Aggregation and Group Operations		Exam 2 Start	x	unit 11 / HW12	
Dec 10	Dec 11	Dec 12	Dec 13	14	14	Testing	Project 2 Presentations!	Exam 2 Due	x		Last Day of Class. bring beer Congratulations!
Last Day of Instruction - December 14											

Live Schedule: https://docs.google.com/spreadsheets/d/1sVV7-4OHZ-EDNqkMJ55OPUfz_QLJ4LZNuZl-cRaxgV0/edit?usp=sharing

Syllabus: https://docs.google.com/document/d/1_lLP7iM11lWNdtZL80-axCznLZUGz4oaVxB4FuryCH0/edit?usp=sharing

Running python

- Command line
  - Use a text editor (Atom, NotePad, TextWrangler, etc.) and save as a .py file.
  - Jupyter Notebook



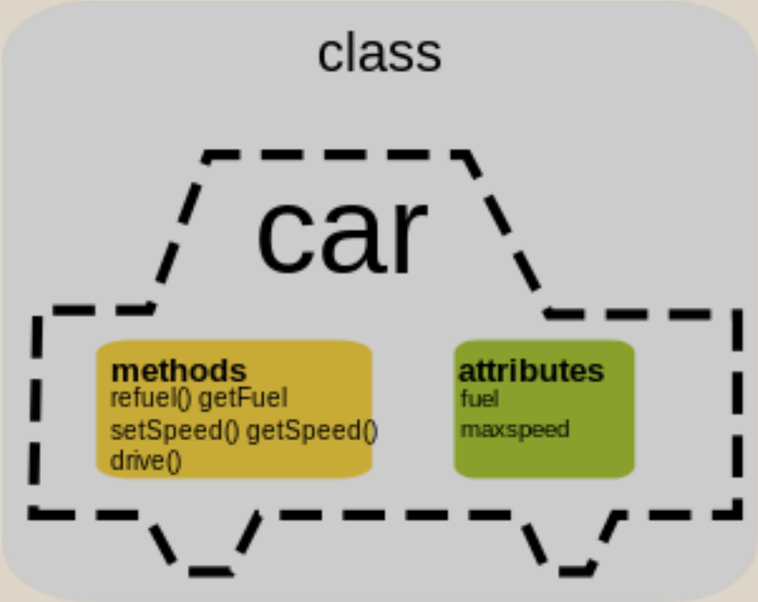
Python expressions

Assignment	=	x = 5
Addition	+	x + 5
Subtraction	-	x - 5
Division	/	x / 5
Multiply	*	x * 5
Exponent	**	x ** 5
Cumulative	+=	x += 5 x = x + 5

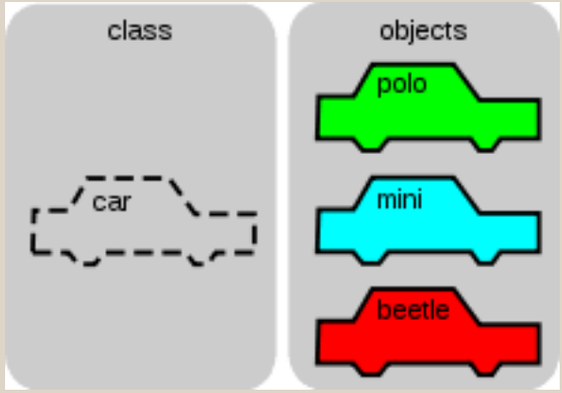
Equivalency	==	x == 5
Cumulative	-=	x -= 2
Integer division	//	x // 5
Modulus	%	x ** 2

Python & Objects

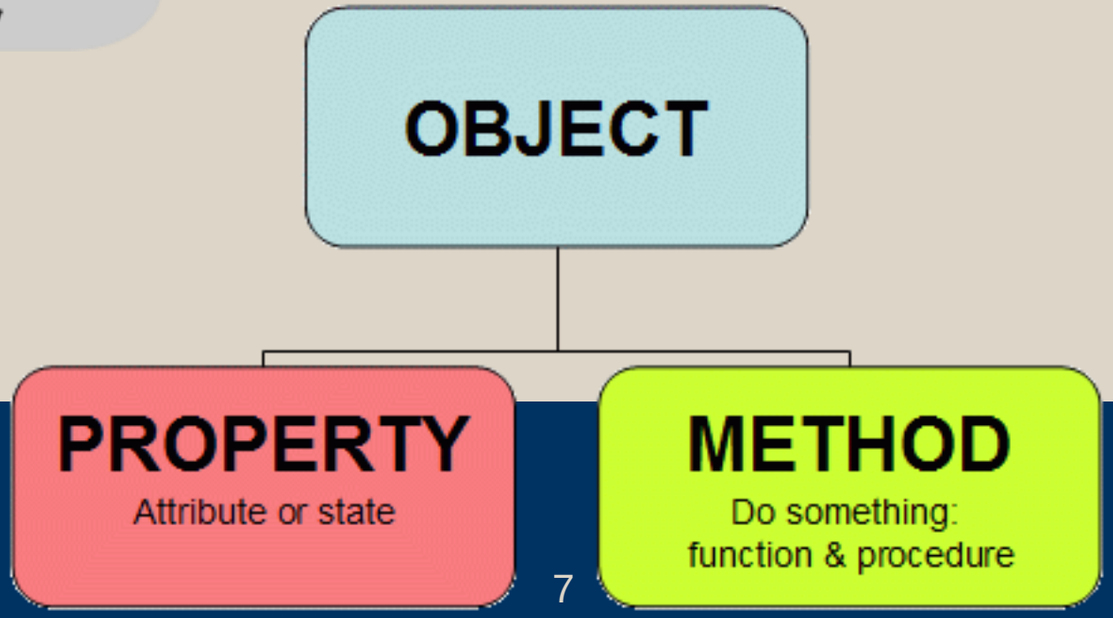
- Everything in python is an object … and every object has a type (class) [“object space”]. These details will be covered in more detail in later parts of the course, so if it is confusing we’ll circle back.



