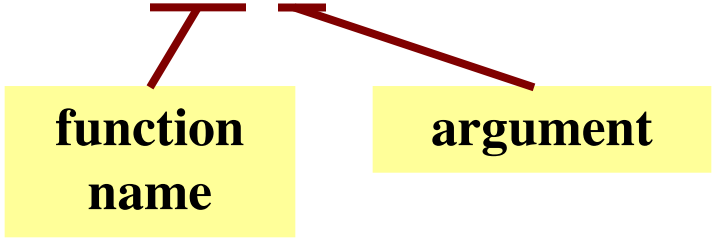
Mini-Lecture 4

Functions

Function Calls

- Python supports expressions with math-like functions
  - A function in an expression is a **function call**
  - Will explain the meaning of this later
- Function expressions have the form **fun**(x,y,…)



- **Examples** (math functions that work in Python):
  - `round(2.34)`
  - `max(a+3,24)`

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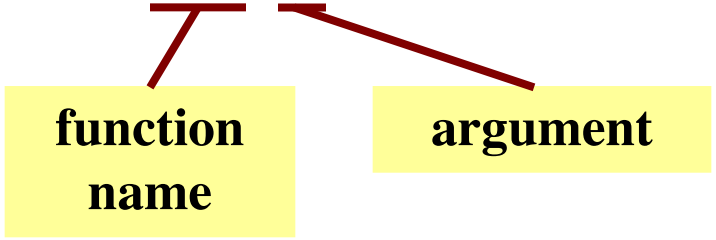

- **Examples** (math functions that work in Python):
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Arguments can be any **expression**

Built-In Functions

- You have seen many functions already
  - Type casting functions: `int()`, `float()`, `bool()`
  - Dynamically type an expression: `type()`
  - Help function: `help()`
  - Quit function: `quit()`

Arguments go in (), but name() refers to function in general

- One of the most important function is `print()`
  - `print(exp)` displays value of `exp` on screen
  - Will see later why this is important

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
```

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Functions require math prefix!

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Module has variables too!

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To access math functions

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Other Modules

- io
  - Read/write from files
- random
  - Generate random numbers
  - Can pick any distribution
- string
  - Useful string functions
- sys
  - Information about your OS

Using the from Keyword

```
>>> import math
>>> math.pi
3.141592653589793
>>> from math import pi
>>> pi
3.141592653589793
>>> from math import *
>>> cos(pi)
-1.0
```

Must prefix with module name

No prefix needed for variable pi

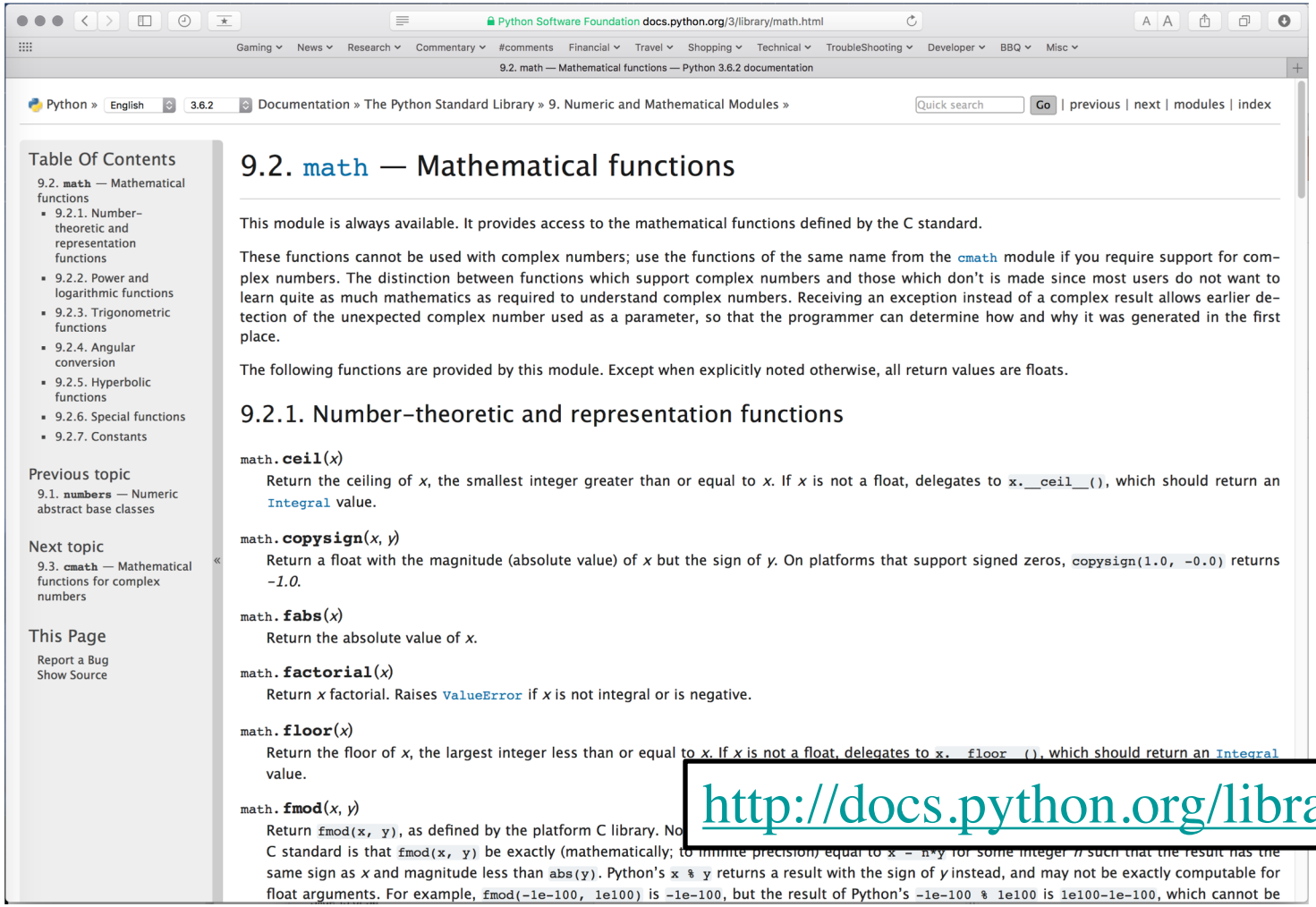
No prefix needed for anything in math

- Be careful using from!
- Using import is *safer*
  - Modules might conflict (functions w/ same name)
  - What if import both?
- **Example**: cos
  - 2 modules: math, numpy
  - Both have func. cos()
  - Each has tradeoffs

Other Variations

