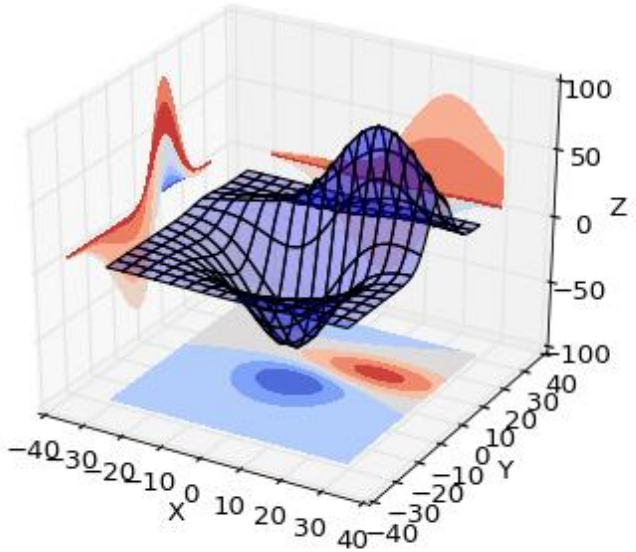
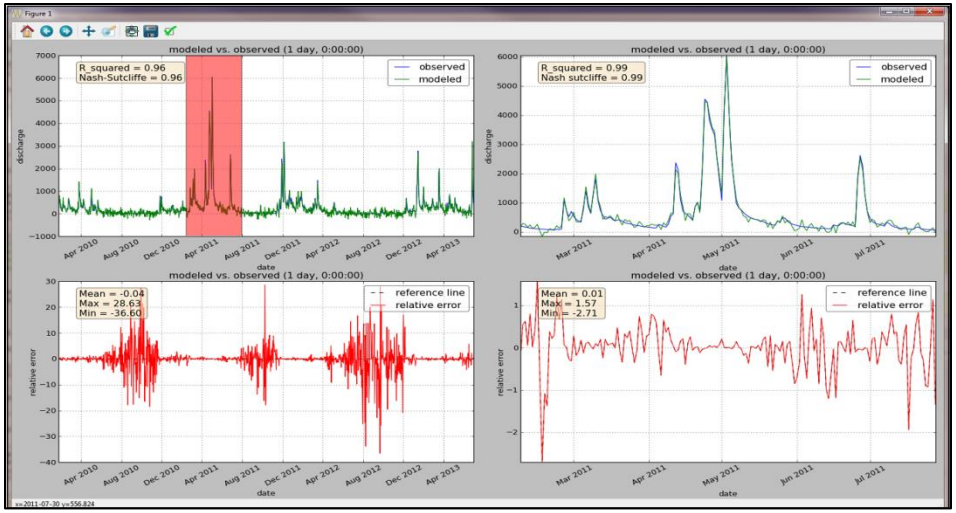
Introduction to Scientific Computing
Meeting 29
Programming with Python






```
# Write Fibonacci series up to n
>>> def fib(n):
>>>     a, b = 0, 1
>>>     while a < n:
>>>         print(a, end=' ')
>>>         a, b = b, a+b
>>>     print()
>>> fib(1000)
0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610
```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Last Meeting

- Completed a python script that reads a sample data file using sys.argv and displays simple statistics to the screen.
- Showed how to use the unix redirect (>) to take the output from the screen and to output that to a file.

Today’s Objective

- See meeting notes.

