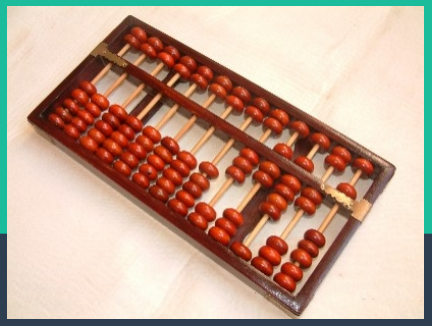
Upper School 2 - Coding

To Graph a Calculator



Nasri Academy
Thurs. Oct. 3rd, 2019
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Overview

- **Review**
- **Def my_function():**
- **File Organization**
- **Intro to MatPlotLib**

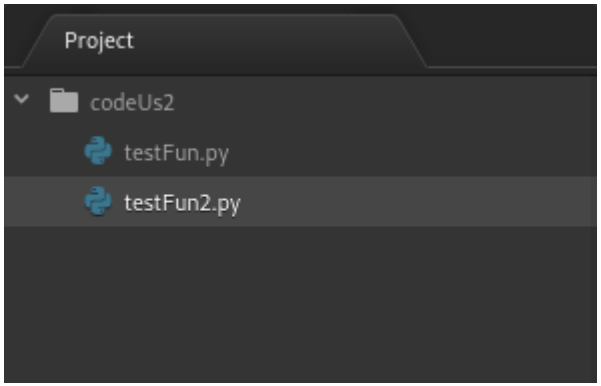
Review

testFun.py testFun2.py

```
1    def average2(a,b):
2        average = (a + b)/2
3        return average
4
5    def average3(a, b, c):
6        average = (a + b + c)/3
7        return average
8
9    def average4(a, b, c, d):
10       average = (a + b + c + d)/4
11       return average
12
13   print(average2(10,5))
14   print(average3(15,10,5))
15   print(average4(20,15,10,5))
16
17   # now you can use functions within functions
18   # becareful with the dataTypes they accept
19   print(average2(2,average3(1,2,3)))
20
```

