IAP Python - Lecture 3

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Documentation

Documentation for these modules can be found a couple different ways.
For the math module:

```
>>> import math
>>> help(math)
```

or visit http://docs.python.org/library/math.html
or google for "python math"
the same will be true of other standard libraries

Math - mathematical functions.

I Won't discuss in detail, but includes

- constants π and e
- error function
- trigonometric functions and their inverses
- log, exponentiation
- absolute value,factorial

You can write many of these yourself, but why bother.

operator

Contains functions for the operators that python defines. for example

```
>>> [1,2,3] contains 3
True
>>> 3+4
7
>>> import operator
>>> operator.contains([1,2,3],3)
True
>>> operator.add(3,4)
```

Why is this useful? So you can pass these functions around rather than creating lambdas.

Datetime: time is actually kinda complicated

sure, you can try to represent time with some kind of tuples, or make your own classes, but thats just silly.
Python comes with a module for managing the Gregorian calendar.

- time : tracks time within a day, which always has 24*3600 seconds in it
- date : tracks days of the calendar
- datetime : both
- timedelta : what you get when you subtract two of the first three objects. You can add it to other time objects

For each of these, you can stringify it with object.strftime(format_string). You can also generate a datetime from a string and a format string provided the two match.

Datetime: time is actually kinda complicated

```
>>> import datetime
>>> today = datetime.datetime.today()
>>> today.strftime("%A,%b %d %H:%M")
'Tuesday,Jan 11 18:25'
```

Random: Randomness

Your basic psuedo-random Number Generator. It is seeded with system time.

```
>>> import random
>>> random.random()
0.13255772573731972
>>> random.random()
0.9245824794240574 7
>>> random.random()
0.33678168180710721
```

It supports a wide variety of types of random variables, from uniform to Weibull. It also has functions to draw elements from a collection such as a set or a list.

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open() and file objects

Not actually a separate library.

`open(filename,mode)`

The filename is the name of the file to be opened or created. A file object has a mode: what operations can you perform on it?

- read
- write: will clear the file beforehand
- append: does not.

The mode is a string which determines what methods will actually work on it. it should be a single character, 'r','w',or 'w'

open() and file objects

If it is in read mode, a file is also an iterator over its lines.

```
>>> a = open("test.txt","r")
>>> [i for i in a]
['fjksl\n', 'jfkds\n', 'sjfkl\n']
```

otherwise, you can call read(), optionally passing it a number of characters. To write to it, you pass it a string. no need to pass in the number of characters. Note that when you are done with a file, you should close it.

with statements

If it is in read mode, a file is also an iterator over its lines.

```
>>> with open("test.txt","r") as a:
...     for line in a:
...         print a
'fjksl
jfkds
sjfkl
```

You can automatically do this using a with statement, which will clean up things once it is executed.

os and sys: operating system interface

sys contains data and objects pertaining to the state of the python interpereter. For instance, if you started this on the command line, sys.flags will show the status of various options that you can pass into python. Some useful things:

- sys.argv: arguments passed on the command line to a script Note that there are more sophisticated says of dealing with these, such as argparse
- sys.modules: what modules can you import?
- sys.version: what version of python are you using?
- sys.sterr, sys.stdin, sys.stdout: file objects corresponding to stdin, stdout, and stderr.

os and sys: operating system interface

the os module is really two modules, as it also includes os.path.
os.path lets you manipulate path names conveniently, joining, extracting directory names, etc.
os lets you examine processes, rename, list, create and remove files, and open files with some special flags.

Demonstration

and now I'm going to demonstrate an example of a small application I wrote for generating Random numbers.

Installing nonstandard libraries

There are two ways to get nonstandard libraries:

- Your operating system distributes them or has a package that provides them
- PyPI : http://pypi.python.org/pypi

To install packages off of PyPI, you want a tool called EasyInstall, found at http://pypi.python.org/pypi/setuptools then you can simply

```
$ sudo easy_install grail
```