

Introduction to Programming



Outline

- What you will get out of this class?
- What is a program?
- What is a programming language?
- What is Python?
- A tour of Python and IDLE.
- Class resources
- Workshop

What you will get out of this class

- Throughout the class we will be building pong using the concepts we learn each class
- Each class we will release source for a new step in pong
- Each class homework will be assigned to help you cement your knowledge of the concepts covered
- Demo time

What is a program?

- A program is a series of instructions to be executed
- Source code is text the machine can translate into instructions
- Source gets translated into machine readable code which the machine then executes

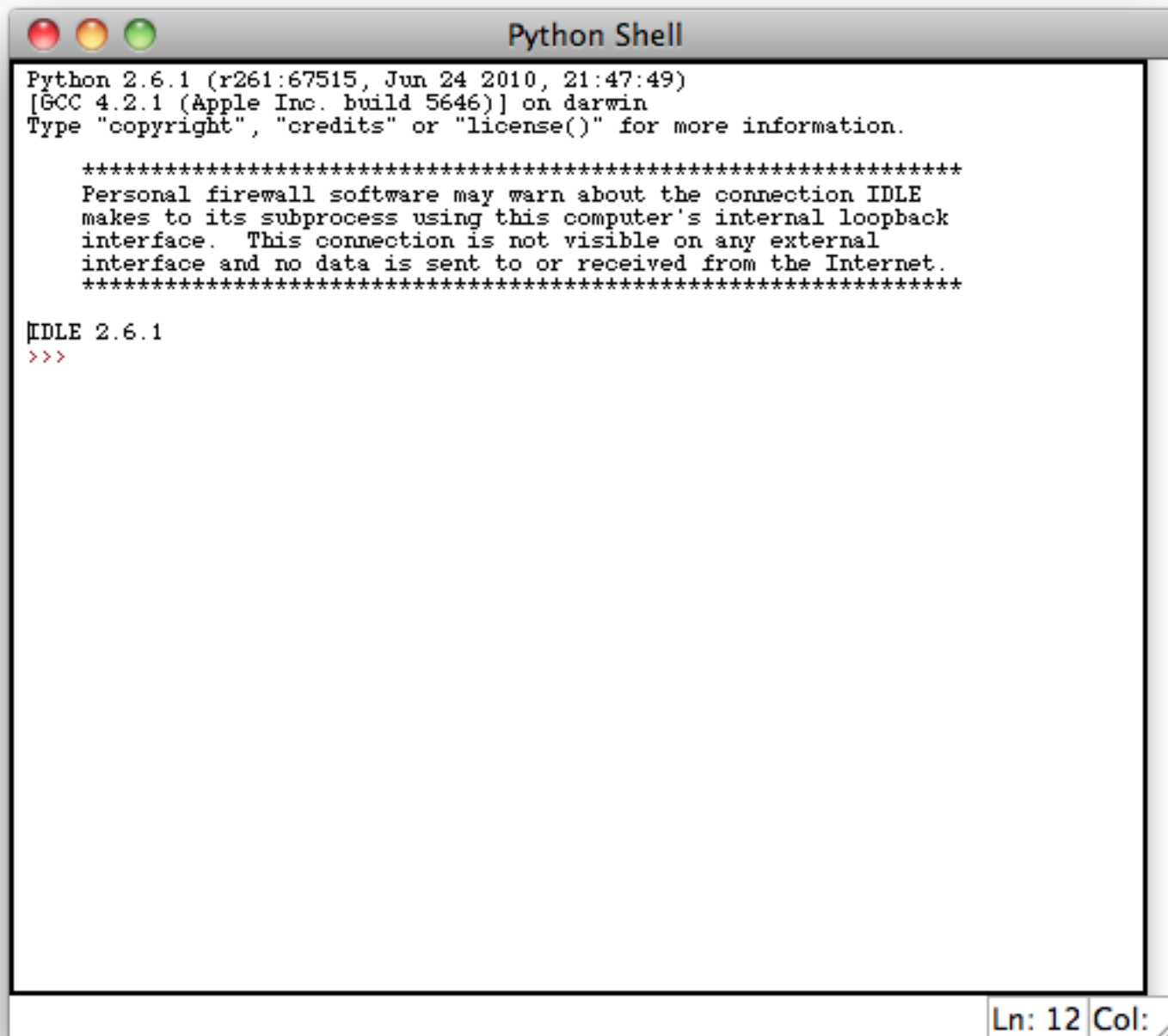
What is a programming language?