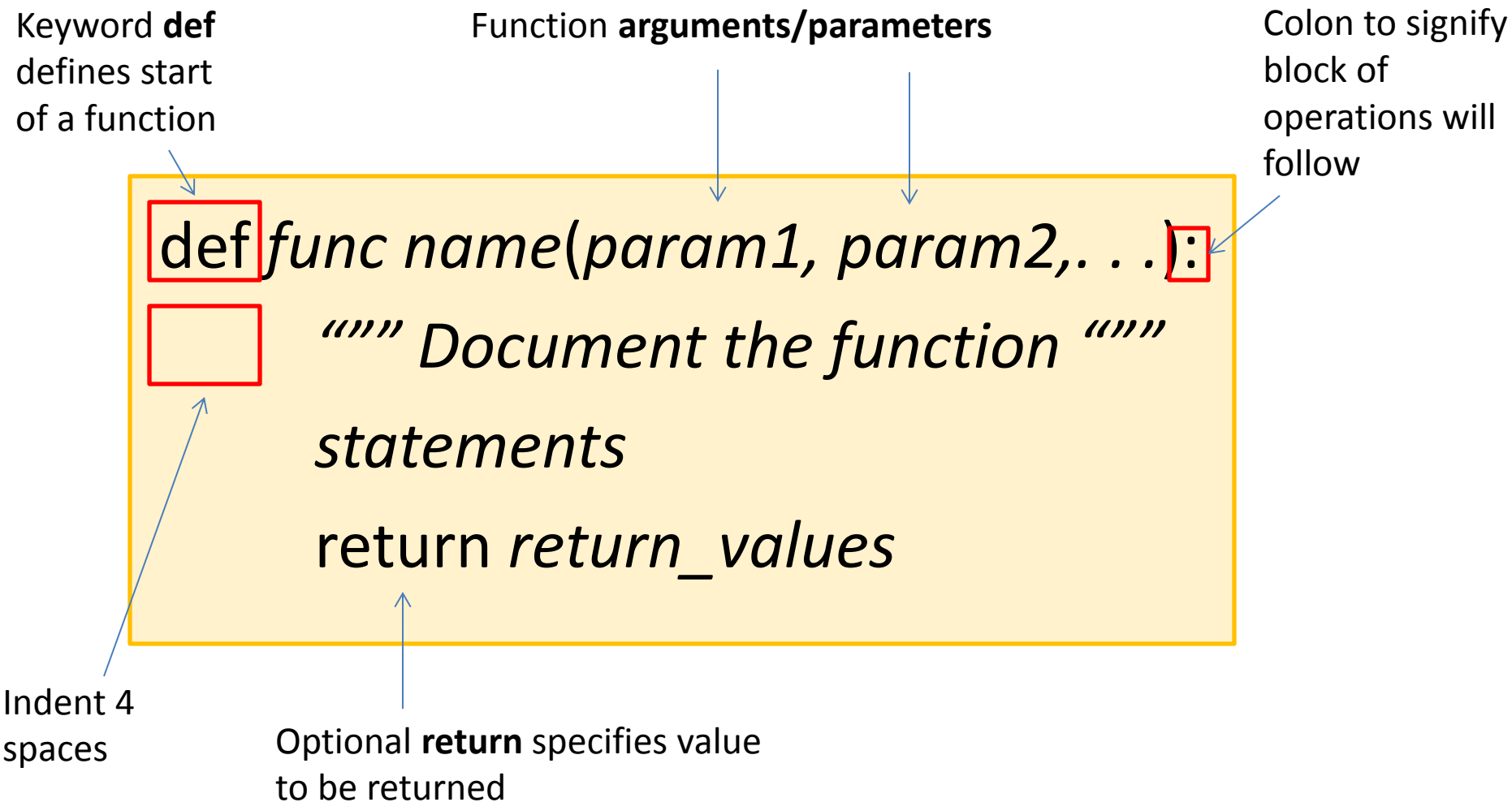
Let’s continue coding!

date	discharge (cfs)	stage (ft)	temperature (celsius)
01/05/2014	100	12.2	5
02/08/2014	110	12.8	3
03/07/2014	105	12.5	10
04/01/2014	98	11.9	20
05/04/2014	92	11.5	25
06/01/2014	104	12.3	28
07/02/2014	97	11.8	32
08/03/2014	95	11.7	33
09/04/2014	96	11.7	27
10/05/2014	101	12.0	20
11/02/2014	112	13.2	15
12/03/2014	109	12.8	7

```
$ python read_measurements.py 2014_measurements_bob.txt
2014_measurements_bob.txt

  discharge (cfs):
     Average: 101.583
     Maximum: 112.0 occurred on 11/02/2014
     Minimum: 92.0 occurred on 05/04/2014

  stage (ft):
     Average: 12.200
     Maximum: 13.2 occurred on 11/02/2014
     Minimum: 11.5 occurred on 05/04/2014

  temperature (celsius):
     Average: 18.750
     Maximum: 33.0 occurred on 08/03/2014
     Minimum: 3.0 occurred on 02/08/2014
```

Quick Demo – Functions

- Functions are used to help to modularize your code.



Some commaon built-in Python Functions

```
>>> abs(-5)
>>> max([1, 2, 3])
>>> min([1, 2, 3])
>>> print("Hello")
```

`abs(a)`	Absolute value of `a`
`max(`*sequence*`)`	Largest element of *sequence*
`min(`*sequence*`)`	Smallest element of *sequence*
`round(a,n)`	Round `a` to `n` decimal places
`cmp(a,b)`	Returns $\begin{cases} -1 \text{ if } a < b \\ 0 \text{ if } a = b \\ 1 \text{ if } a > b \end{cases}$

Video – Python

- Software Carpentry, Greg Wilson
  - Python: Functions
    - http://software-carpentry.org/v4/python/func.html

Practice

- Let’s write some functions!