

# Introduction to IPython Notebook

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Unidata Python Workshop

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# Overview

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- Examples of basic IPython Notebook Usage.

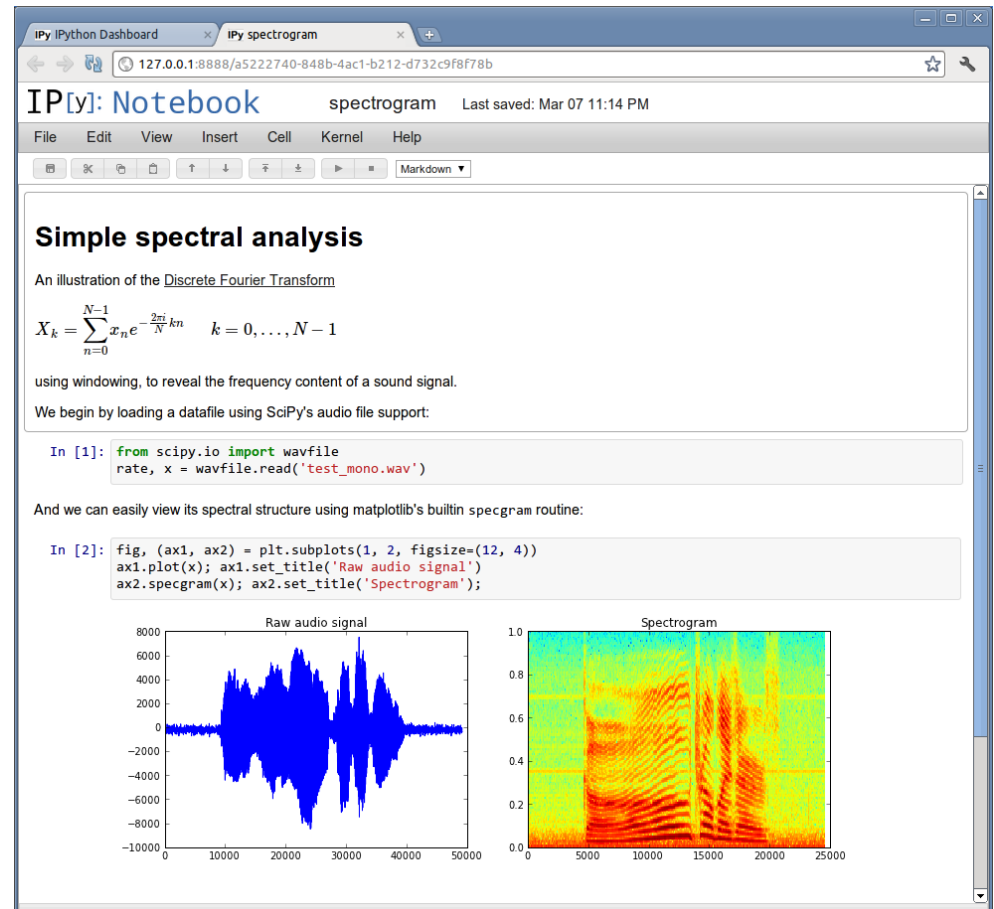
# Overview

- Brief overview of IPython Notebook
  - What is it?
  - How do you use it?
- Examples of basic IPython Notebook Usage.
- Discuss some Advanced IPython Notebook Uses.

# What is IPython Notebook?

*“The IPython Notebook is a web-based interactive computational environment where you can combine code execution, text, mathematics, plots and rich media into a single document”*

