Python

Bootcamp 2021

Outline for today

- Setup Anaconda
- Running Python
- Variables and Assignment
- Data Type
- Built-in functions
- Conditionals
- Loops

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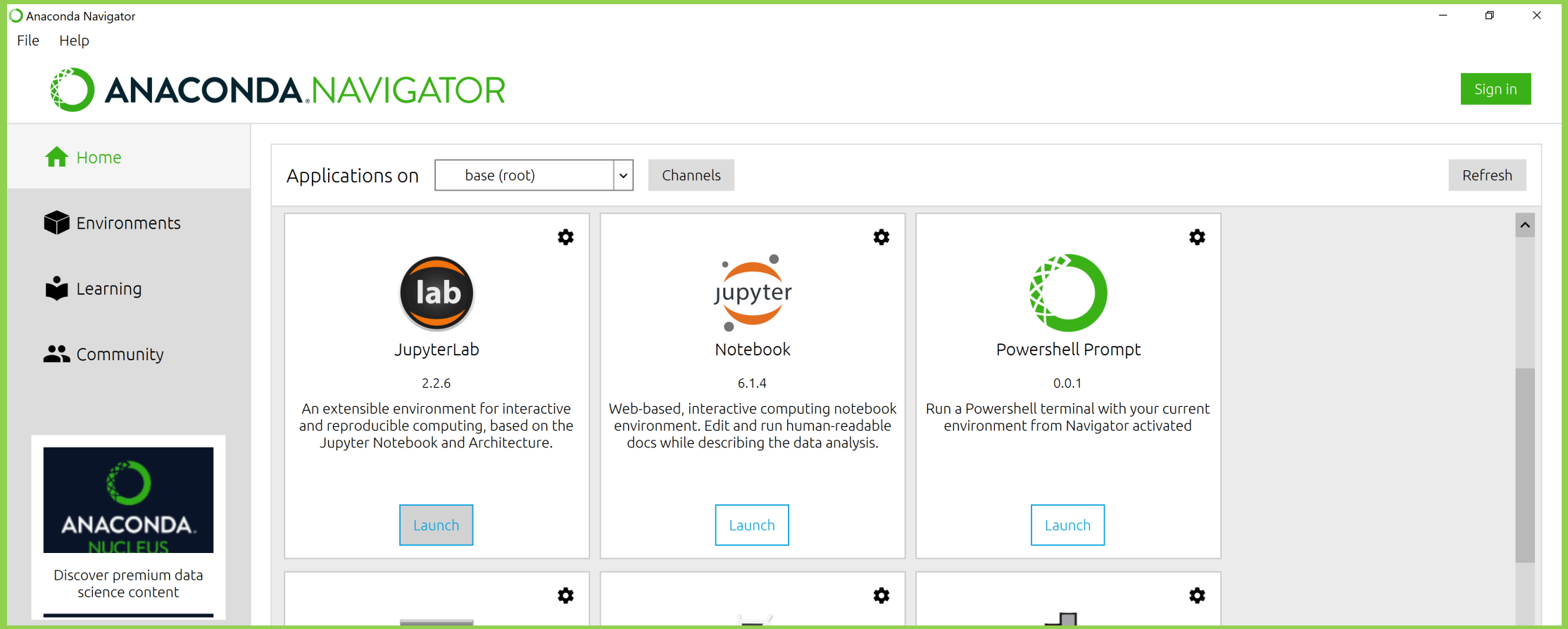
Setup Anaconda



