

Setting up Python

The computer lab should have python installed in every computer. If you are working on your own machine, you will probably need to install Python. We will be using the standard Python software, <https://www.python.org/download/releases/2.7.8/>

You should download and install version **2.7.8**, *NOT* 3.X.

If you have already downloaded Python 3.X, it is OK. Multiple versions can run at the same time.

Windows:

Download and install Windows Installer from the above website.

Mac OS X:

Download and install MacOSX installer from the above website.

Other Linux:

Check which version of Python you have by running
`python -V`

at a terminal. If you have a newer version of Python, you can set Python 2.7 as the default. If you need help with this, ask a TA. Otherwise, you should be able to do one of the following options:

```
sudo apt-get install python2.7
```

if you don't already have Python 2.7 installed; if you do, run

```
sudo apt-get install idle
```

to install Idle for Python 2.7. If you have Python and Idle installed with a *newer* version of Python (eg Python 3.X), you'll want to instead run these two commands to install the correct version of Idle:

```
sudo apt-get install idle-python2.7 sudo ln -s /usr/bin/idle-python2.7 /usr/bin/idle
```

You should then be able to run Idle by simply running

```
idle&
```

from the command prompt. If you would rather compile from source, visit the [Python 2.7.8 release page](#) for compressed tarballs. If you're having problems, please ask an LA for assistance.

Warning: On the Python homepage, the latest version available for download is actually 3.X. Do not install this! This version is not backwards compatible with the code that you'll be writing in this course (for example, you have to type `print("test")` instead of `print "test"`). Instead, be sure to download the version listed above.

Using IDLE

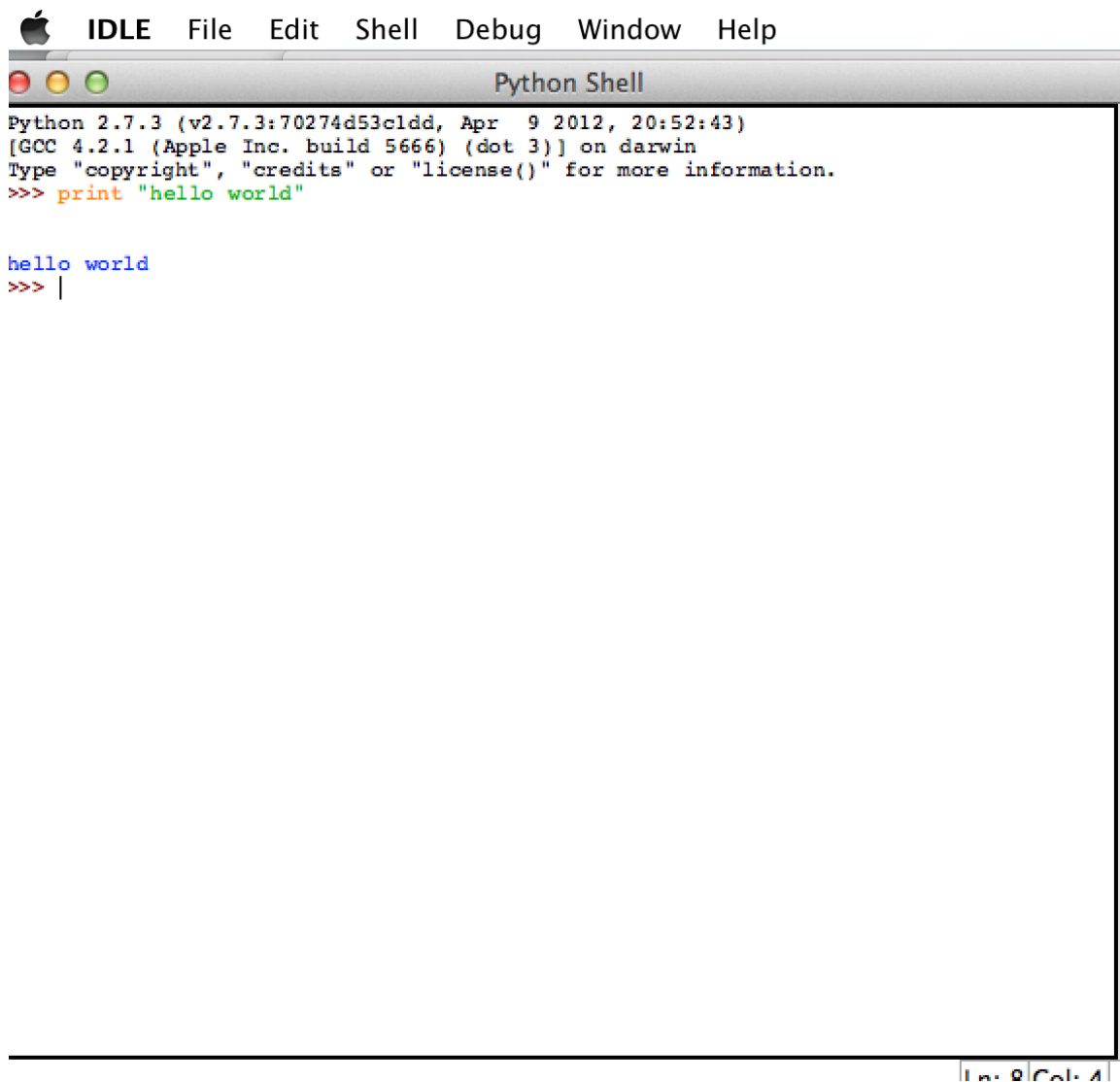
IDLE is the standard Python development environment. Its name is an acronym of "Integrated DeveLopmentEnvironment". It works well on both Unix and Windows platforms.

