Function Calls

- Python supports expressions with math-like functions
  - A function in an expression is a *function call*
- **Function calls** have the form

name(x,y,…)

function name — **argument**

- **Arguments** are
  - **Expressions**, not values
  - Separated by commas
- **Examples:**
  - round(2.34)
  - max(a+3,24)

Built-in Functions vs Modules

- The number of built-in functions is small
  - http://docs.python.org/3/library/functions.html
- Missing a lot of functions you would expect
  - **Example**: cos(), sqrt()
- **Module**: file that contains Python code
  - A way for Python to provide optional functions
  - To access a module, the import command
  - Access the functions using module as a *prefix*

Example: Module math

```
>>> import math
>>> math.cos(0)
1.0
>>> cos(0)
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'cos' is not defined
>>> math.pi
3.141592653589793
>>> math.cos(math.pi)
-1.0
```

To access math functions

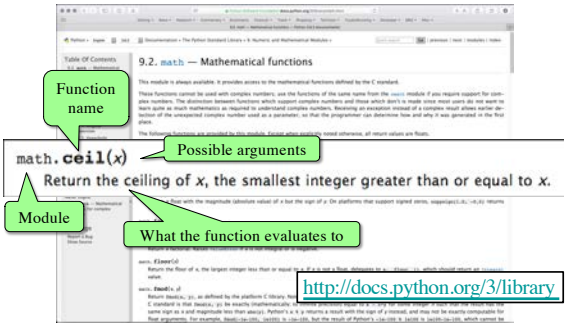
Functions require math prefix!

Module has variables too!

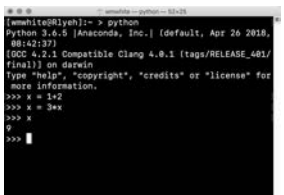
Other Modules

- os
  - Information about your OS
  - Cross-platform features
- **random**
  - Generate random numbers
  - Can pick any distribution
- introcs
  - Custom module for the course
  - Will be used a lot at start

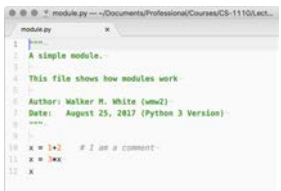
Reading the Python Documentation



Interactive Shell vs. Modules



- Launch in command line
- Type each line separately
- Python executes as you type



- **Write in a code editor**
  - We use Atom Editor
  - But anything will work
- Load module with import

Using a Module

Module Contents

```
""" A simple module.

This file shows how modules work
"""

# This is a comment
x = 1+2
x = 3*x
x
```

Docstring (note the Triple Quotes) Acts as a multiple-line comment Useful for *code documentation*

Single line comment (not executed)

Commands Executed on import

Not a command. import **ignores this**

Using a Module

Module Contents

```
""" A simple module.

This file shows how modules work
"""

# This is a comment
x = 1+2
x = 3*x
x
```

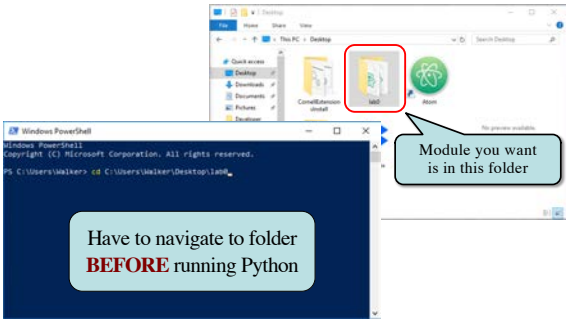
"**Module data**" must be prefixed by module name

Prints **docstring** and module contents

Python Shell

```
>>> import module
>>> x
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'x' is not defined
>>> module.x
9
>>> help(module)
```

Modules Must be in Working Directory!



Modules vs. Scripts

Module

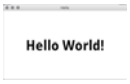
- Provides functions, variables
  - **Example**: temp.py
- import it into Python shell

```
>>> import temp
>>> temp.to_fahrenheit(100)
212.0
>>>
```

Script

- Behaves like an application
  - **Example**: helloApp.py
- Run it from command line:

```
python helloApp.y
```



Files look the same. Difference is how you use them.

Scripts and Print Statements

module.py

```
""" A simple module.

This file shows how modules work
"""

# This is a comment
x = 1+2
x = 3*x
x
```

Only difference

script.py

```
""" A simple script.

This file shows why we use print
"""

# This is a comment
x = 1+2
x = 3*x
print(x)
```

User Input

```
>>> input('Type something')
Type somethingabc
'abc'
>>> input('Type something: ')
Type something: abc
'abc'
>>> x = input('Type something: ')
Type something: abc
>>> x
'abc'
```

No space after the prompt.

Proper space after prompt.

Assign result to variable.

Numeric Input

- input returns a string
  - Even if looks like int
  - It cannot know better
- You must convert values
  - int(), float(), bool(), etc.
  - Error if cannot convert
- One way to program
  - But it is a *bad* way
  - Cannot be automated

```
>>> x = input('Number: ')
Number: 3
>>> x
'3'
>>> x + 1
TypeError: must be str, not int
>>> x = int(x)
>>> x+1
4
```

Value is a string.

Must convert to int.