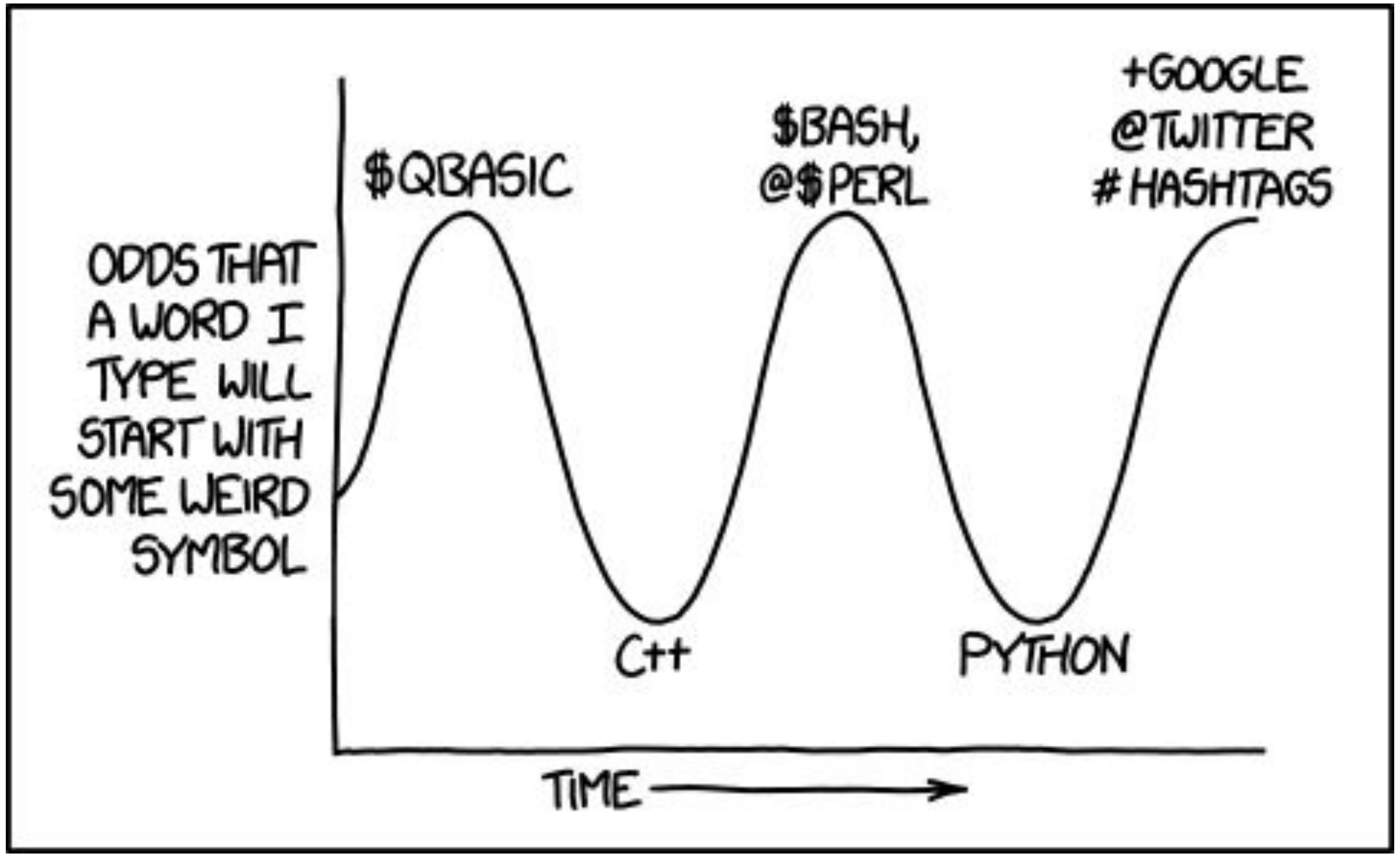
Python Scripting - Part 3

Spring 2024
PCfB Class 6
February 23, 2024


ODDS THAT A WORD I TYPE WILL START WITH SOME WEIRD SYMBOL
$QBASIC
C++
$BASH, @$PERL
PYTHON
+GOOGLE @TWITTER #HASHTAGS
TIME

Check-in

Outline

- List/dictionary comprehension
- Reading from/writing to files
- String formatting
- Python modules