<http://ipython.org/notebook.html>



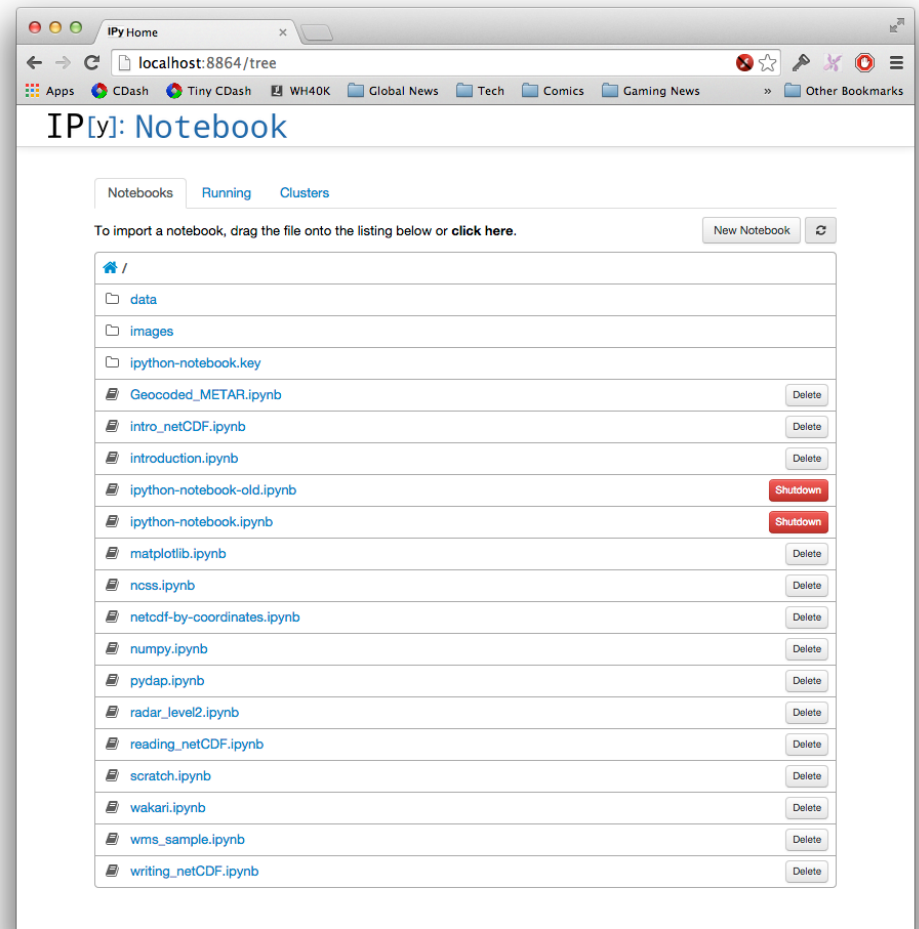
# What is IPython Notebook

- IPython Notebook is comprised of two parts:
  - The IPython Notebook server
  - Individual Notebooks (.ipynb)



# IPython Notebook Server

- The IPython Notebook Server acts as a dashboard for a collection of individual notebooks.



# IPython Notebook Server

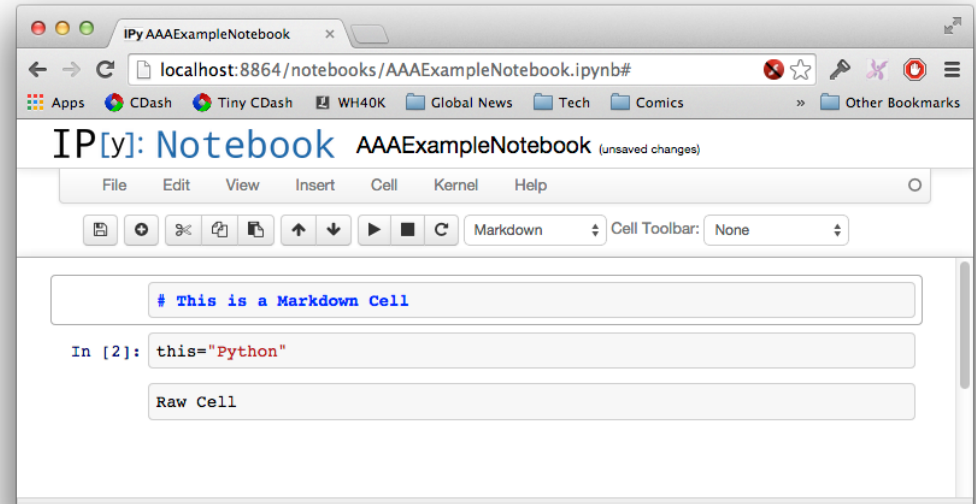
The screenshot shows the IPython Notebook Server interface in a web browser at `localhost:8864/tree`. The interface includes a file browser on the left, a central area for notebook management, and a top navigation bar. Three callouts provide detailed views of specific UI elements:

- Top Left Callout:** A circular inset showing a list of notebook files, including `intro_netCDF.ipynb`, `ipython-notebook-old.ipynb`, `ipython-notebook.ipynb`, `matplotlib.ipynb`, `ncss.ipynb`, `netcdf-by-coordinates.ipynb`, and `numpy.ipynb`.
- Top Right Callout:** A circular inset showing the "New Notebook" button and a refresh icon.
- Bottom Right Callout:** A circular inset showing the "Delete" and "Shutdown" buttons for a notebook.

The main interface displays a list of notebooks with columns for the notebook name and actions (Delete, Shutdown). The "Shutdown" buttons are highlighted in red. The "New Notebook" button is also visible in the top right of the main interface.

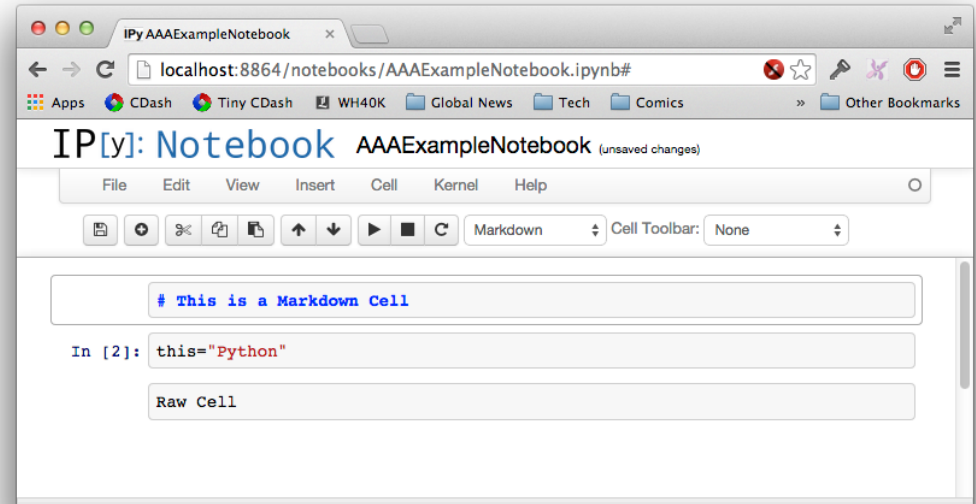
# IPython Notebooks

- An IPython Notebook is a collection of *cells*.