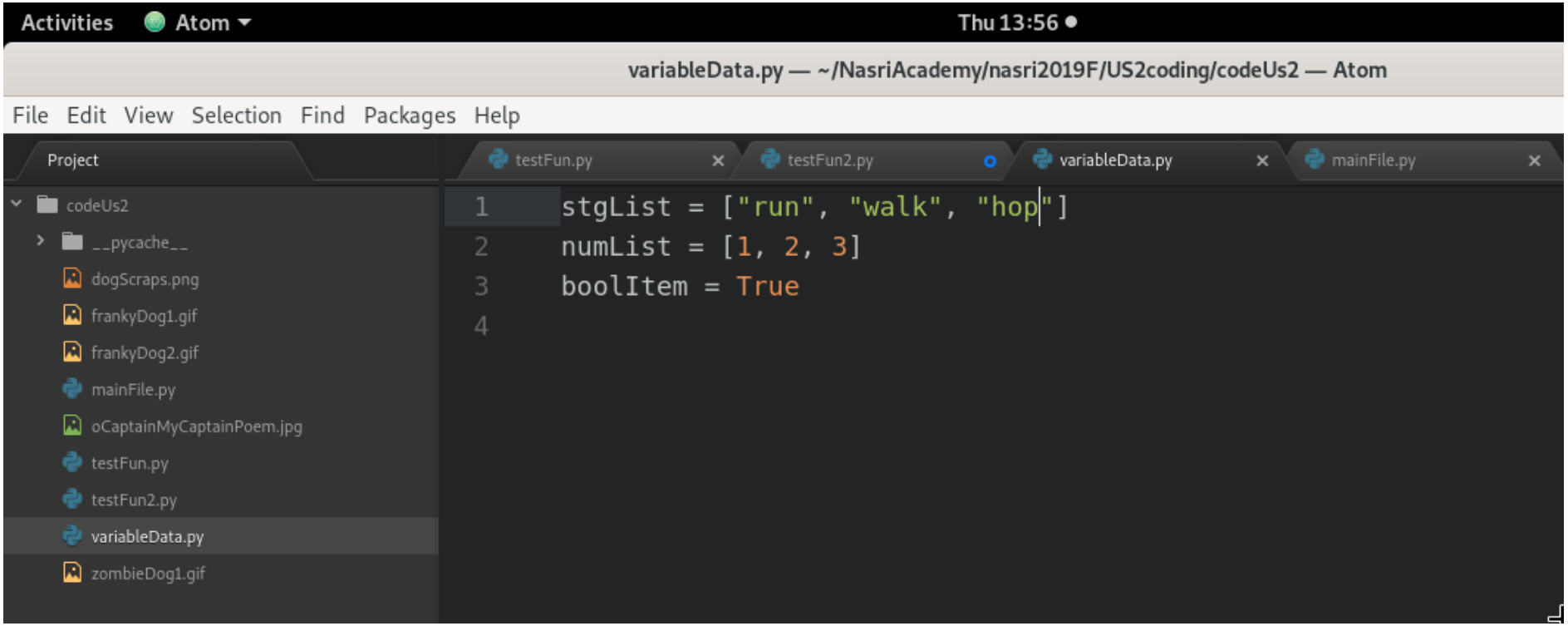
File Organization

- How do you structure programs into separate files?
- How do you call a function from another file?
- For those using atom, use the browser view to drop your files into view like so.



- We’re going to add a few more files to this folder

File Organization



File Organization

Activities Atom Thu 13:56

mainFile.py — ~/NasriAcademy/nasri2019F/US2coding/codeUs2 — Atom

File Edit View Selection Find Packages Help

Project

- codeUs2
  - __pycache__
  - dogScraps.png
  - frankyDog1.gif
  - frankyDog2.gif
  - mainFile.py
  - oCaptainMyCaptainPoem.jpg
  - testFun.py
  - testFun2.py
  - variableData.py
  - zombieDog1.gif

testFun.py | testFun2.py | variableData.py | mainFile.py

```
1   from variableData import stgList,numList
2   import random
3
4   print(random.choice(stgList))
5   print(random.choice(numList))
6
7   # try this
8   print(boolItem)
9   # what can you do to fix this?
10
```

Classwork

Given the shorter 2 sides of a right triangle, create a function that gives you the length of the third side.

Welcome Guide | triangles02.py

```
1    # a solution to the right triangle problem
2    import math
3
4    def rightTriangle(a,b):
5        c = math.sqrt(a**2.0 + b**2)
6        return c
7
8    # Check it!
9    # Can solve a 3,4,5 triangle?
10   print(rightTriangle(3,4))
```

Can you modify your program to find the length of any triangle (not just right triangles)?

Classwork (cont.)

```python
import math


# for this function, a and b should both be less than c
def anyTriangleHypo(a, b):
    c = math.sqrt(a**2.0+b**2.0)
    return c


# for this function, a should be less than c
def rightTriangleShort(a, c):
    if a >= c:
        return print("error 404, a is larger or equal to c")
    else:
        shortSide = math.sqrt(c**2.0 - a**2.0)
        return shortSide


print(anyTriangleHypo(3, 4))
print(rightTriangleShort(6, 5))

# this function runs for a while
for i in range(5):
    print(anyTriangleHypo(i, 4))