List/dictionary comprehension

List comprehension

```
l = [1, 8, 5, 2]
```

```
l = [1, 8, 5, 2]
```

Iterate through a string

```python
numstring="123456789"
sqroots = [float(x)**(0.5) for x in numstring]
```

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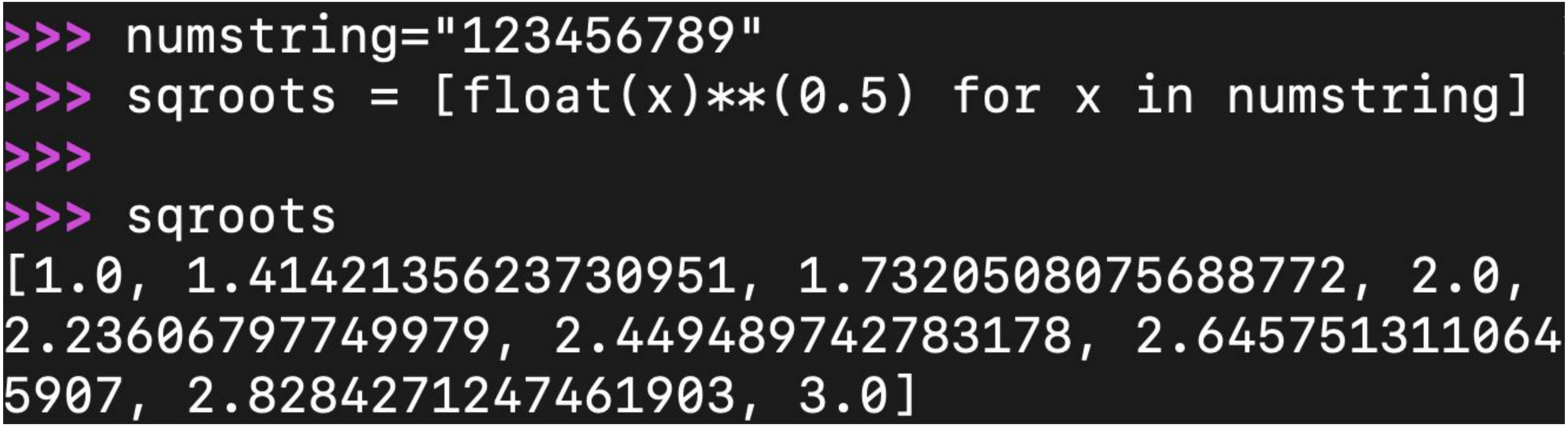


```
>>> numstring="123456789"
>>> sqroots = [float(x)**(0.5) for x in numstring]
>>>
>>> sqroots
[1.0, 1.4142135623730951, 1.7320508075688772, 2.0,
2.23606797749979, 2.449489742783178, 2.645751311064
5907, 2.8284271247461903, 3.0]
```

```
l = [1, 8, 5, 2]
```

```
l = [1, 8, 5, 2]
```

Dictionary comprehension

```
newdict = {x:1.0/x for x in range(1,11)}
```

```
>>> newdict = {x:1.0/x for x in range(1,11)}
>>> newdict
{1: 1.0, 2: 0.5, 3: 0.3333333333333333, 4: 0.25, 5: 0.2, 6: 0.1666666666666
666666, 7: 0.14285714285714285, 8: 0.125, 9: 0.1111111111111111, 10: 0.1}
>>> 
```

First example:

```
>>> newdict = {x:1.0/x for x in range(1,11)}
>>> newdict
{1: 1.0, 2: 0.5, 3: 0.3333333333333333, 4: 0.25, 5: 0.2, 6: 0.1666666666666
666666, 7: 0.14285714285714285, 8: 0.125, 9: 0.1111111111111111, 10: 0.1}
>>> 
```

Second example:

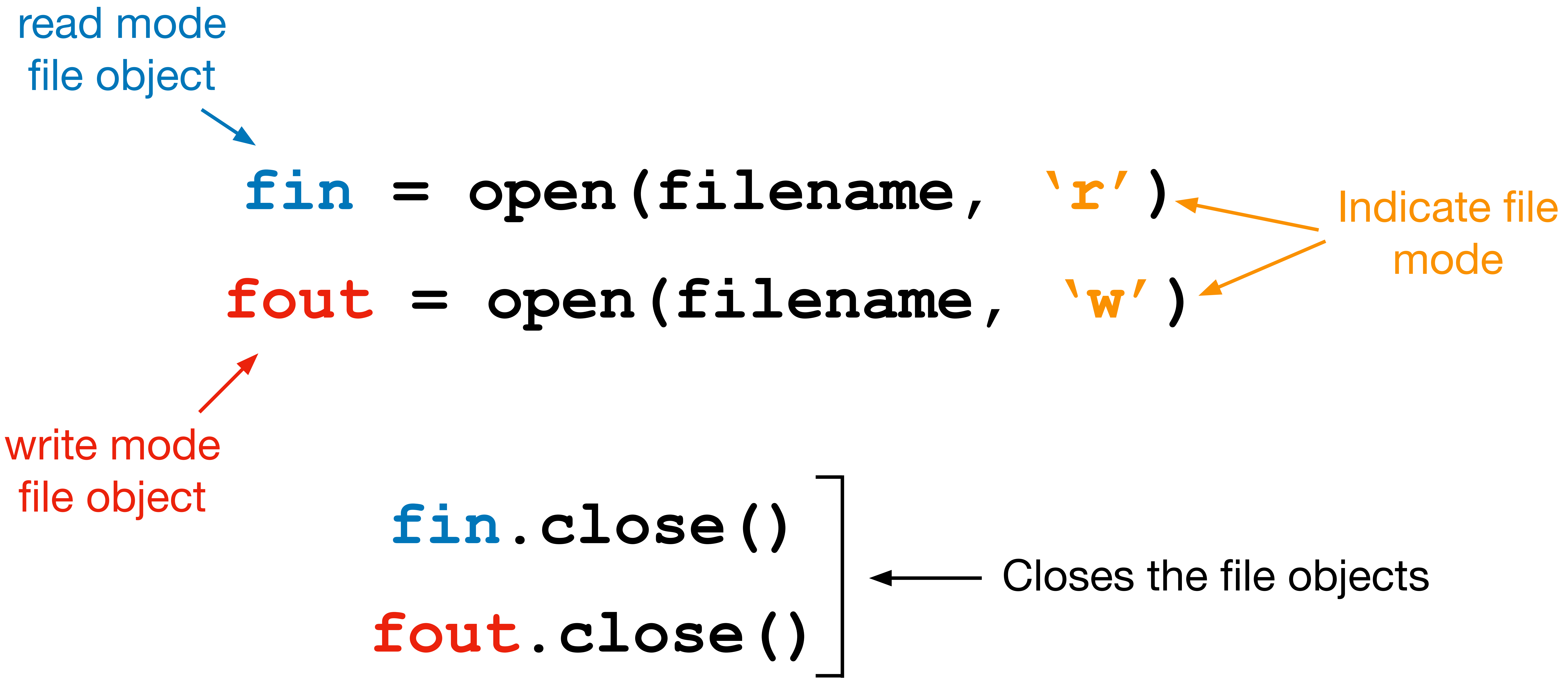
```
newerdict = {key:value/2 for key,value in newdict.items() if key%2==0}

```

```
>>> newerdict = {key:value/2 for key,value in newdict.items() if key%2==0}
>>> newerdict
{8: 0.0625, 2: 0.25, 4: 0.125, 10: 0.05, 6: 0.08333333333333333}
>>> 
```

Reading from/writing to files

Reading from/Writing to files



read mode file object

```
fin = open(filename, ‘r’)
fout = open(filename, ‘w’)
```

Indicate file mode

write mode file object

```
fin.close()
fout.close()
```

Closes the file objects

`with` statement

Step through file line by line

```
with open(filename, “r”) as fin:
```

Write to a file

```
with open(filename, “w”) as fout:
```

String formatting

% operator

`%s`

`%d`

`%f`

% operator

```
a = 5
b = 1.25
c = “Sample1”
```

`%d` operator

```
a = 5
d = 55
```

`%f` operator

```
b = 1.25
e = 5.7812163
```

f-string formatting

```
a = 5
b = 1.25
c = “Sample1”
```

Traditional approach:

```
“%s\t%d\t%f\n” % (c, a, b)
```

Python modules

Python modules

- Python functions that can be imported, as needed for use within your scripts
- Standard modules: included with Python installation
- 3rd party modules: must be installed

Module basics

Method #1: `import numpy`

- Import the entire module and link functions to the module name
- Example usage:

```
numpy.mean([54, 75, 78, 91, 37, 81])

numpy.std([54, 75, 78, 91, 37, 81])
```