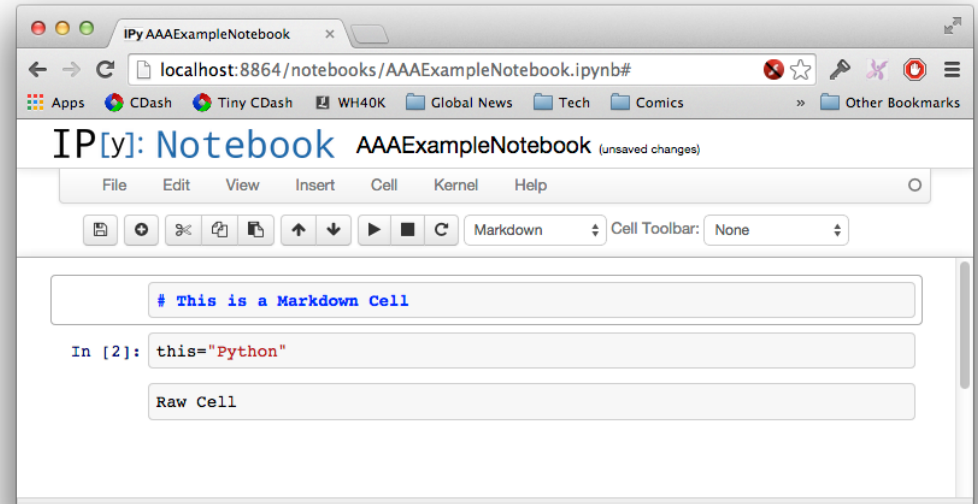
# IPython Notebooks

- An IPython Notebook is a collection of *cells*.
  - Markdown



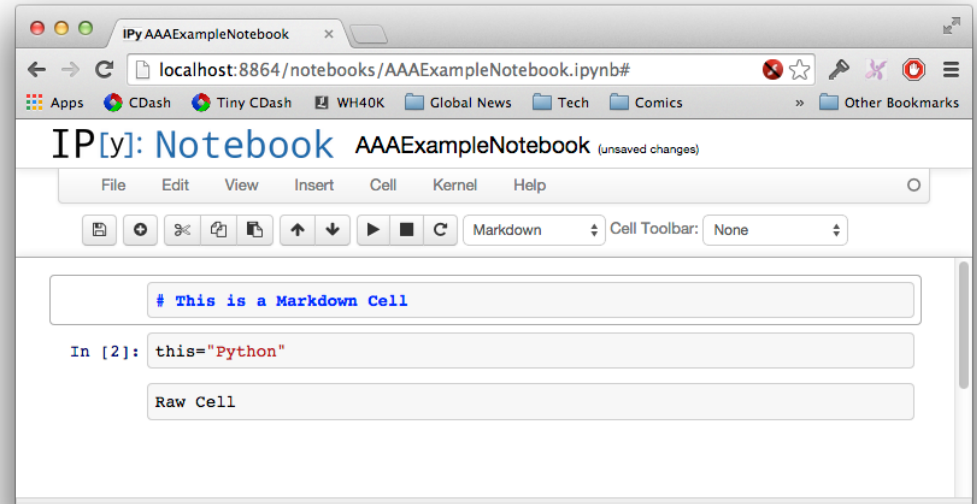
# IPython Notebooks

- An IPython Notebook is a collection of *cells*.
  - Markdown
  - Code

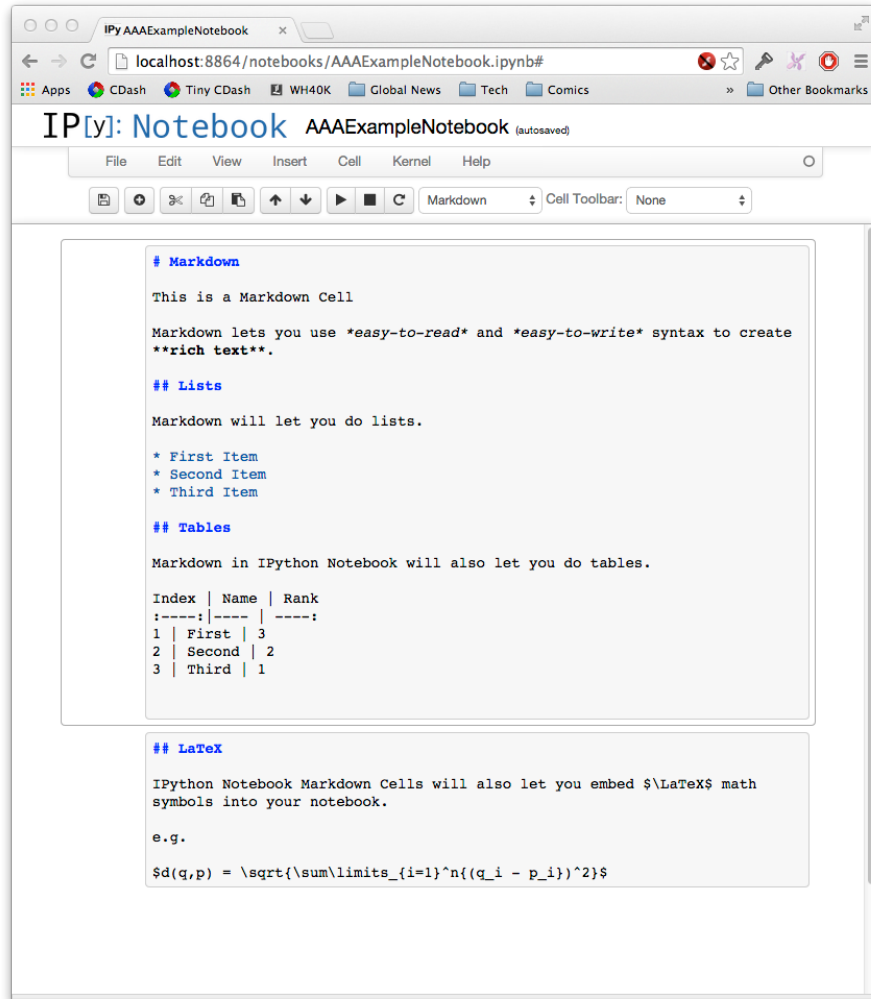


# IPython Notebooks

- An IPython Notebook is a collection of *cells*.
  - Markdown
  - Code
  - “Raw” - *Raw cells are left ‘as is’ and are not processed.*



# Markdown Cells



IPy AAAExampleNotebook

localhost:8864/notebooks/AAAExampleNotebook.ipynb#

Apps CDash Tiny CDash WH40K Global News Tech Comics » Other Bookmarks

IP[y]: Notebook AAAExampleNotebook (autosaved)