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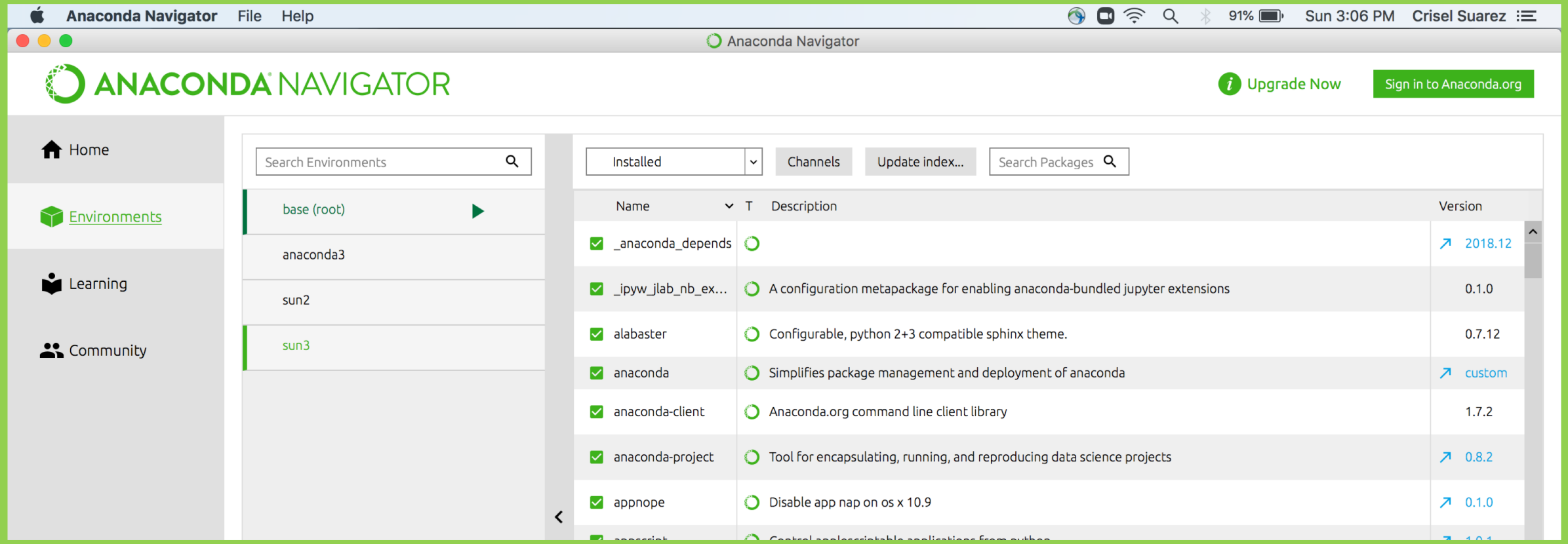


Setup Anaconda

- >On your bash shell

- $ conda create --name bootcamp2021
- proceed ([y]/n)?
- Y
- $ conda info --envs
- $ conda env list
- $ conda activate bootcamp2021
- $ conda list -n bootcamp2021
- $ conda install package-name
- $ conda install package-name=2.3.4

- https://conda.io/projects/conda/en/latest/user-guide/tasks/manage-environments.html

- https://docs.anaconda.com/anaconda/user-guide/tasks/install-packages/

- $conda create –name bootcamp2021 –clone base

Scripts /Spyder/Jupyter Notebook/JupyterLab

- All have pros/cons
- Choose what works best for you
- It is okay to switch between platforms

Python Scripts

- Run scripts on your bash shell
  - $python

    >>>

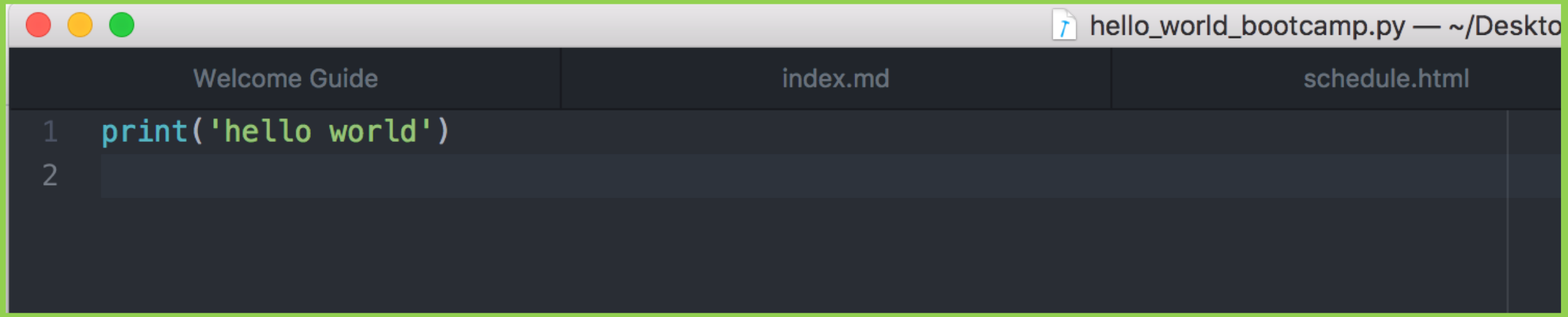
    >>>print(‘hello world’)

