Lec 3: Strings, files, functions

Orange text on the presentation slides indicate significant updates to something on the note-taking handout.

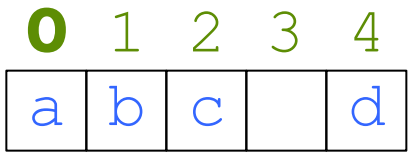
(The handouts go to press significantly before we finalize lecture content.)

Have your iClicker at the ready.

Slides by D. Gries, L. Lee, S. Marschner, W. White

Operations for Getting Data from Strings: Indexing and slicing

- s = 'abc d' (note the space)



- Access portions with [].
  - s[0] is 'a'
  - s[4] is 'd'
  - s[5] causes IndexError: string index out of range
  - String slicing: give start index, "don't include" start index

    s[0:2] is 'ab' (excludes c). Everyone forgets this at least once.

    s[2:] is 'c d'.

    s[:2] is 'ab'.

Finger Exercise

- greet = 'Hello all'

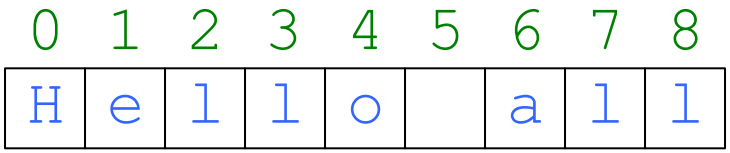
0	1	2	3	4	5	6	7	8
H	e	l	l	o		a	l	l

- What is greet[3:6]?

A: 'lo a'
B: 'lo '
C: 'lo'

Finger Exercises

- greet = 'Hello all'



- What is greet[3:6]?

A: 'lo a'
B: 'lo ' **CORRECT**
C: 'lo'

Other Ways to Get Data from Strings

- s_1 **in** s_2
  - Tests if s_1 "a part of" s
- len(s)
  - Value is # of chars in s
- s_1.index(s_2)
  - Position of the 1st instance of s_2 in s_1
- s_1.count(s_2)
  - Number of times s_2 appears inside s_1
- s.strip()
  - A copy of s with white-space removed at ends
  - s_1.strip(s_2) removes the characters in s_2 from ends of s_1, if there are any.

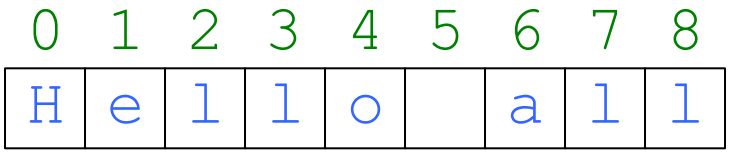
```
s = 'abracadabra'
```

A '#' marks a *comment* for the reader *(including the code's author)*. Python ignores the rest of the line.

```
# the following all evaluate to True
'a' in s
'cad' in s
not('foo' in s)
len(s) == 11
s.index('a') == 0
s.index('rac') == 2
s.count('a') == 5
'  cs1110  '.strip() == 'cs1110'
s.strip('a') == 'bracadabr'
```

Finger Exercise

- greet = 'Hello all'



- What is greet.index('l')?

- How about this?

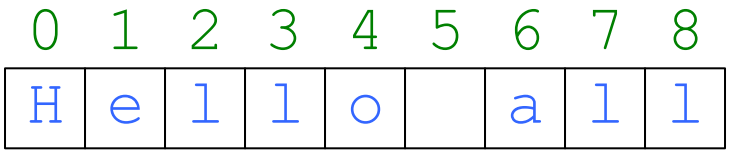
  greet.index(greet[7:])

A: error
B: 7
C: True
D: 2

(blank to prevent fast-forward)

Finger Exercise

- greet = 'Hello all'



- What is greet.index('l')?

- How about this?

  greet.index(greet[7:])

A: error
B: 7
C: True
D: 2 **CORRECT**

A String Puzzle (Extraction Practice)

Given: variable data contains a string with at least two ','s.