File Edit View Insert Cell Kernel Help

Markdown Cell Toolbar: None

```
# Markdown

This is a Markdown Cell

Markdown lets you use *easy-to-read* and *easy-to-write* syntax to create
**rich text**.

## Lists

Markdown will let you do lists.

* First Item
* Second Item
* Third Item

## Tables

Markdown in IPython Notebook will also let you do tables.

Index | Name | Rank
:----:|----:|----:
1 | First | 3
2 | Second | 2
3 | Third | 1

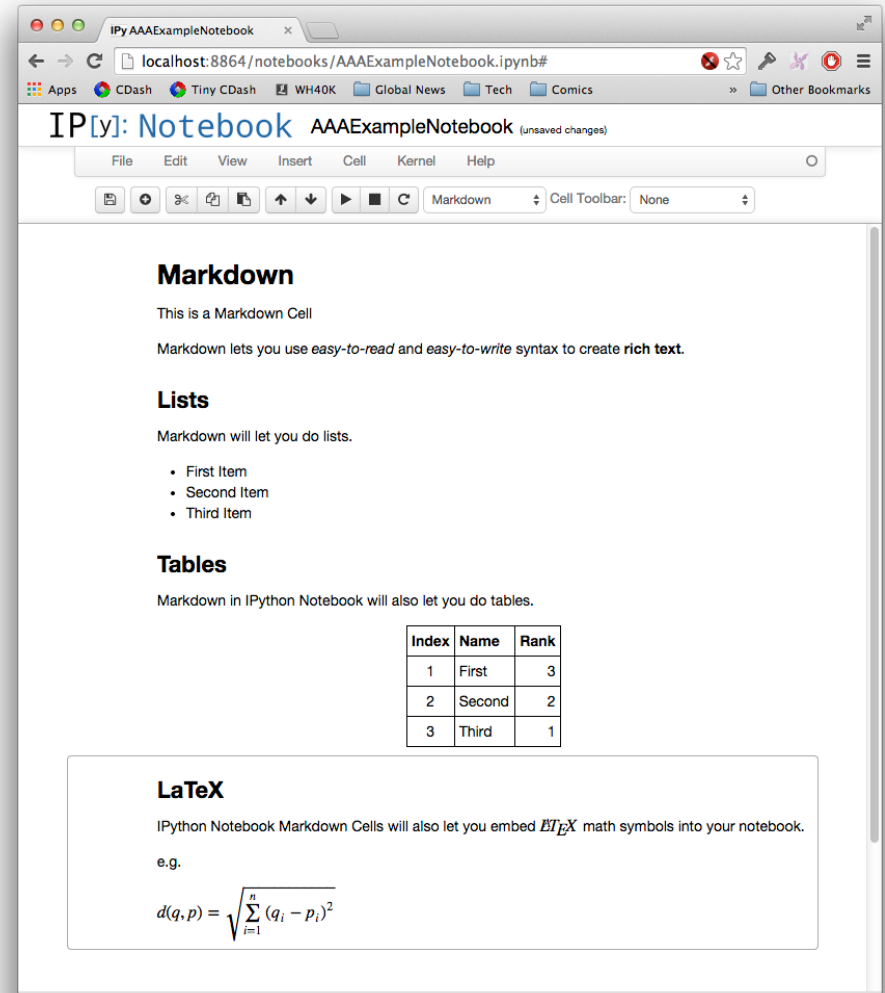
## LaTeX

IPython Notebook Markdown Cells will also let you embed  $\LaTeX$  math
symbols into your notebook.

e.g.


$$d(q,p) = \sqrt{\sum\limits_{i=1}^n (q_i - p_i)^2}$$