    >>>exit() #Go back to your bash shell ($)

- $ vim hello_world.py
- print(‘hello world’)
- $python hello_world.py

- vim
- Insert mode (i)
- Type your script/notes
- esc
- :wq

Python Scripts-Atom/Text Editor



On your bash shell

$python hello_world_bootcamp.py

hello world

Spyder

Spyder (Python 3.7)

File Edit Search Source Run Debug Consoles Projects Tools View Help

C:\Users\vechan

...nal\Courses\PythonProgrammerBootcamp2020\1. Spyder python files\8.8_dictionary_questions_UNSOLVED.py

Test_ImportData.py | _xlrd.py | 8.8_dictionary_questions_UNSOLVED.py

```
43  Question 2
44  Write python code that will create a dictionary containir
45  that represent the first 12 values of the Fibonacci seque
46  i.e {1:0,2:1,3:1,4:2,5:3,6:5,7:8 etc}
47  '''
48
49  n = 12 #number of iteration in the fibonacci sequence
50  x = 0 #first position of fibonacci sequence
51  y = 1 #second position and impact of next sequence
52  d_kv = {} #same as creating d_kv = dict ()
53
54  for i in range (1,n+1): #iterating the sequence starting
55      d_kv [i] = x # 1st sequence d_kv [1] = 0, d_kv [2] =
56      x,y = y, x+y
57
58  print (d_kv)
59
60
61
62  '''
63  Question 3
64  Create a dictionary to represent the open, high, low, clo
65  for 4 imaginary companies. 'Python DS', 'PythonSoft', 'Py
66  the 4 sets of data are [12.87, 13.23, 11.42, 13.10],[23.8
67  [98.99,102.34,97.21,100.065],[203.63,207.54,202.43,205.24
68  '''
69  companies = ['Python DS', 'PythonSoft', 'Pythazon', 'Pybc
70  status = ['Open', 'High', 'Low', 'Close']
71  prices =  [[12.87, 13.23, 11.42, 13.10],[23.54,25.76,21.8
72  [98.99,102.34,97.21,100.065],[203.63,207.54,202.43,205.24
73
74  d_sp = {}
```

Nam	Type	Size	Value
d_kv	dict	12	{1:0, 2:1, 3:1, 4:2, 5:3, 6:5, 7:8, 8:13, 9:21,
i	int	1	12
n	int	1	12
x	int	1	144
y	int	1	233