```
>>> import math as m
>>> m.cos(0)
1.0
>>> from math import cos
>>> cos(0)
1.0
>>> sin(0)
ERROR
```

Reading the Python Documentation



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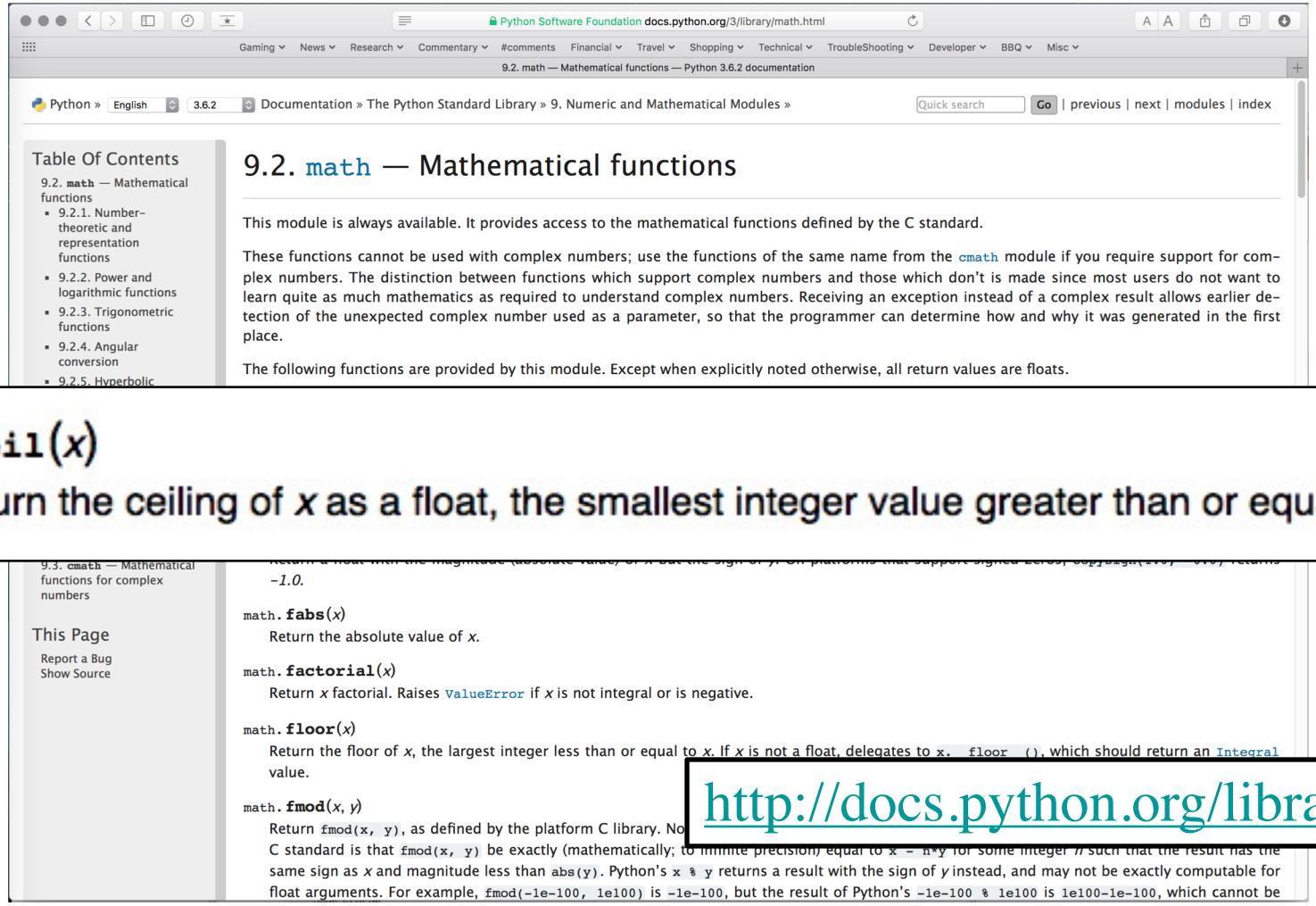

http://docs.python.org/library

Reading the Python Documentation