Numerical Python

plotting, arrays

CS101 Lecture #15
Administrivia
Homework #8 is due Friday, Dec. 2.
Numerical Python (numpy)
The problem

```python
mydata = [ 4.5, 6.0, 1.2, 5.4 ]
from math import sin
sin(mydata)

Why doesn’t this work?
- list can contain any type!
- Also operators don’t do what we “want”:
  mydata * 2.0  # doesn't double values!
```
import numpy
import numpy as np  # better way
	numpy provides arrays and mathematical functions.

data = np.array([ 4.5, 6.0, 1.2, 5.4 ])
data * 2.0
Consider a data set containing patient inflammation records for 60 patients over a period of 40 days, contained in inflammation.csv.

```python
data = np.loadtxt( './data/inflammation.csv', delimiter=',' )
```
Max for each patient
`data.max(axis=1)`

Average for each day
`data.mean(axis=0)`
import matplotlib.pyplot as plt

A plotting environment similar to MATLAB.
Can plot lists or arrays. 

xs = list( range(4) )  
ys = [ 4.5, 6.0, 1.2, 5.4 ]
plt.plot( xs, ys )
plt.show()
Always include labels:
- `plt.xlabel( 'domain' )`
- `plt.ylabel( 'range' )`
- `plt.title( 'topical data' )`

```python
plt.plot( xs, ys )
plt.xlabel( 'x' )
plt.ylabel( 'y' )
plt.title( 'some values' )
plt.show()
```
Basic cycle:
- Add data to plot.
- Add labels to plot.
- Show plot.
Two kinds of plots today:
- `plt.plot(x, y)` # for ptwise data
- `plt.imshow(A)` # for array data
- `plot`: third argument is *format string* (optional; color string + line style string); default as 'b-' for a solid blue line.

```python
plt.plot(xs, ys, 'r.' )
plt.show()
```

- `plot`: can also take keyword arguments.

```python
plt.plot(xs, ys, 'r.', label='height' )
plt.show()
```
Reminders
Reminders

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