Ex: `data="LL,'14, 1-800-OPYTHON,1-555-TYPHOON"`

Goal: give an expression for the part of the string after the **2nd** ','. *(How can we use the index operation?)*

```
# (1) Store in variable j the index of the first comma.

# (2) Store in variable tail the part of data starting after j

# (3) Give an expression for the part of tail starting after ','
```

(blank to prevent fast-forward)

String Puzzle Solution

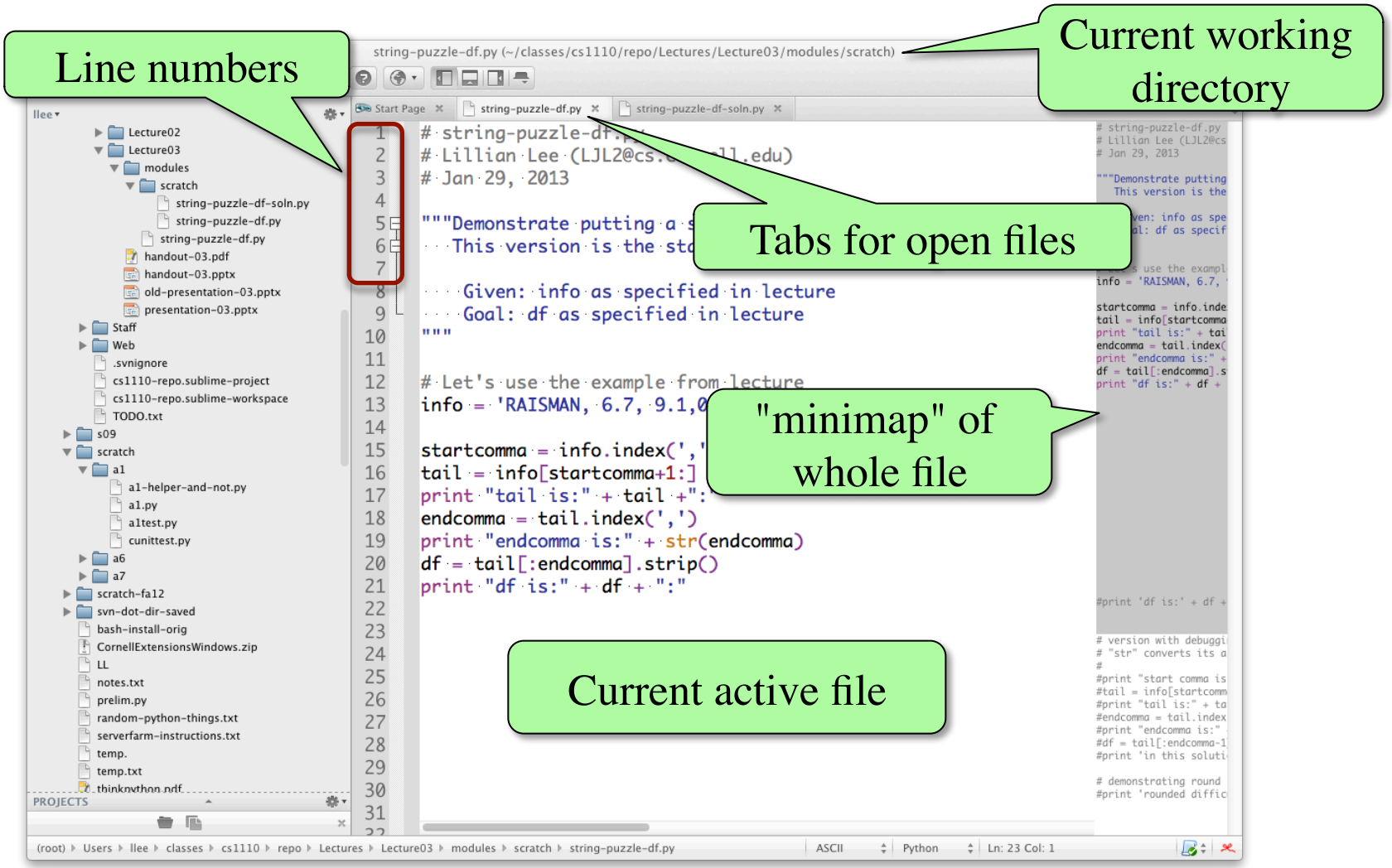
Given: variable data contains a string with at least two ','s.