“Real world” things expressed in a computer.
The properties/facets of the object are attributes; what the class can do (like verbs) are the methods.



Copy the class (“constructors”) and tailor as you need to. Encapsulation, Polymorphism, Inheritance



Python Objects & Types

- `x = 5` —> `type(x)` —> `int`

```
>>> x = 5
>>> type(x)
<class 'int'>
>>>
```

- Boolean (`True, False`; 0 1) bool
- Integers (**`int`**) Counting numbers; 1, 2, 3, … n
- Floating point numbers (**`float`**; e.g., 3.14159)
- String (**`str`**) - A sequence of characters.

Type cast: convert data from one type to another, e.g.,
`(float)x`

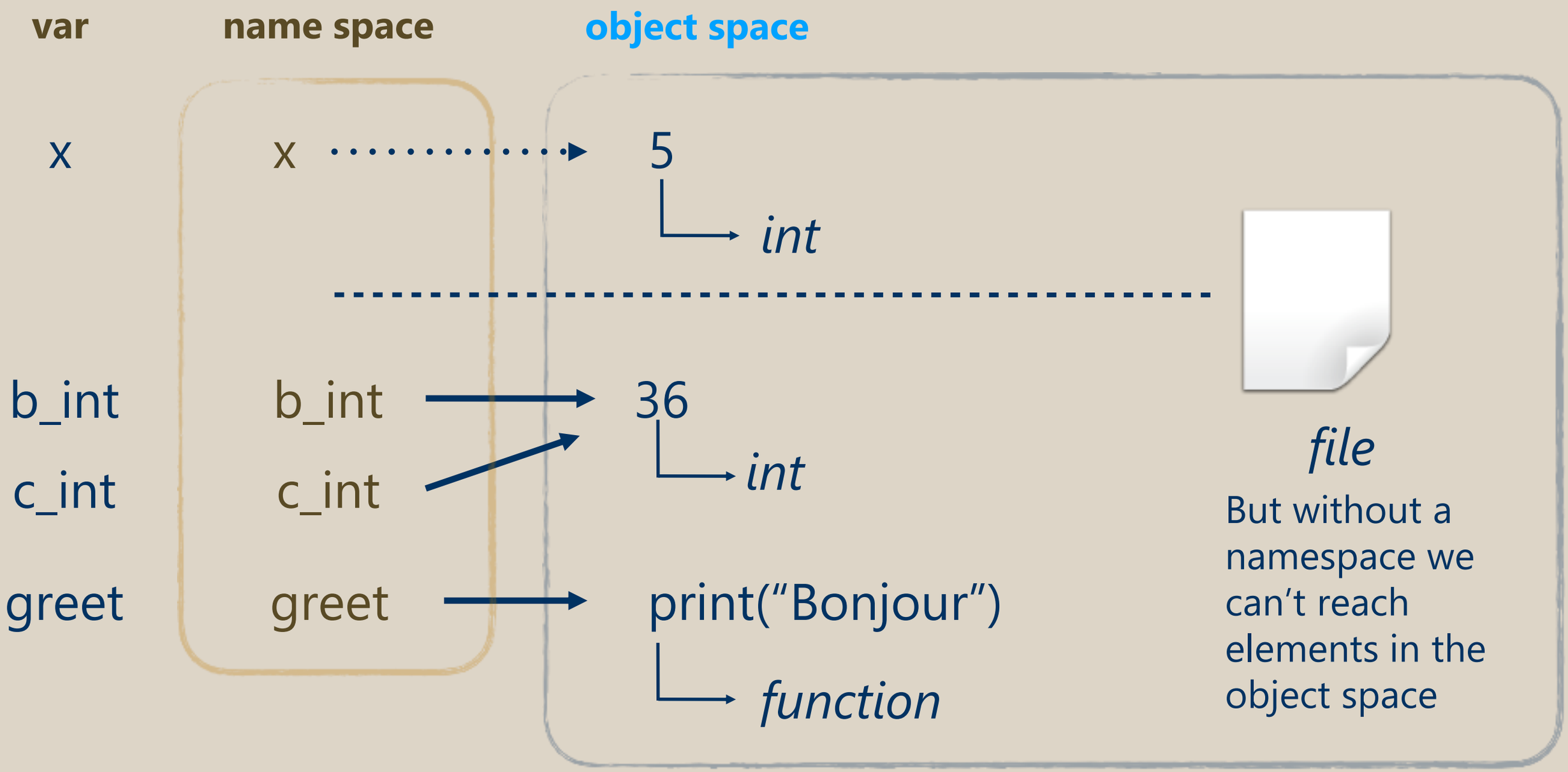
- `x = (float)input("Enter data:")`
- `s = input(str("Enter some text:"))`

var

name space

object space

Variables go into a special object called a "name space." Think of "scope & visibility" of vars and how they're accessed in the code.