- Artificial language designed to express computations that can be performed by a machine
- Can be compiled or interpreted
- Compiled languages are translated to machine code before being run
- Interpreted languages are translated into machine code while the program runs

What is Python?

- An cross-platform interpreted programming language
- Created by Guido van Rossum
- Especially good for scripting and prototyping
- Makes a great first language

A Tour of Python And IDLE



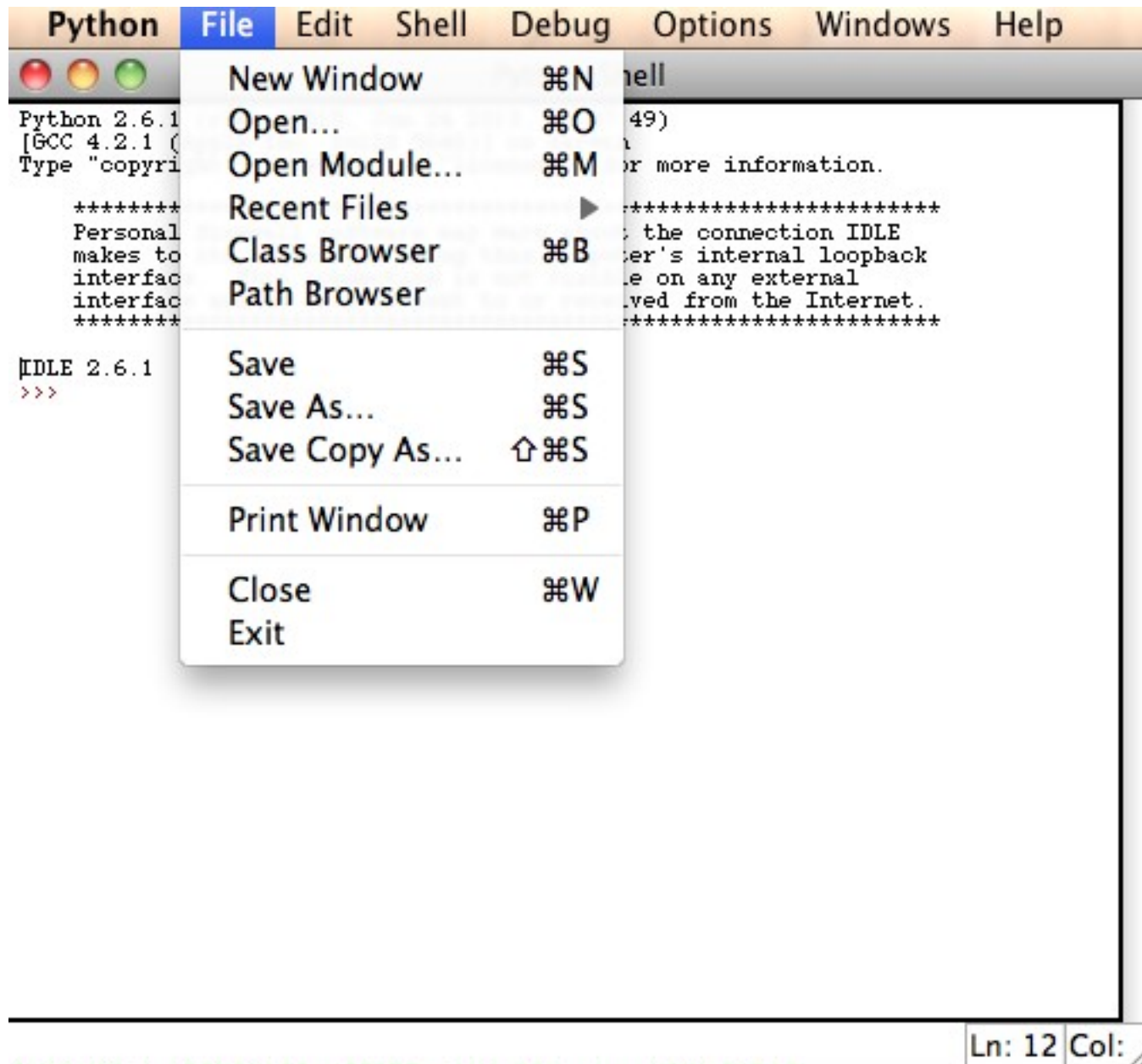
```
Python Shell