Ex: `data="LL,'14, 1-800-OPYTHON,1-555-TYPHOON"`

Goal: give an expression for the part of the string after the **2nd** ','. *(How can we use the index operation?)*

```
# (1) Store in variable j the index of the first comma.
        j = data.index(',')
# (2) Store in variable tail the part of data starting after j
        tail = data[j+1:]
# (3) Give an expression for the part of tail starting after ','
        tail[tail.index(',')+1:]
```

Install Komodo Edit on your laptops!



Req'd Format for CS1110 Python Files

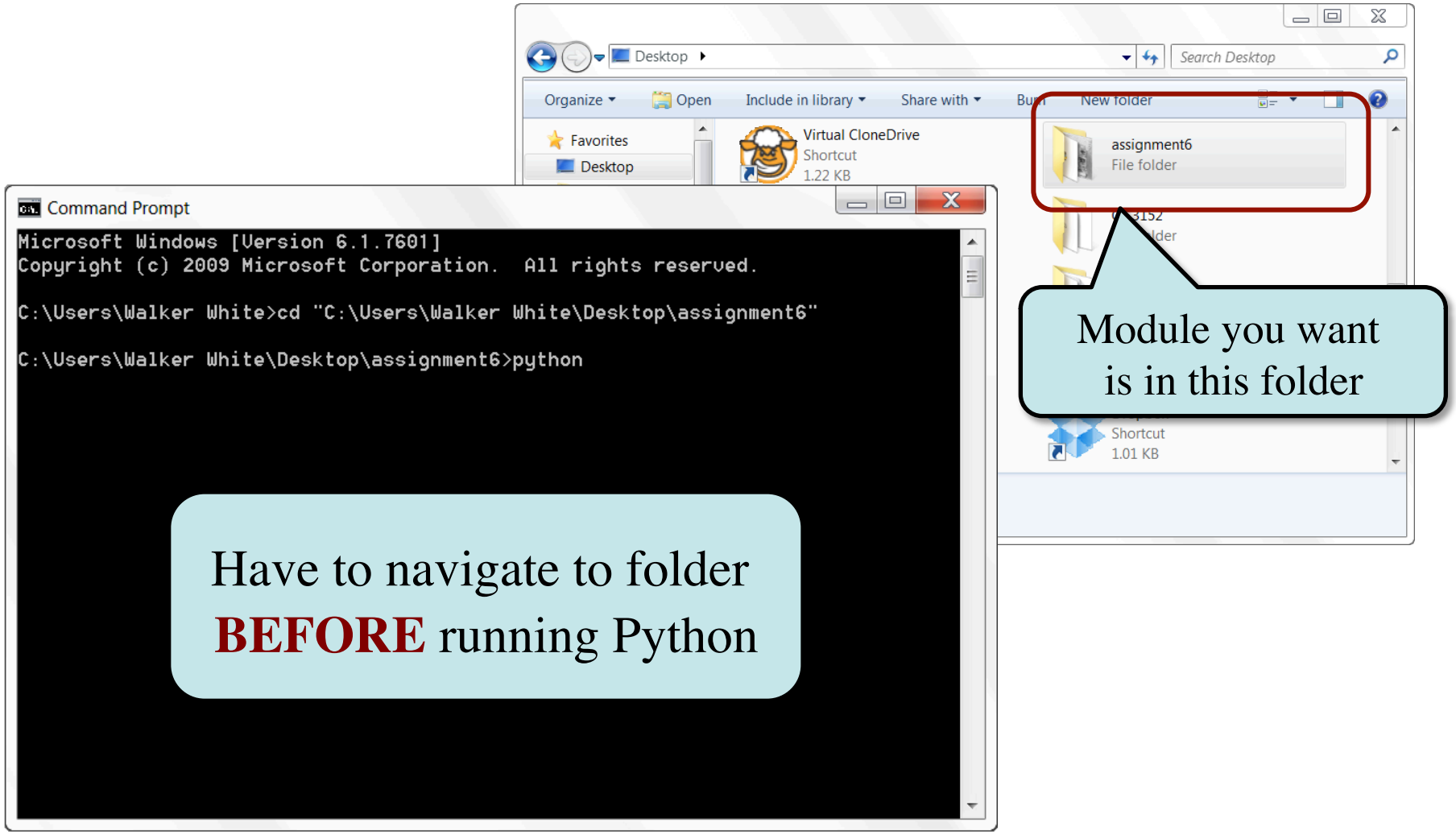
```
# string_puzzle_df.py
# Lillian Lee (LJL2) and Steve Marschner (SRM2)
# Thu Jan 30, 2014

""" Demonstrates putting a sequen
    of commands into a ...."""

x = 1+2
x = 3*x
print x
```