Variable explorer | Help | Plots | Files

Console 1/A

```
Python 3.9.0 (tags/v3.9.0:9cf6752, Oct  5 2020, 15:34:40)
[MSC v.1927 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more
information.

IPython 7.19.0 -- An enhanced Interactive Python.

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```

IPython console | History

LSP Python: ready | Kite: initializing | custom (Python 3.9.0) | Line 58, Col 13 | UTF-8 | CRLF | RW | Mem 51%

Script Code goes here

Declared Variables

Output

Spyder

Run your code

Spyder (Python 3.7)

File Edit Search Source Run Debug Consoles Projects Tools View Help

C:\Users\vechan

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Variable explorer | Help | Plots | Files

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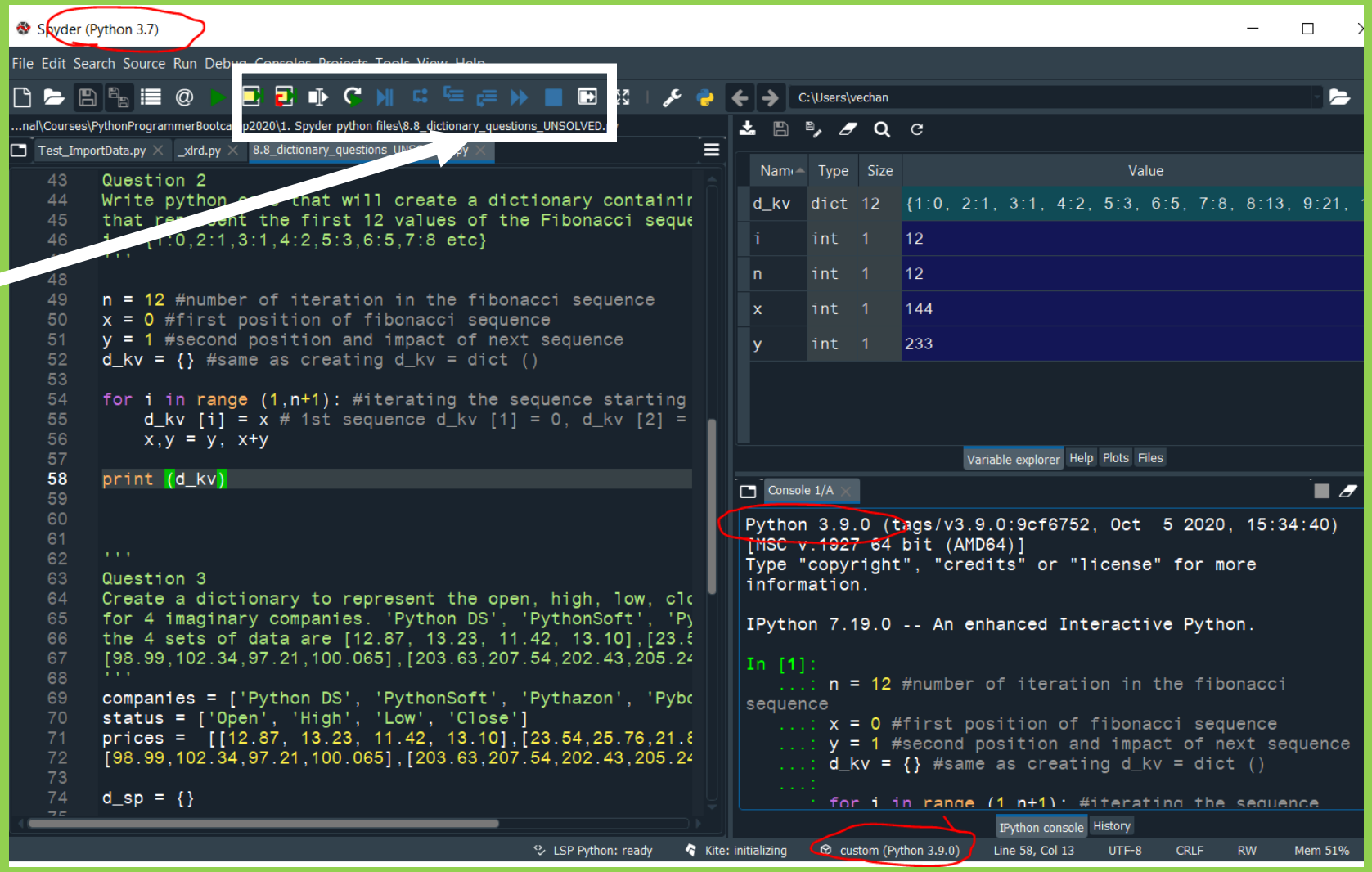
Spyder

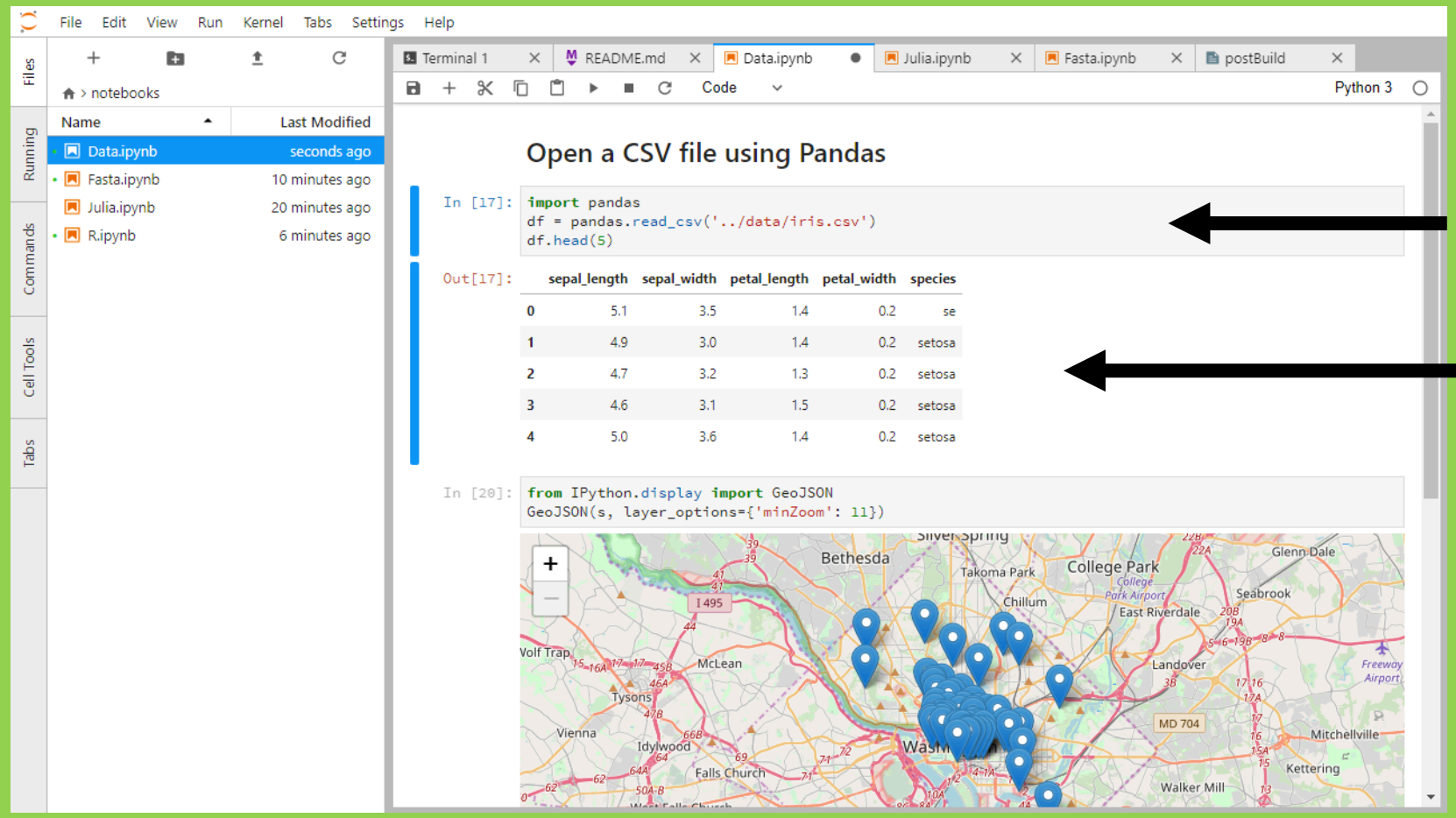
Debug your code



More on this later

Jupter Lab (.ipynb)

$ jupyter lab



Cell – Code

Output

To run a cell:
shift + enter

https://jupyterlab.readthedocs.io/en/stable/user/notebook.html

$ jupyter notebook

Jupter notebook (.ipynb)

- When in Command mode (esc/gray),
  - The b key will make a new cell below the currently selected cell.
  - The a key will make one above.
  - The x key will delete the current cell.
  - The z key will undo your last cell operation (which could be a deletion, creation, etc).

https://jupyter-notebook.readthedocs.io/en/latest/notebook.html

Jupter notebook (.ipynb)

•Markdown great for commenting/adding notes to your code!

•A simple plain-text format for writing lists, links, and other things that might go into a web page.

