Digital Audio – Lab 1: Intro to IPython Notebook

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Tools installation

Download:

http://continuum.io/downloads#py34 (http://continuum.io/downloads#py34)

Check if if you need the 32 or 64bits vesion by running:

```
uname -m
```

- `x86_64` => 64-bit kernel
- `i686` => 32-bit kernel

Install by running:

```
bash Anaconda-2.1.0-<your version>.sh
```

Python tutorial

https://docs.python.org/3.4/tutorial/introduction.html
(https://docs.python.org/3.4/tutorial/introduction.html)

The main Python interpreter can be used, but a better solution is to use the IPython interactive command shell.

Python exercise

From the Python controlflow tutorial below, copy the 4.4 example to IPython, and make it run. Explain with your own words the principle of the "for & else" statement.

https://docs.python.org/3.4/tutorial/controlflow.html
(https://docs.python.org/3.4/tutorial/controlflow.html)

4.4. break and continue Statements, and else Clauses on Loops

Numpy tutorial

http://wiki.scipy.org/Tentative_NumPy_Tutorial (http://wiki.scipy.org/Tentative_NumPy_Tutorial)

Until the *Copies and Views* section (included).

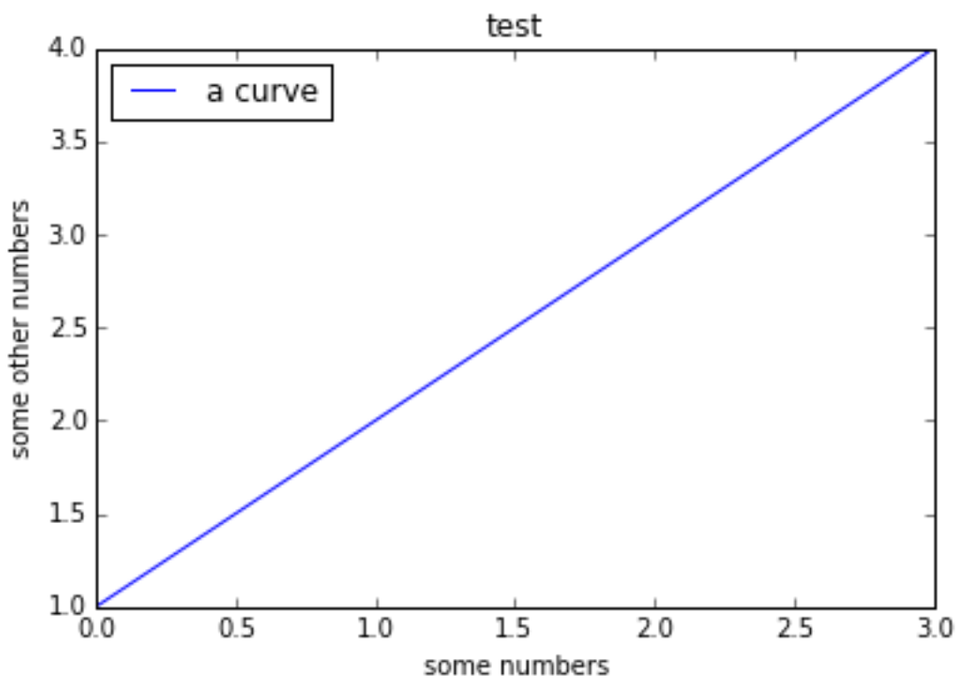
Pyplot exercise: plot a sinewave

$$y(t) = sin(2\pi f t + \phi)$$

Here is a first example of a simple plot:

In [3]:

```
%matplotlib inline
import matplotlib.pyplot as plt
plt.plot([1,2,3,4])
plt.title('test')
plt.xlabel('some numbers')
plt.ylabel('some other numbers')
plt.legend(['a curve'], loc='best')
plt.show()
```



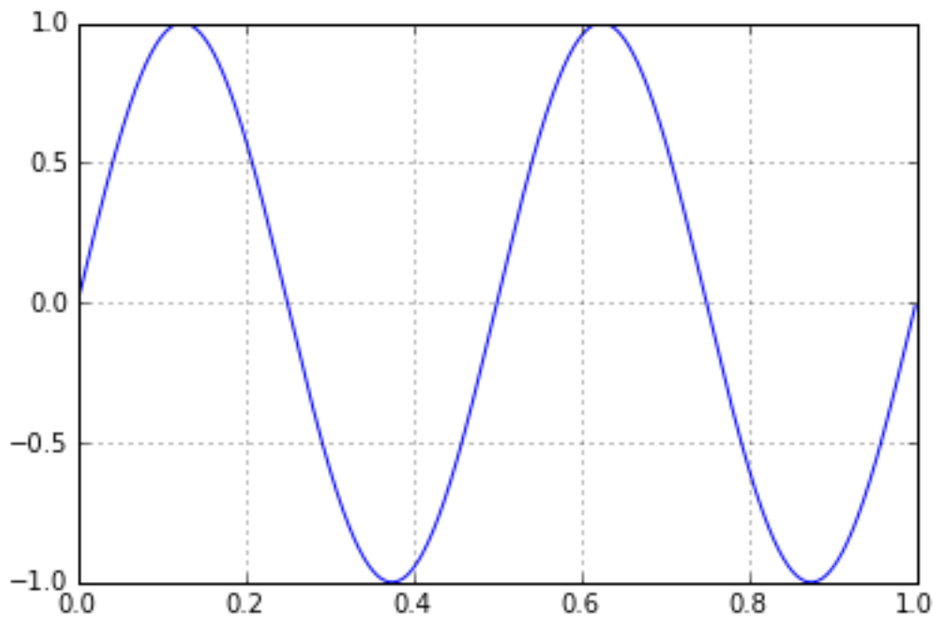
Expected result:

In [3]:

```
ax = plt.figure().add_subplot(111)
ax.grid()
ax.plot(t_arr, s_arr)
```

Out[3]:

```
[<matplotlib.lines.Line2D at 0x106aecac8>]
```



Exercise: basic synth

Create a basic synth based on simple sinewaves:

- You need to create a simple note progression within an octave
- Use a small function based on the previous sine generator you implemented
- Use another little function to convert from note to frequency
- If you enter a group of notes (e.g. in a list), the synth should generate and record the signal to

a wave file.
- Use this module to save to file: `from scipy.io import wavfile`

Note:

- No need to handle rhythm or any complex pattern
- Middle C note is 261.6 Hz
- For instance, a C-Maj scale in our system would be noted: [0, 2, 4, 5, 7, 9, 11, 12]

Exercise: decibels¶

Compare loudness increase and dB increase between a 10 W and a 1000 W amplifier. Show the calculation details.

IPython notebook tutoral

http://nbviewer.ipython.org/github/ipython/ipython/blob/2.x/examples/Notebook/User%20Interface.ipynb (http://nbviewer.ipython.org/github/ipython/ipython/blob/2.x/examples/Notebook/User%20Interface.ipynb)

Skip the *Keyboard shortcut customization*.

http://nbviewer.ipython.org/github/ipython/ipython/blob/2.x/examples/Notebook/Running%20Code.ipynb (http://nbviewer.ipython.org/github/ipython/ipython/blob/2.x/examples/Notebook/Running%20Code.ipynb)

Plot again your simple sine using these tools.