```



IPy AAAExampleNotebook

localhost:8864/notebooks/AAAExampleNotebook.ipynb#

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IP[y]: Notebook AAAExampleNotebook (unsaved changes)

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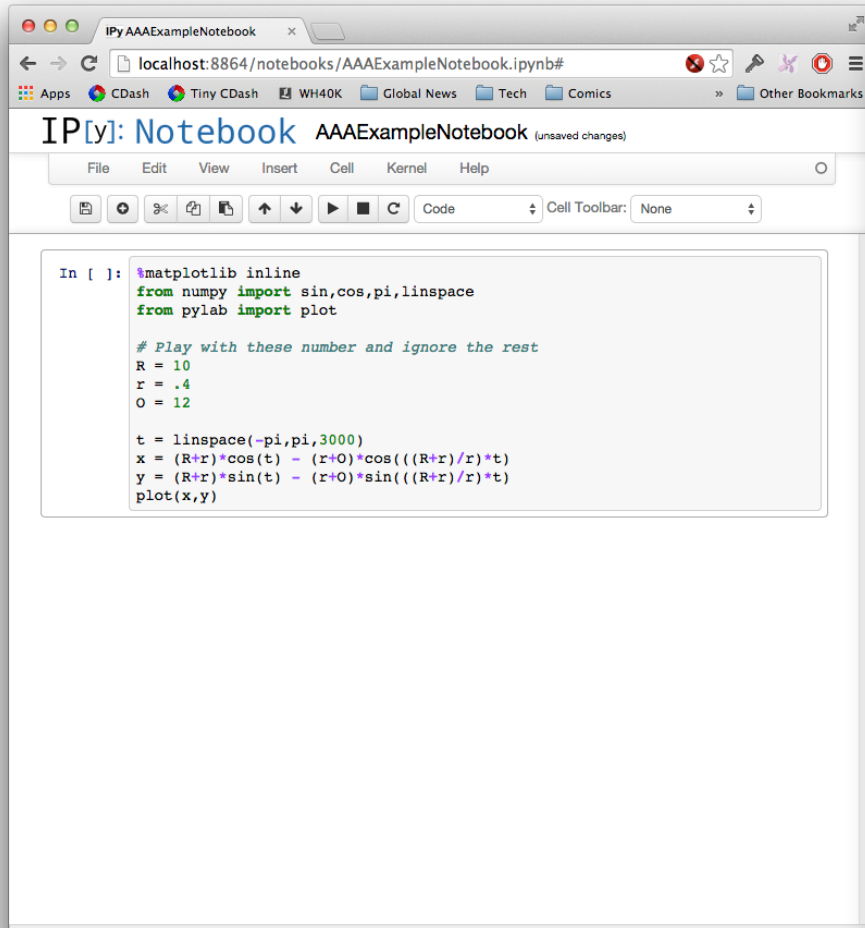
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$$d(q,p) = \sqrt{\sum_{i=1}^n (q_i - p_i)^2}$$

# Python Cells



IPy AAAExampleNotebook

localhost:8864/notebooks/AAAExampleNotebook.ipynb#

Apps CDash Tiny CDash WH40K Global News Tech Comics » Other Bookmarks

IP[y]: Notebook AAAExampleNotebook (unsaved changes)