Header:
file name, authoring info

Docstring: *note the triple quotes*.
Multi-line comment explaining the purpose & function of the file.

Note: Unlike with the command prompt, evaluating an expression produces nothing when a Python file is run. Writing just `x` wouldn't do anything.

Start Python in Your Script's Directory!



Running Python Commands from a File

- At the terminal prompt (*not* >>>):

```
python string_puzzle_soln.py
```

Given: info contains a comma-separated string with last name, difficulty, execution, and penalty.

- *Example:* info = 'RAISMAN, 6.7, 9.1,0'

Goal: store the difficulty as a string, with no extra spaces or punctuation, in variable df

Where, in the following sequence of commands, does the first (conceptual) error occur?

A: `startcomma = info.index(',')`
B: `tail = info[startcomma+1:] # extra space OK`
C: `endcomma = tail.index(',')`
D: `df = tail[:endcomma-1].strip()`
E: this sequence achieves the goal

Using a Function From Another File (such files are called *modules*)

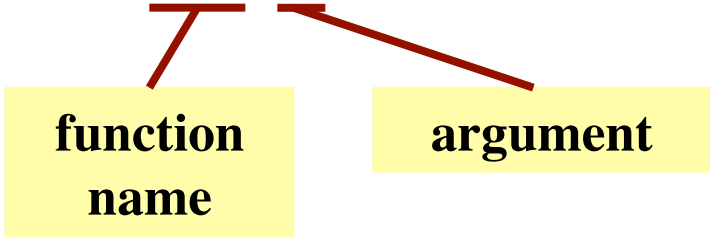
Example: what if we want 'Raisman', not 'RAISMAN'?

Lucky us: someone has written a module (file) `string` that contains a function `capwords`.

```
import string                          # Tell Python to access this module
name = info[:info.find(',')]           # name is 'RAISMAN'
print string.capwords(name)            # output is 'Raisman'
```

Function Calls

- Python supports expressions with math-like functions
- Function expressions have the form **fun**(x,y,…)