```

Introduction to Pip

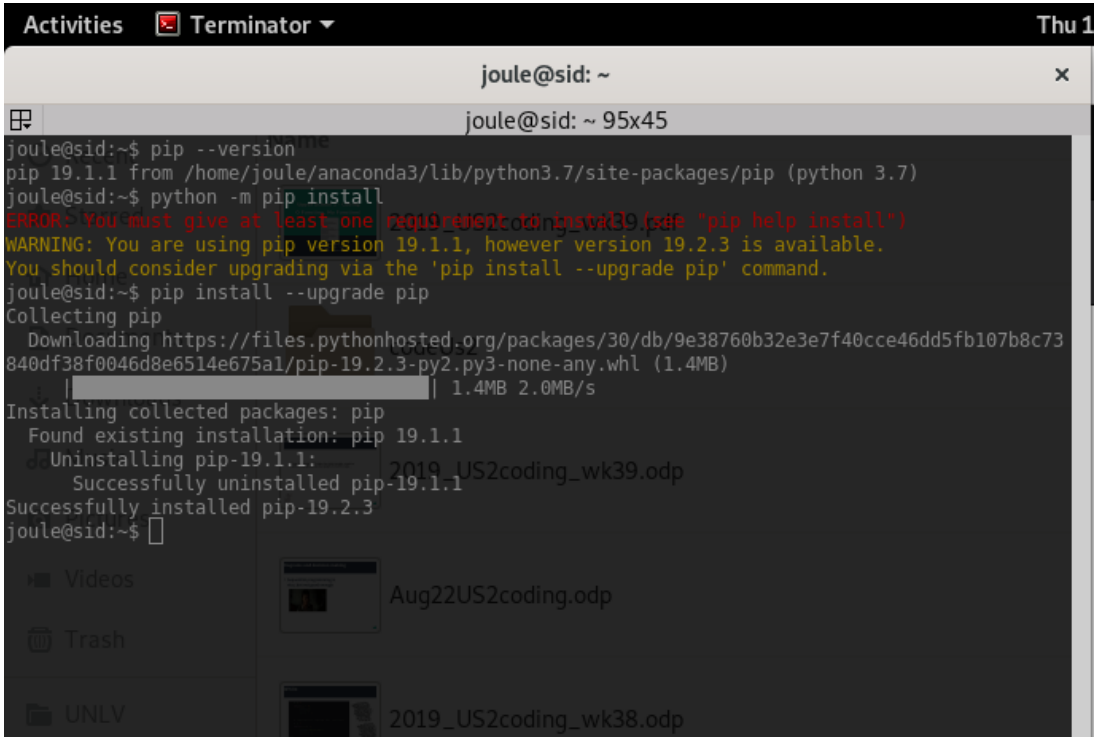
Installing package is typically done using the pip command

It comes installed with modern python environments

To install or to check to see if it’s updated

python -m pip install -U pip
pip install –upgrade pip

We will use pip to install numpy and matplotlib



Introduction to NumPy

```
joule@sid:~$ python -m pip install numpy
Requirement already satisfied: numpy in ./anaconda3/lib/python3.7/site-packages (1.15.4)
joule@sid:~$
```

Numpy is a matrix library and is often used to make linear algebra easier.

It is a powerful library with commonly used functions (along with advanced functions) that you use without having to make them from scratch.

https://numpy.org/
https://numpy.org/devdocs/user/quickstart.html

To invoke it within a program try

import numpy is np

Introduction to matplotlib

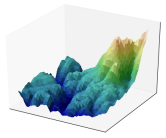
```
joule@sid:~$ python -m pip install matplotlib
Requirement already satisfied: matplotlib in ./anaconda3/lib/python3.7/site-packages (3.0.2)
```

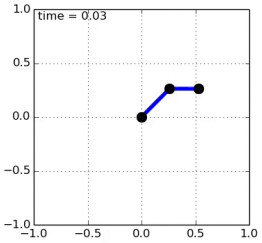
https://matplotlib.org/users/installing.html

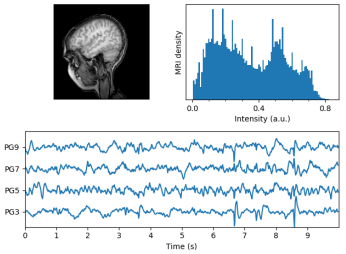
Python -m pip install -U pip
Python -m pip install -U matplotlib

matplotlib

Matplotlib is a library for rendering all sorts of plots and graphs. You can use it for your science project or for when you're writing reports! You can even use it to analysis images and to analysis robotic arm trajectories.







Classroom Example