String Objects

- A string is a "sequence object" [imagine the memory address of this string is 0 and is n bytes long. - Locate entire strings, individual letters, range of letters]

- Strings can be joined (or "concatenated") and manipulated:
  1. concatenation: "cat" + "dog" outputs "`catdog`"
  2. multiplication of chars: "-"*10 outputs ————
  3. <string>`.upper()`, e.g., `x = "cat"` `print(x.upper())`
  4. <string>`.lower()`
  5. `s = input("Type here:")`
  6. `s_cast = input(str("Cast to string:"))`

Strings - Special Chars

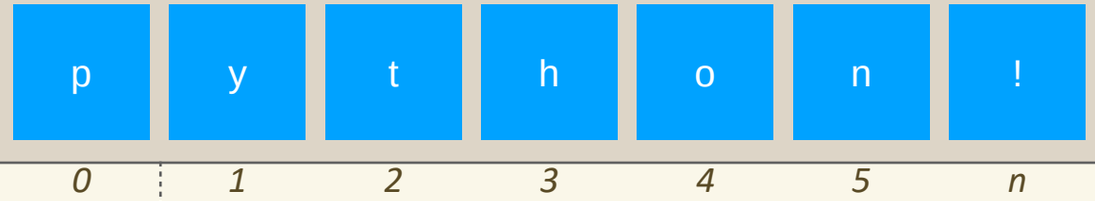
- Single and double quotes:

```
' '        # single quotes (the dagger kind)
"  "       # double quotes (notice the pairing)

t = input("Welcome, you're here! ")
           # double quotes surrounding string
           # so the single quote is safe
s = input('Welcome, you\'re here!’)
           # single quotes, so middle one needs
           # to be "escaped"
```

- Block quotes """
- \ escape sequence … `\n` (newline) `\t` (tab) `\’`
- `print(“here is a string.”, end = ‘’)`

String Slicing: using indices



`[0]`	from the start of the string
`[-1]`	one letter from the end of the string
`[0:3]`	from the start of the string to the 4th letter
`[1:-1]`	from 1 to the next to last letter
`[1:5:2]`	from 1 to 5, by 2 *at a time*
`[:-1]`	beginning (:) to second to last letter (*n* - 1)
`[:]`	entire string
`[::-1]`	entire string, reversed

Breakout Session (10-12 min)

1. Fire up what you downloaded for week 2 in Jupyter and create a string variable that prints exactly

```
The “trouble with
Tribbles” is that they
\\\EAT/// too many MREs.
```

2. Using one line of Python code, slide your variable from part 1 to print “selbbirT” 300 times.

```
selbbirT selbbirT selbbirT …
```

Control of Flow (if, while)

If statements

```
if xxx:
    doX()
elif yyy:
    doY()
else:
    doZ()
```

Nested if

```
if x > 2:
    print("x is greater than 2")
elif x < 0:
    print("x is negative")
else:
    print("x is less than 2 but still positive")
```

while loop

Nested loops

```
countdown = 5
while countdown > 0:
    print(countdown)
    countdown -= 1
print("Blast off!")
```

We'll see several other techniques, such as for x in range() when we work with lists and dictionaries.

Nested Loop | Repeating an action

```
row = int(input("Enter an integer: "))

# while row >= 0:

j = 0
while j <= row:
    print(j, end=" ")
    j += 1
```

```
Enter an integer: 5
0 1 2 3 4 5
```

```
Enter an integer: 5
0 1 2 3 4 5
0 1 2 3 4
0 1 2 3
0 1 2
0 1
0
```

```
row = int(input("Enter an integer: "))

while row >= 0:
  # inner loop
  j = 0
  while j <= row:
      print(j, end=" ")
      j += 1
   print("")
   row -= 1
```

Breakout room

```
ans = input('do you have 8 legs?')
if ans == "yes":
    print("you are a spider")
else:
    ans = input("do you have 4 legs?")
    if ans == "yes":
        print('you are a quad')
    else:
        print("you are a bicycle.")
```

Breakout rooms

- Make a calculator
- Work with conditionals (if statements)
- Save a .py file and execute it.

```
Enter a first number : 4
Enter a second number: 3
Enter operand: "a", "s", "d" or "m": a
4.0 + 3.0  =  7.0
```

```
Enter a menu option: [add, sub, div, multi]:    add
Enter the first value:  3
Enter the second value: 2

3.0 + 2.0 = 5.0

Great job 👍
```

That’s it! Enjoy a great week and keep up with your drills and assignments.