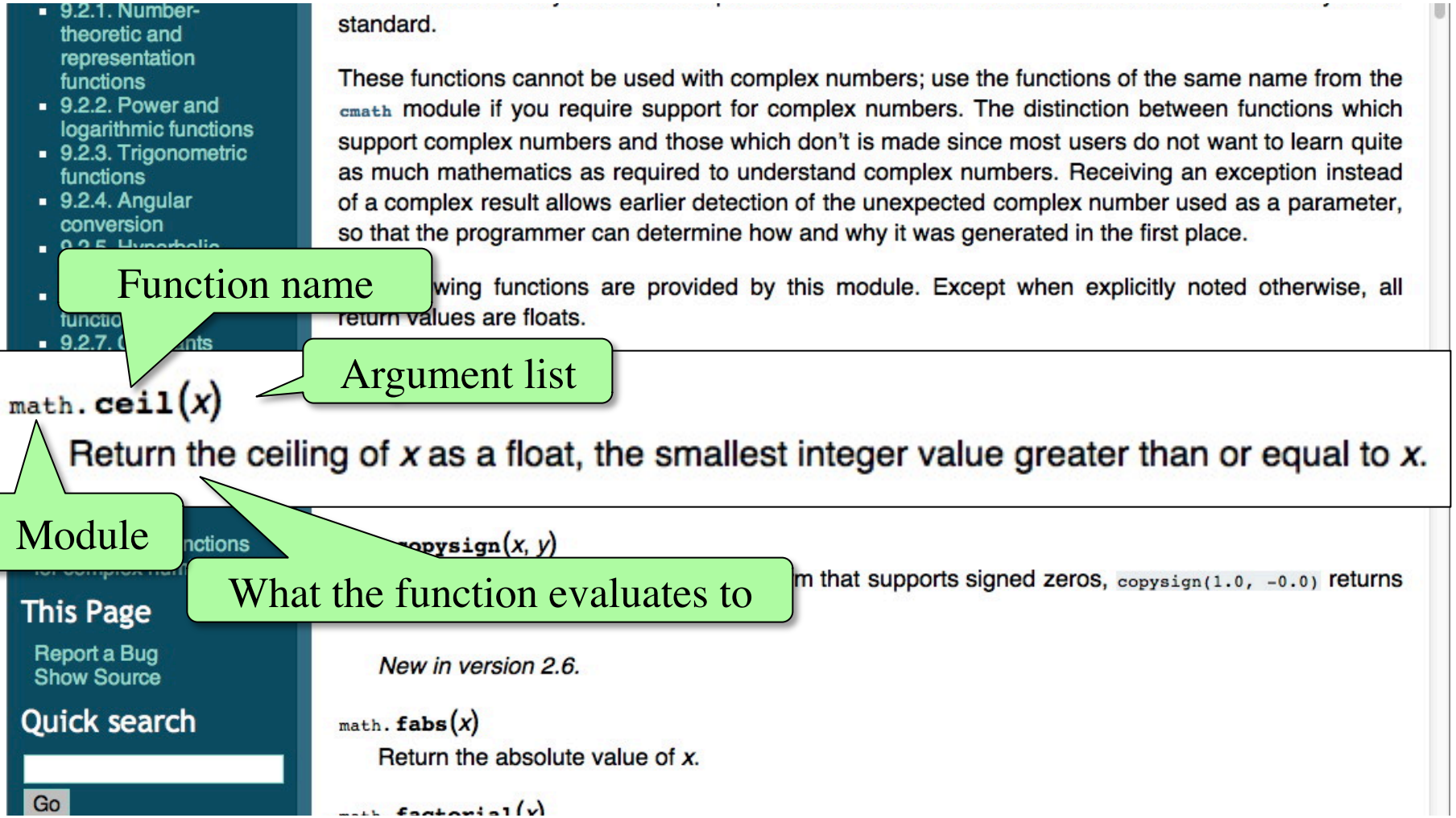
- Examples of *built-in* functions:
  - Numerical functions: `round(`*number*`)`, `pow(`*base*, *exp*`)`
  - Getting user input: `raw_input()`
  - Help function: `help()`

Python Comes with Many Modules

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

- Complete list:
- http://docs.python.org/library
- **Library**: built-in modules
  - May change each release
  - Why version #s are an issue

Reading the Python Documentation



Print Statements: Useful Inspection Tool (in Python Files)

print <expression> evaluates <expression>, converts it to a string, and displays it.

```
data = 2
print data
```

```
2
```

```
data = 'this has two trailing spaces  '
print data
```

```
this has two trailing spaces
```

```
print 'data is:' + str(data) + ':'
```

```
data is:this has two trailing spaces  :
```