It has a Python shell window, which gives you access to the Python interactive mode. It also has a file editor that lets you create and edit existing Python source files.

During the following discussion of IDLE's features, instead of passively reading along, you should start IDLE and try to replicate the screenshots.

Interactive Python shell

When you start up IDLE, a window with an interactive Python shell will pop up:



You can type Python code directly into this shell, at the '>>>' prompt. Whenever you enter a complete code fragment, it will be executed. For instance, typing:

```
>>> print "hello world"
```

and pressing ENTER, will cause the following to be displayed:

```
hello world
```

Try typing an underscore (`_`). Can you see it? On some operating systems, the bottoms of hanging letters such as 'g' or 'y', as well as underscorces, cannot be seen in IDLE. If this is the case for you, go to Options -> Configure IDLE, and change the size of the default font to 9 or 11. This will fix the problem!

IDLE can also be used as a calculator:

```
>>> 4+4
8
>>> 8**3
512
```

Addition (+), subtraction (-), multiplication (*), division (/), modulo (%) and power (**) operators are built into the Python language. This means you can use them right away. If you want to use a square root in your calculation, you can either raise something to the power of 0.5 or you can *import* the *math* module. Do not worry about what it means right now, we will cover this later during the course. Below are two examples of square root calculation:

```
>>> 16**0.5
4.0
>>> import math
>>> math.sqrt(16)
4.0
```