Python 2.6.1 (r261:67515, Jun 24 2010, 21:47:49)
[GCC 4.2.1 (Apple Inc. build 5646)] on darwin
Type "copyright", "credits" or "license()" for more information.

*****
Personal firewall software may warn about the connection IDLE
makes to its subprocess using this computer's internal loopback
interface.  This connection is not visible on any external
interface and no data is sent to or received from the Internet.
*****

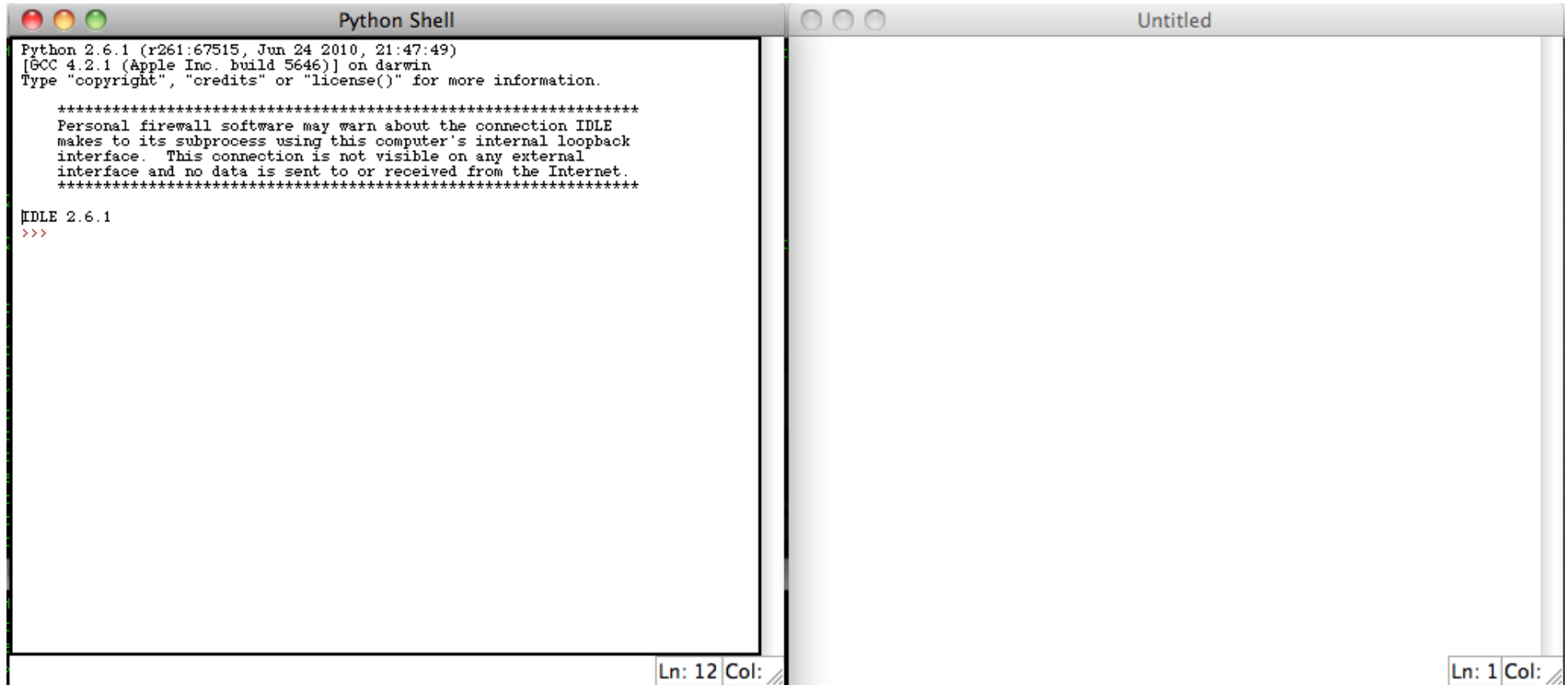
IDLE 2.6.1
>>>
```

Ln: 12 Col: //

A Tour of Python And IDLE (cont.)