Turn the current cell into a **Markdown cell** by entering the Command mode (**Esc**) and press the **M** key.

In [ ]: will disappear to show it is no longer a code cell and you will be able to write in Markdown.

Turn the current cell into a **Code** cell by entering the Command mode (**Esc**) and press the **y** key

Markdown – html

* Use asterisks
* to create
* bullet lists.

Lists

A Level-1 Heading

A Level-2 Heading (etc.)

Headings

[Create links](http://software-carpentry.org) with `[...](...)`.

Or use [named links][data_carpentry]. [data_carpentry]: http://datacarpentry.org

urls + links

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Variables and Assignments

- In Python the = symbol assigns the value on the right to the name on the left
- age = 42
- my_name = ‘Crisel Suarez’
- Grade1 = ‘A’

- Variable names
  - can **only** contain letters, digits, and underscore _
  - cannot start with a digit
  - are **case sensitive** (age, Age and AGE are three different variables)

Variables and Assignments

- first_name = ‘Kathy ’
- age = 10
- **print**(first_name, 'is', age, 'years old’)

- Variables can be used in calculations:
  - new_age = age +10

- Indexing
- print(first_name[0]

*** Python indexing starts at 0 ***

Indexing and Slices

- [start:stop]
- atom_name = 'sodium’
- print(atom_name[0:3])
  - > sod

- len(atom_name)
- 6

Key Points

- Use variables to store values.
- Use print() to display values.
- Variables persist between cells.
- Variables must be created before they are used.
- Variables can be used in calculations.
- Use an index to get a single character from a string.
- Use a slice to get a substring.
- Use the built-in function len() to find the length of a string.