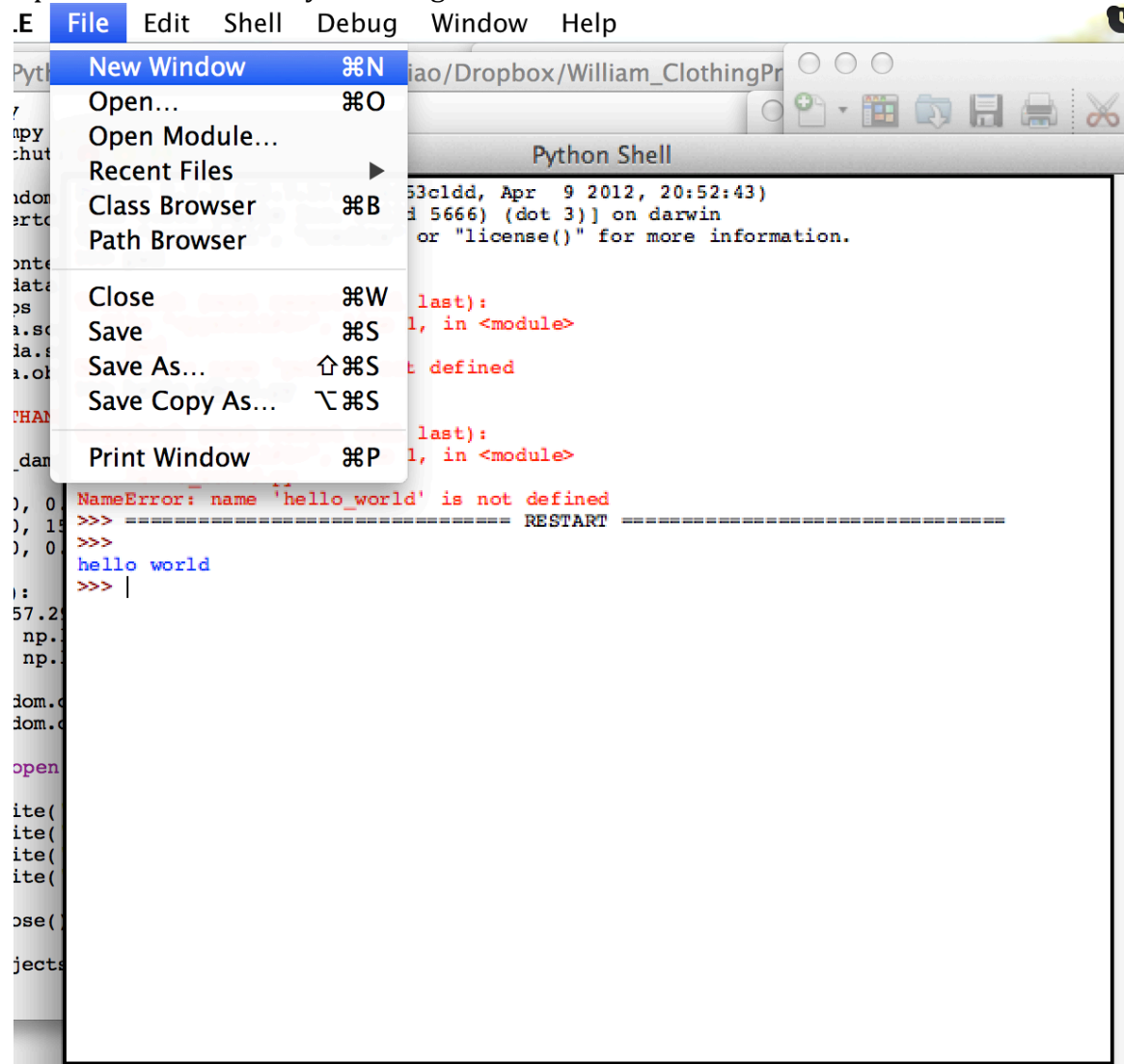
The math module allows you to do a number of useful operations:

```
>>> math.log(16, 2)
4.0
>>> math.cos( 0 )
1.0
```

Note that you only need to execute the import command once after you start IDLE; however you will need to execute it again if you *restart* the shell, as restarting resets everything back to how it was when you opened IDLE. Don't worry too much about this right now; we'll cover it more in depth soon!

