

## Relevant Reading and assignment

- Through ch. 5 in Byte of Python (pg. 1-34)
- Ch. 1, Langtangen,2009
- install python, ipython, text editor, numpy and matplotlib.
- e-mail pdf with project description two weeks from today

## What is Python? What can I do with it?

- interpreted
- high level
- numerous built-in and external libraries or modules
- allows a variety of programming styles
- extensible
- interactive use, calculate directly
- create scripts/programs

## Getting python and add-on modules

- download and install individual components ([www.python.org](http://www.python.org))
  - package managers?
  - manual installation
  - easy-install (setuptools)
  - monolithic distributions (enthought, pythonxy)
- Important add-on libraries
  - numpy (array processing)([numpy.scipy.org](http://numpy.scipy.org))
  - scipy (scientific algorithms)([numpy.scipy.org](http://numpy.scipy.org))
  - matplotlib (plotting)([matplotlib.sourceforge.net](http://matplotlib.sourceforge.net))
  - lots of others (sympy, simpy, fipy, sfepy, shapely)
- other useful items
  - text editor
  - ipython

## Interactive Calculations

- python and ipython shell
- basic math ops (+ - \* / \*\* %)
- basic boolean ops (== != < > not and or in is)
- logging ipython session %logon, %logoff, %logstart, %logstop
- use interactive shell to test methods
- types of numbers: float, integer, long (integers), Boolean (integers) complex

## Accessing more complex math functions

- import keyword
- opens up library, access to new functions and/or methods
- import math
  - `math.cos(2*math.pi)`
  - `cos` and `pi` are math methods
- import math as mt
  - `mt.sin(180.)`
- from math import sin,cos,tan,pi
  - `tan(pi/2.)`
- from math import \*
- namespace
- using ipython to see what's available in math module

## strings

- single and double quote
- numbers in quotes are not numbers
- triple quotes, multi-line string
- string is immutable
- string is a sequence
  - selecting and slicing characters, strides
- escape sequences
  - `\t`, `\n`, `\r\n`

## variables

- variables store data or information
- assigned with '='
- first character must be letter or underscore, use sensible names
- store data in variable
- define equation in terms of other variables
- can create 'circular expression', use old to define new (eg. `i=i+2`)

## basic data structures, sequences

- strings,"
- lists,[]
  - mutable sequence
- tuples,()
  - immutable sequence
- dictionaries,
  - hash or look-up table
- methods associated with objects

## Copying Objects

- be careful and verify assumed behavior
- if objects are linked, have same id
  - new object or 'container' with the same content
  - changing one may change the others unexpectedly
  - need to define 'new' container
    - \* use slicing to make copy
    - \* dictionary copy method
    - \* use 'copy' library, `copy.copy` and `copy.deepcopy`

Notes from Andrew Reeve, U. Maine