- Python is case-sensitive.
- Use meaningful variable names

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Data Types

- str() – String
- int()- integer
- Float() - decimals
- Type() > What kind of data type

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Lists

- Storing multiple variables

- pressures = [0.273, 0.275, 0.277, 0.275, 0.276]

- **print**('pressures:', pressures)
- **print**('length:', len(pressures))
- **print**('zeroth item of pressures:', pressures[0])

- pressures[0] = 0.265

-

Lists – Appending

- list_name.append()
- primes = [2, 3, 5]
- **print**('primes is initially:', primes)
- primes.append(7)
- **print**('primes has become:', primes)

Lists – Deleting

- del list_name[index] to remove an element from a list

- primes = [2, 3, 5, 7, 9]
- **print**('primes before removing last item:', primes)
- **del** primes[4]
- **print**('primes after removing last item:', primes)

List- Empty []

- Empty_list = []
- Helpful as a starting point for collecting values

Practice:

- **print**('string to list:', list('tin’))
- **print**('list to string:', ''.join(['g', 'o', 'l', 'd’]))

What does list do?

What does .join do?

*We will come back to list with Numpy’s version …arrays

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Built-in functions

- Think math function
- f(x) = x + 5
- x -> input
- f(x) -> output

- Functions can take 0 or many arguments
- print()
- f(x1, x2, x3,…) = x1+ x2+x3 +…..

Built-in functions

- max(1,2,3)
- min(5,6,7)
- round(3.712, 1) #rounds to 1 decimal place

- help(round)

Functions attached to objects are called methods

- Methods have parentheses like functions, but come after the variable.