Creating your own python script

1. Open a new window by choosing New Window from the File menu.

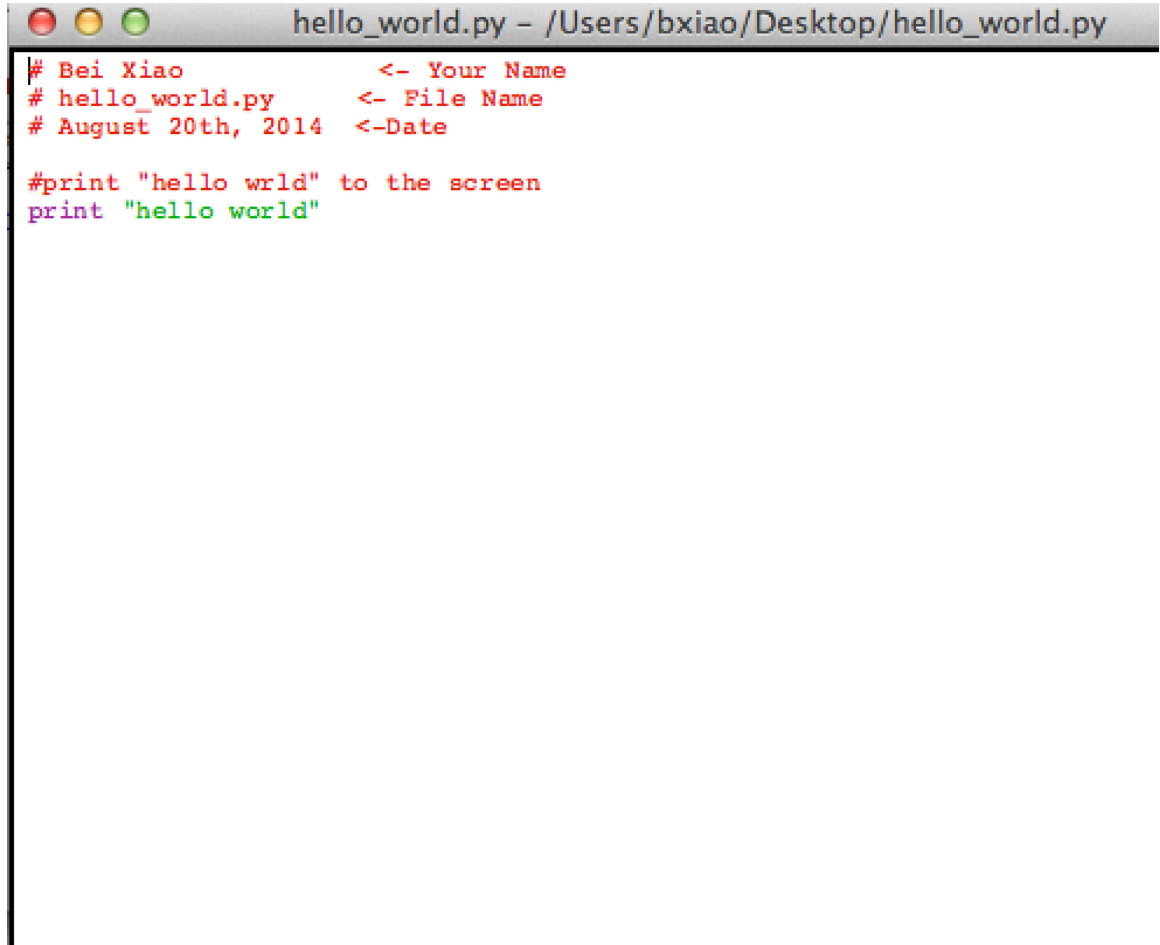


2. Save the file as hello world.py. Do NOT skip the '.py' portion of the file name - otherwise, you will lose out on syntax highlighting
3. . Start every program with a bank of comments, with a comment line for your name, your recitation section, the name of your file, and today's date. Recall that a comment line begins with a '#' (pound) symbol.

You can now write your very own Hello, world! program. This is the first program that most programmers write in

a new programming language. In Python, Hello world! is a very simple program to write. Do this now... it should be only one line.

When you are done, save your work and run it. Your code should look similar to this:

A screenshot of a code editor window titled "hello_world.py - /Users/bxiao/Desktop/hello_world.py". The window contains the following Python code:

```
# Bei Xiao          <- Your Name
# hello_world.py   <- File Name
# August 20th, 2014 <-Date

#print "hello wrld" to the screen
print "hello world"
```

To run your program, chose Run Module from the Run menu (or just hit F5 on Windows/Linux, or fn-F5 on a Mac). When you run the code, your shell should look similar to this:

The screenshot shows the Python IDLE environment. The top menu bar includes 'DLE', 'File', 'Edit', 'Format', 'Run', 'Window', and 'Help'. The 'Run' menu is open, showing options: 'Python Shell', 'Check Module' (with a keyboard shortcut $\backslash X$), and 'Run Module' (with a keyboard shortcut F5). The 'Run Module' option is highlighted in blue. Below the menu, the Python Shell window displays the following text:

```
2.7.3 (v2.7.3:70274d53c1dd...  
.2.1 (Apple Inc. build 5666...  
copyright", "credits" or "l...  
d  
ack (most recent call last)  
  "<pyshell#0>", line 1, in  
    d  
ror: name 'pwd' is not defi...  
llo_world.py  
ack (most recent call last)  
  "<pyshell#1>", line 1, in  
    llo_world.py  
ror: name 'hello_world' is  
=====
```

The code editor window shows the following code:

```
#print "hello wrld" to the screen  
print "hello world"
```

The status bar at the bottom right indicates 'Ln: 4 |'.

When you run your code, it first prints the line `>>> ===== RESTART =====`, then runs your code underneath that line.

Here is an official IDLE tutorial:

<https://docs.python.org/2/library/idle.html>

Exercises:

Use IDLE to calculate:

1. Factorial of 5.
2. $6+4*10$
3. $(6+4)*10$, compare with the above solution.
4. Positive root of the following equation:
 $34*x^2 + 68*x - 510$
Recall:

$$a*x^2 + b*x + c$$

$$x1 = (-b + \sqrt{b*b - 4*a*c}) / (2*a)$$

5. Make a script and print "hello world again"