Method #2: **`import numpy as np`**

- Import the entire module and link functions to a name specified by the user

- Example usage:

```
np.mean([54, 75, 78, 91, 37, 81])

np.std([54, 75, 78, 91, 37, 81])
```

Method #3: `from numpy import mean`

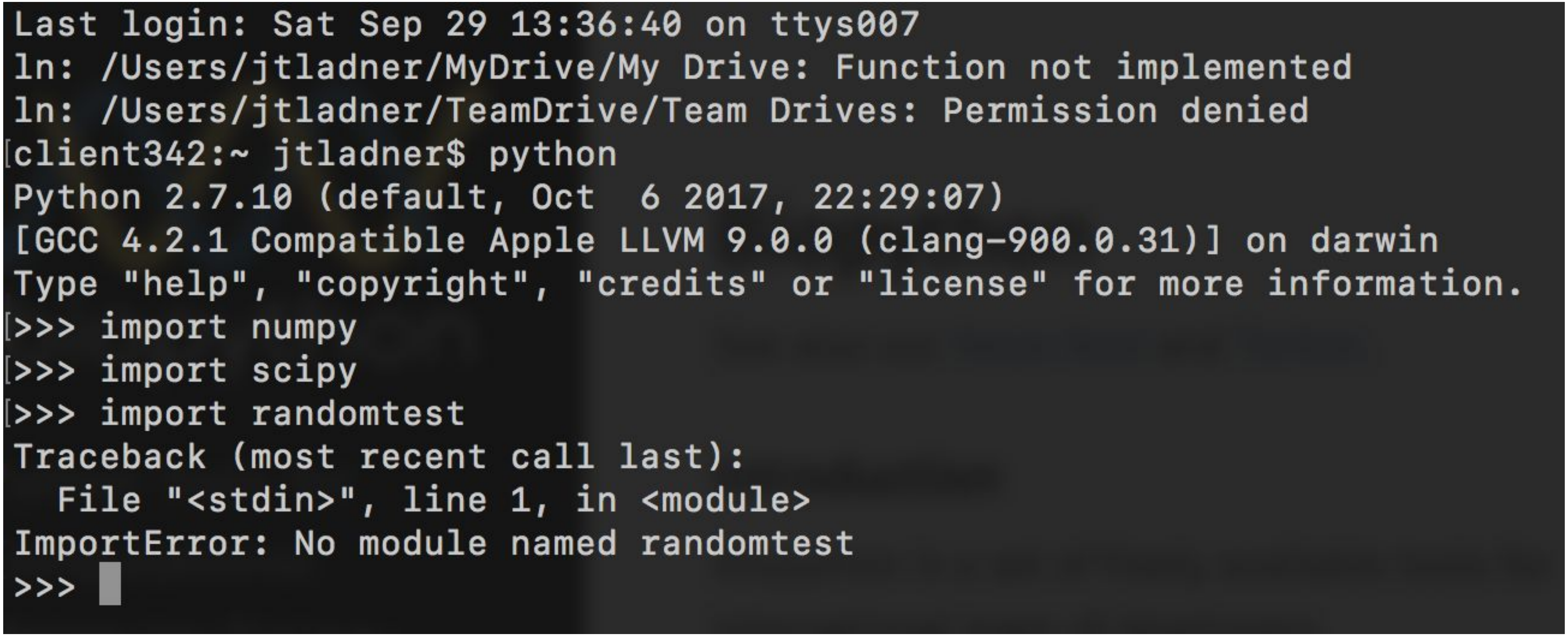
- Import select functions from a module
- Functions exist on their own, NOT linked to module name
- Example usage:

```
mean([54, 75, 78, 91, 37, 81])
```

Recommended 3rd party modules

- **NumPy & SciPy** (https://scipy.org/)
- **Pandas** (https://pandas.pydata.org/)
- **Matplotlib** (https://matplotlib.org/)
- **Biopython** (https://biopython.org/)

Checking to see if module is installed



```
Last login: Sat Sep 29 13:36:40 on ttys007
ln: /Users/jtladner/MyDrive/My Drive: Function not implemented
ln: /Users/jtladner/TeamDrive/Team Drives: Permission denied
[client342:~ jtladner$ python
Python 2.7.10 (default, Oct  6 2017, 22:29:07)
[GCC 4.2.1 Compatible Apple LLVM 9.0.0 (clang-900.0.31)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
[>>> import numpy
[>>> import scipy
[>>> import randomtest
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
ImportError: No module named randomtest
>>> 
```