```
my_string = 'Hello world!' # creation of a string object

print(my_string.swapcase())
# calling the swapcase method on the my_string object
```

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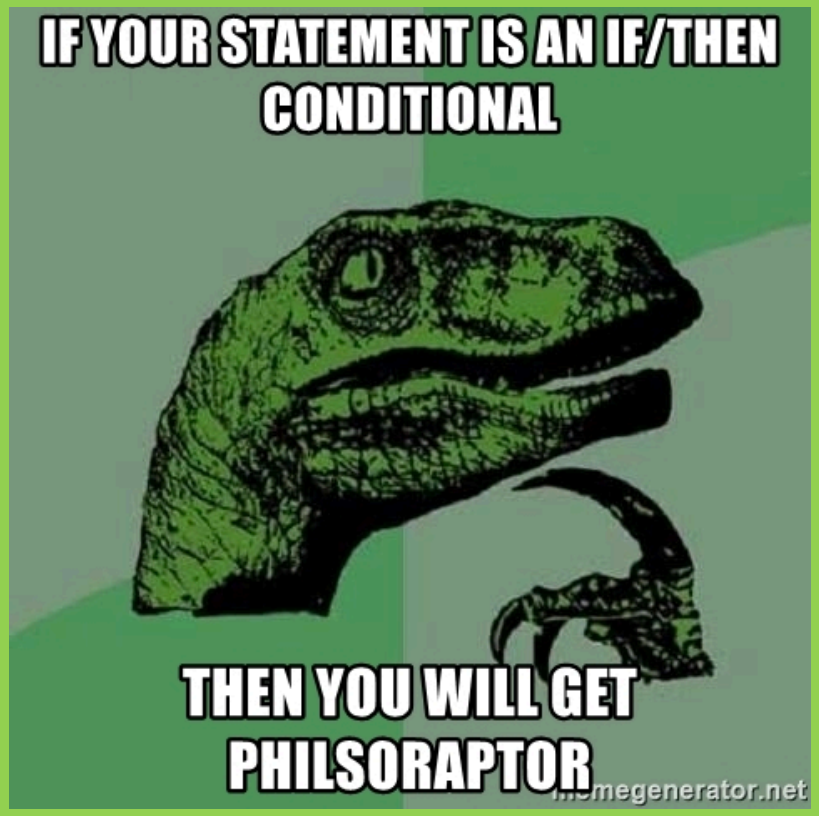
Conditionals

- if (condition is True):
  then do something

- if (condition is True):
  then do something
- else:
  - Do something else

- if (condition is True):
  then do something
- elif (this condition is true):
  - then do this
- else:
  - Do this



Conditionals – Try it out

- mass = 3.4
- If mass > 3.0:
  - print(‘Mass is ’ , mass)

- if mass > 3:
  - print(‘Mass is less than 3’)
- else:
  - print(‘Mass is more than 3’)

- if mass < 3.7:
  print(‘mass less than 3.7’)
- elif (if mass > 3.2):
  - print(‘mass greater than 3.2’)
- else:
  - print(mass greater than 3.7 or less than 3.2)

Conditionals – Try it out

- mass = 3.4
- If ((mass < 3.7) and (mass >3.2)):
  - print(mass less than 3.7 or greater than 3.2)

- mass = 3.4
- If ((mass < 3.7) or (mass >3.2)):
  - print(mass less than 3.7 or greater than 3.2

- mass = 3.8
- If ((mass < 3.7) and (mass >3.2)):
  - print(mass less than 3.7 or greater than 3.2

- mass = 3.8
- If ((mass < 3.7) or (mass >3.2)):
  - print(mass less than 3.7 or greater than 3.2

Conditionals

p	q	p and q
TRUE	TRUE	TRUE
TRUE	FALSE	FALSE
FALSE	TRUE	FALSE
FALSE	FALSE	FALSE

p	q	p or q
TRUE	TRUE	TRUE
TRUE	FALSE	TRUE
FALSE	TRUE	TRUE
FALSE	FALSE	FALSE

Loops

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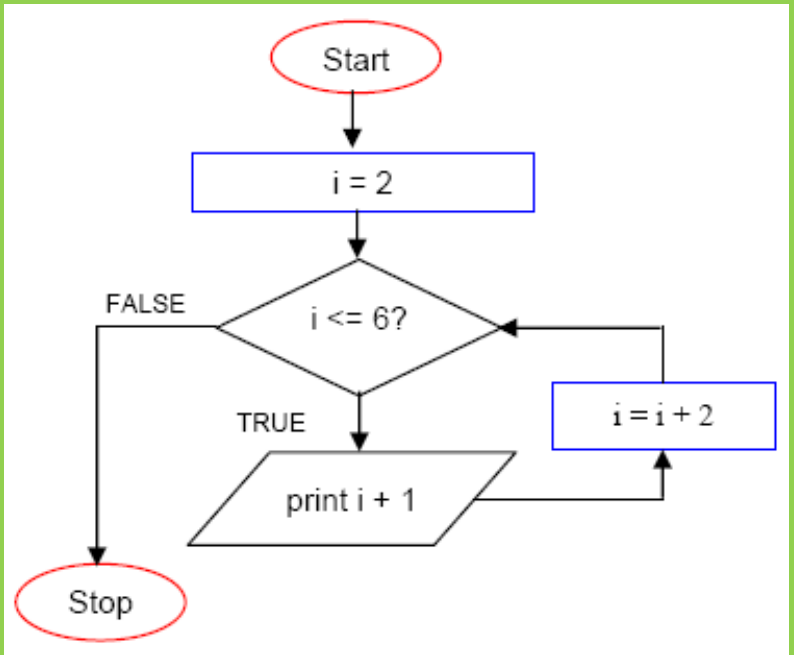
Loops