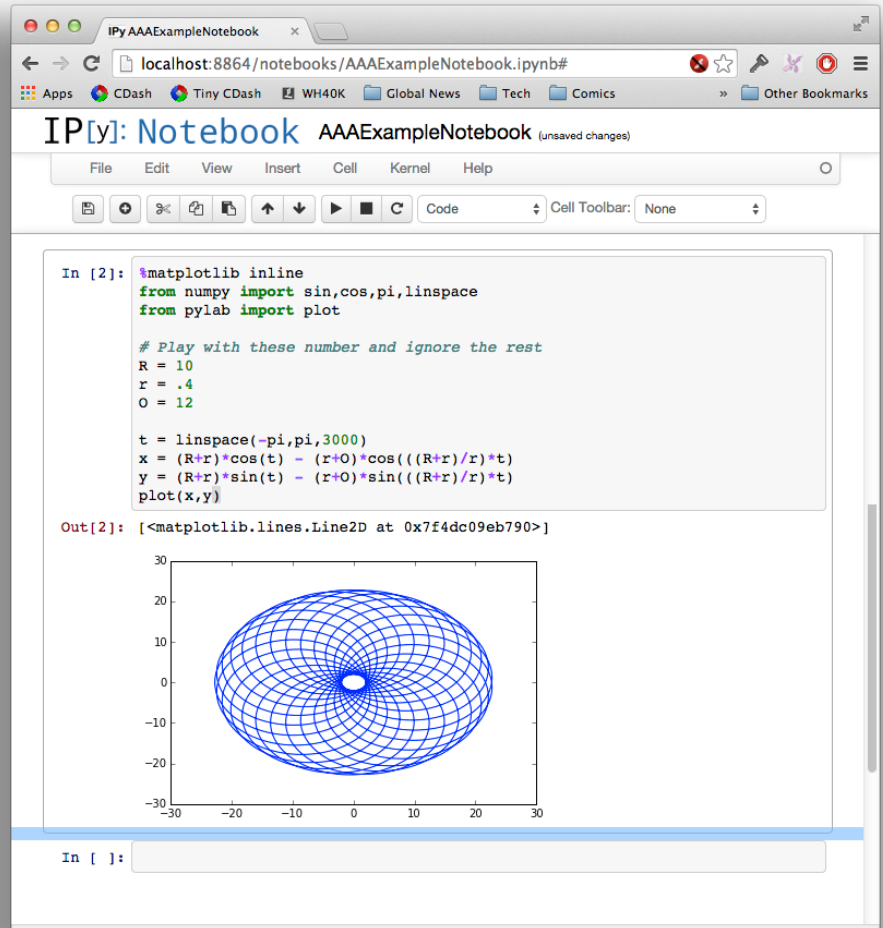
File Edit View Insert Cell Kernel Help

Code Cell Toolbar: None

```
In [ ]: %matplotlib inline
from numpy import sin,cos,pi,linspace
from pylab import plot

# Play with these number and ignore the rest
R = 10
r = .4
O = 12

t = linspace(-pi,pi,3000)
x = (R+r)*cos(t) - (r+O)*cos(((R+r)/r)*t)
y = (R+r)*sin(t) - (r+O)*sin(((R+r)/r)*t)
plot(x,y)
```



IPy AAAExampleNotebook

localhost:8864/notebooks/AAAExampleNotebook.ipynb#

Apps CDash Tiny CDash WH40K Global News Tech Comics » Other Bookmarks

IP[y]: Notebook AAAExampleNotebook (unsaved changes)

File Edit View Insert Cell Kernel Help

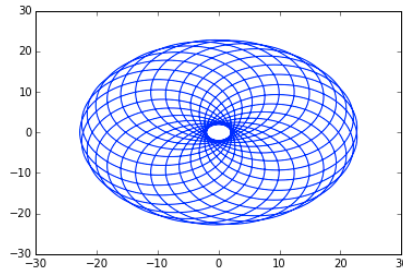
Code Cell Toolbar: None

```
In [2]: %matplotlib inline
from numpy import sin,cos,pi,linspace
from pylab import plot

# Play with these number and ignore the rest
R = 10
r = .4
O = 12

t = linspace(-pi,pi,3000)
x = (R+r)*cos(t) - (r+O)*cos(((R+r)/r)*t)
y = (R+r)*sin(t) - (r+O)*sin(((R+r)/r)*t)
plot(x,y)
```

Out[2]: [<matplotlib.lines.Line2D at 0x7f4dc09eb790>]