Loops are a programming construct which allow us to repeat a command or set of commands for each item in a list. As such they are key to productivity improvements through automation



i	i<= 6	Output
2	True	3
4	True	5
6	True	7
8	False	

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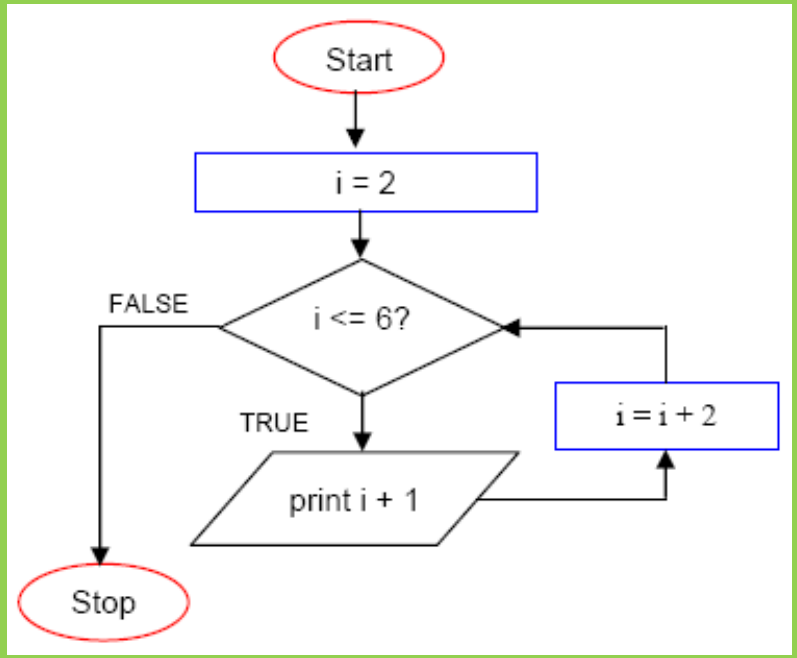

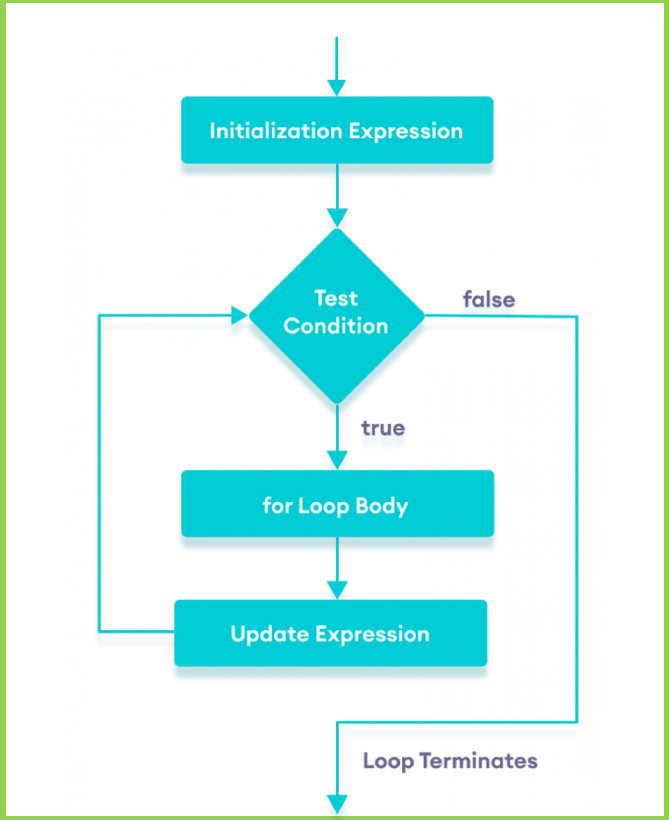

Loops

- **for** number **in** [2, 3, 5]:
  - **print**(number)

- primes = [2, 3, 5]
- **for** p **in** primes:
  - squared = p ** 2
  - cubed = p ** 3
  - **print**(p, squared, cubed)

Loops

- The built-in function range produces a sequence of numbers.
- *Not* a list: the numbers are produced on demand to make looping over large ranges more efficient.

- **print**('a range is not a list: range(0, 3)’)
- **for** number **in** range(0, 3):
  - **print**(number)

Loops – Practice

- *# List of word lengths: ["red", "green", "blue"] => [3, 5, 4]*
- lengths = ____
- **for** word **in** ["red", "green", "blue"]:
  - lengths.____(____)
- **print**(lengths)

Loops – Practice

- *# List of word lengths: ["red", "green", "blue"] => [3, 5, 4]*
- lengths = []
- **for** word **in** ["red", "green", "blue"]:
  - lengths.append(len(word))
- **print**(lengths)

Loops – Practice

- *# Concatenate all words: ["red", "green", "blue"] => "redgreenblue”*
- words = ["red", "green", "blue"]
- result = ____
- **for** ____ **in** ____:
  - ____
- **print**(result)

Loops – Practice

- *# Concatenate all words: ["red", "green", "blue"] => "redgreenblue”*
- words = ["red", "green", "blue"]
- result = ””
- **for** word **in** words:
  - result = result+word
- **print**(result)