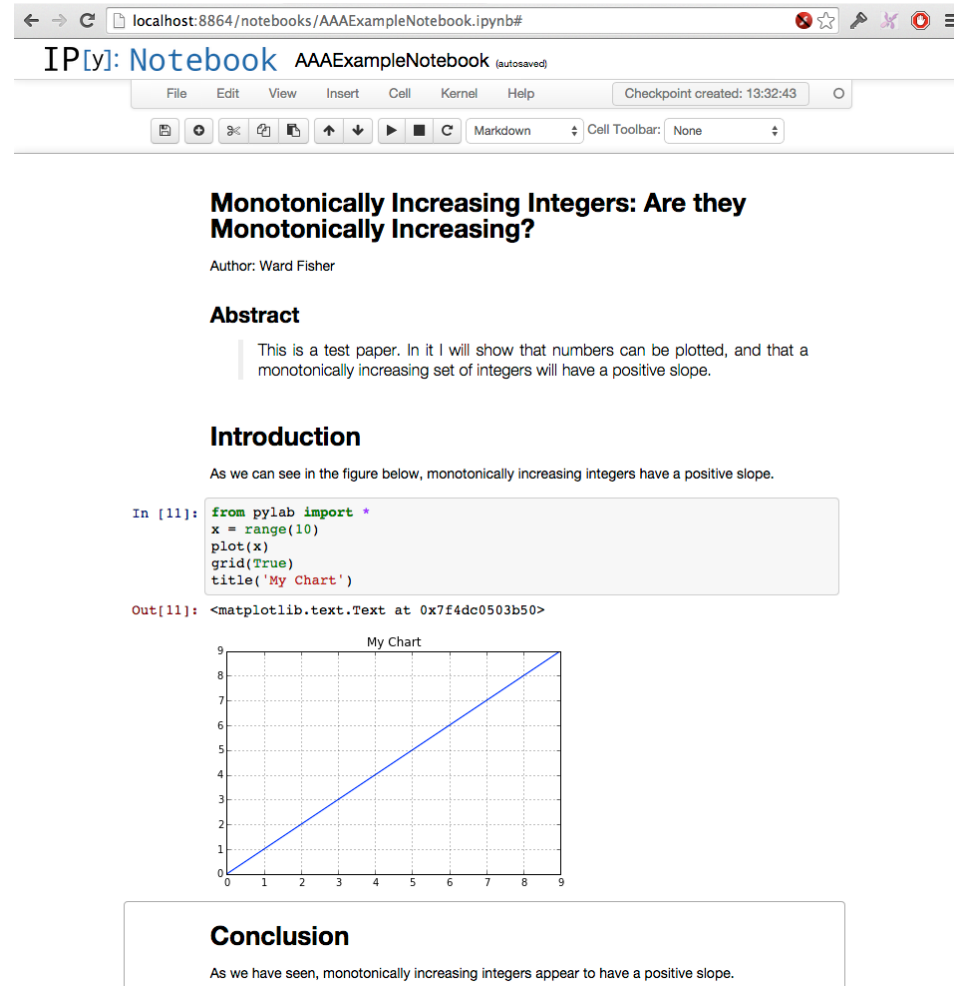


In [ ]:



# What does this get you?

- A sharable document with embedded, reproducible experimental data analysis.



localhost:8864/notebooks/AAExampleNotebook.ipynb#

IP[y]: Notebook AAExampleNotebook (autosaved)

File Edit View Insert Cell Kernel Help Checkpoint created: 13:32:43

Monotonically Increasing Integers: Are they Monotonically Increasing?

Author: Ward Fisher

**Abstract**

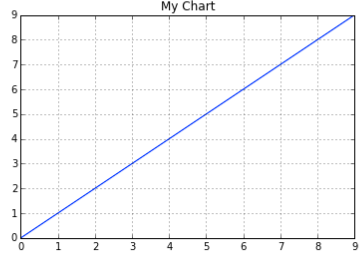
This is a test paper. In it I will show that numbers can be plotted, and that a monotonically increasing set of integers will have a positive slope.

**Introduction**

As we can see in the figure below, monotonically increasing integers have a positive slope.

```
In [11]: from pylab import *
x = range(10)
plot(x)
grid(True)
title('My Chart')
```

Out[11]: <matplotlib.text.Text at 0x7f4dc0503b50>



**Conclusion**

As we have seen, monotonically increasing integers appear to have a positive slope.

# Installing IPython Notebook

- The easiest way to install IPython notebook is with a package manager like “Conda”
  - Maintained by Continuum Analytics
  - <http://continuum.io/downloads>

# Installing IPython Notebook

- Once Anaconda is installed, you can use the 'conda' command to install ipython notebook (and other packages).

```
$ conda install ipython ipython-notebook
```

# Launching IPython Notebook

- IPython Notebook is launched via the command line.

```
$ ipython notebook
```

# Launching IPython Notebook

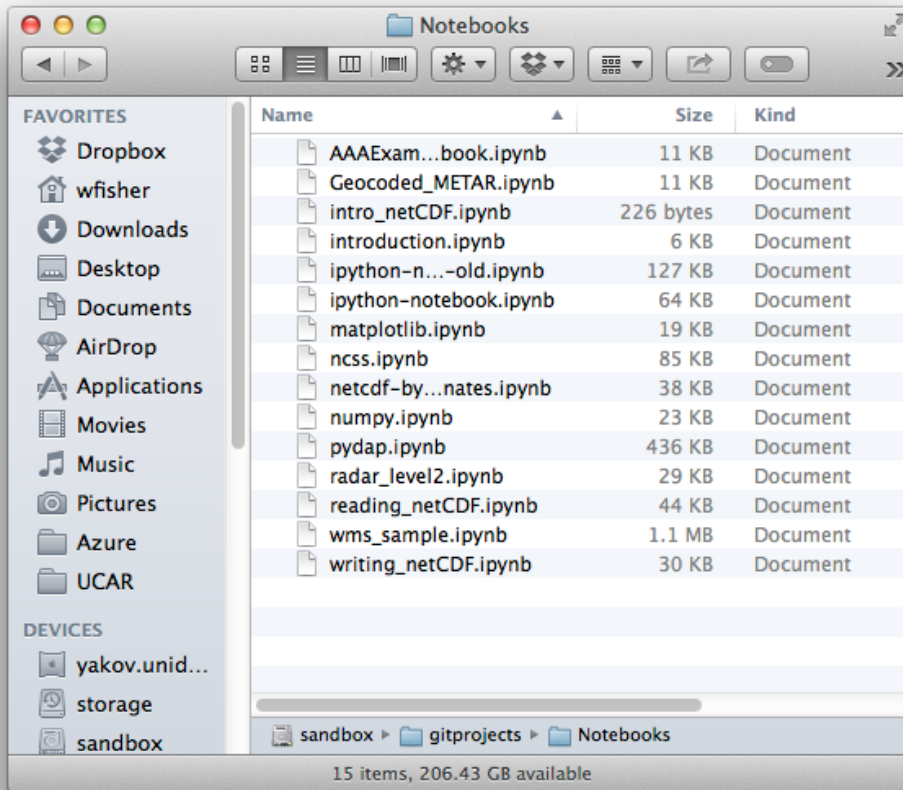
- IPython Notebook is launched via the command line.

```
$ ipython notebook [options]
```

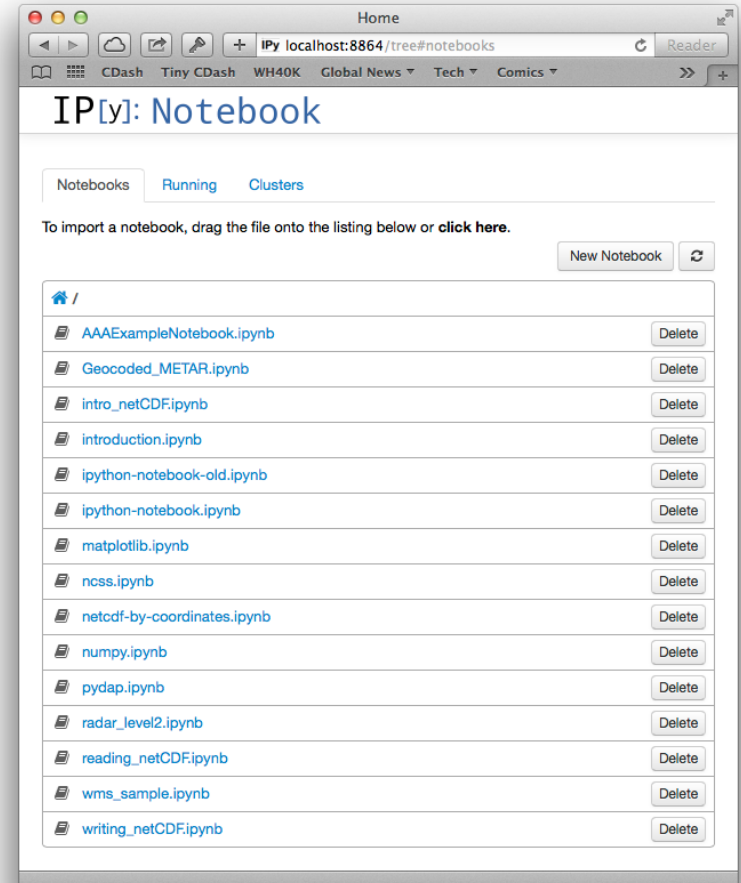
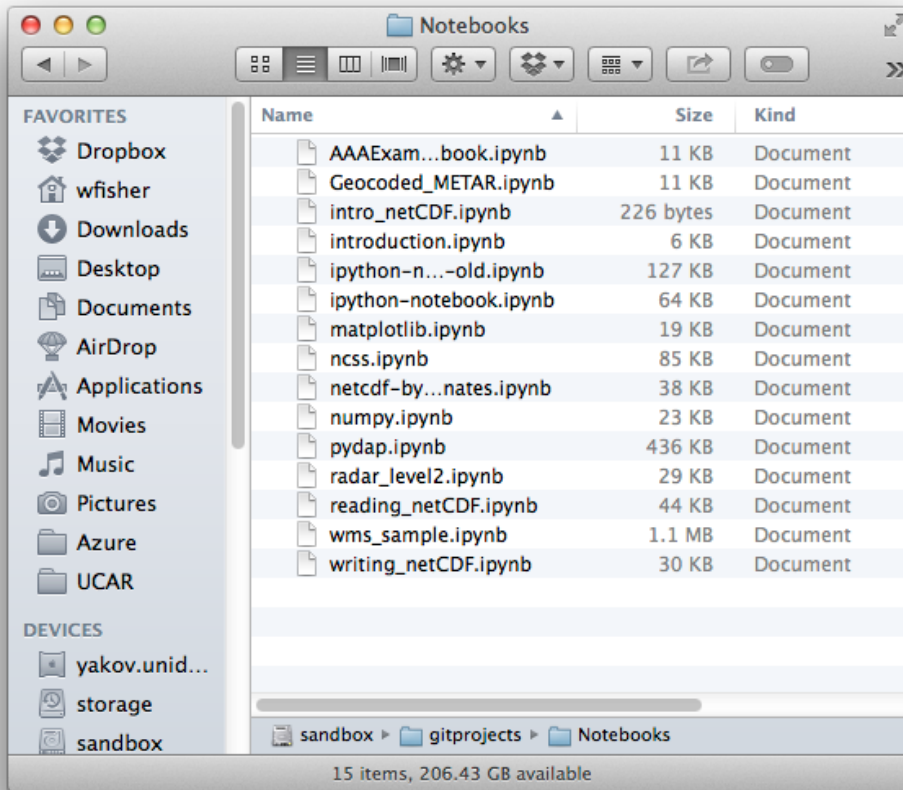
- There are a number of command line options for advanced usage.

# Running IPython Notebook Server

- Notebooks are arranged in a directory.
- You launch IPython Notebook from the root of this directory structure.



# Running IPython Notebook Server



# Working in IPython Notebook

Switching to the Browser.