A Tour of Python And IDLE (cont.)



The image shows a screenshot of the Python Shell and an Untitled window in IDLE 2.6.1. The Python Shell window displays the following text:

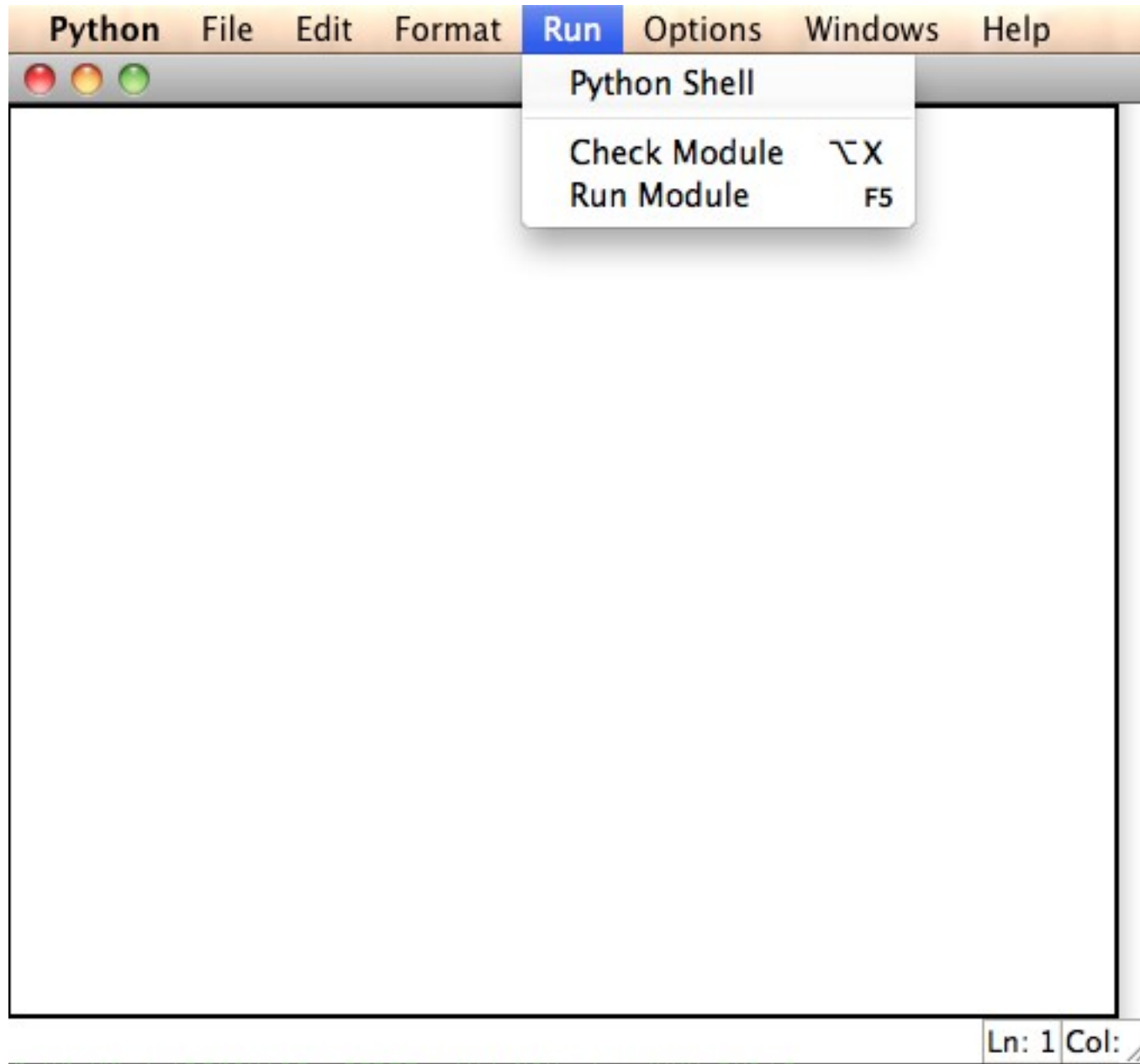
```
Python 2.6.1 (r261:67515, Jun 24 2010, 21:47:49)
[GCC 4.2.1 (Apple Inc. build 5646)] on darwin
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*****

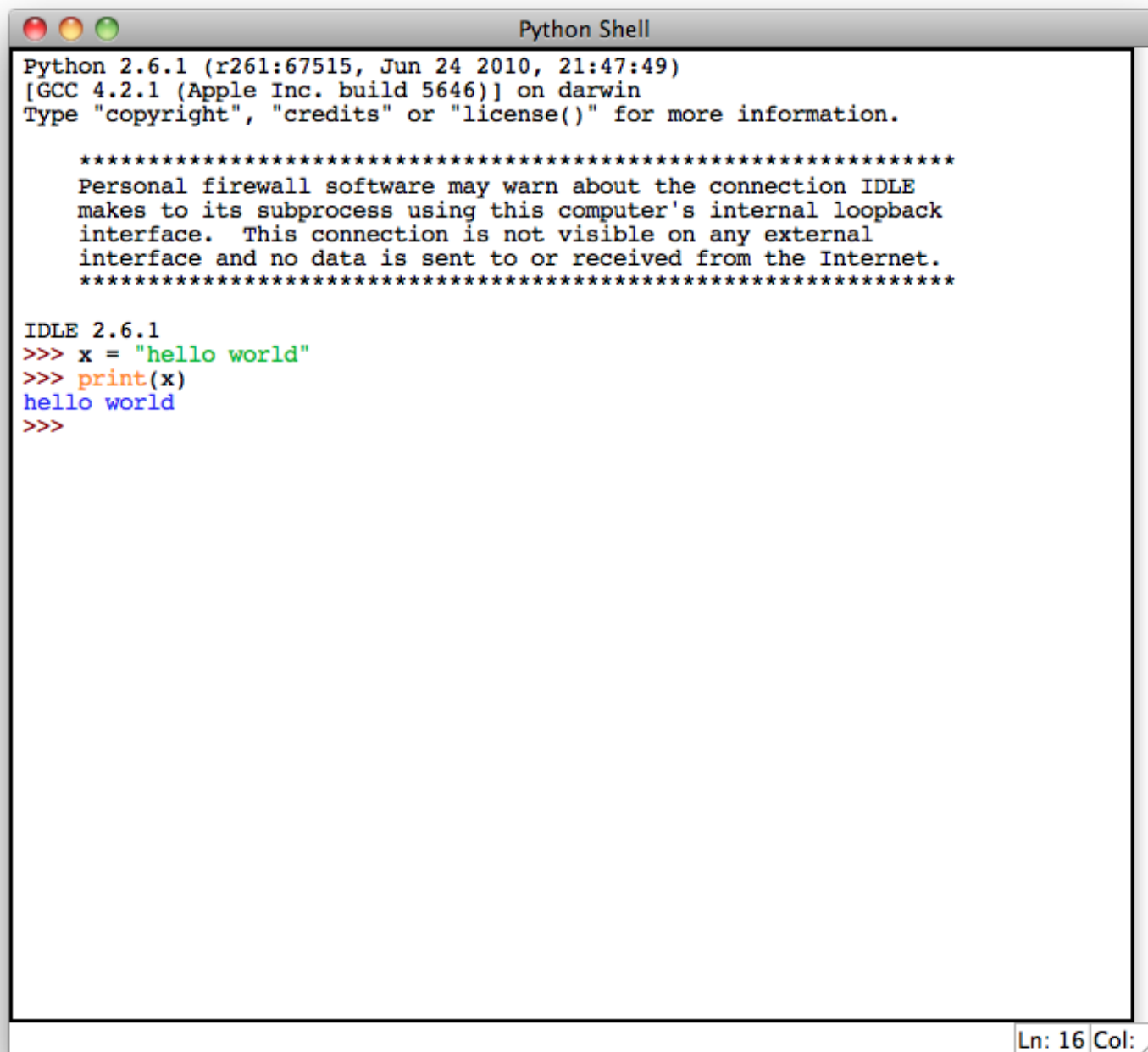
IDLE 2.6.1
>>>
```

The Untitled window is currently blank. The status bar at the bottom of the Python Shell window shows "Ln: 12 Col:" and the status bar at the bottom of the Untitled window shows "Ln: 1 Col:".

A Tour of Python And IDLE (cont.)



Hello World



A screenshot of a Python Shell window titled "Python Shell". The window contains the following text:

```
Python 2.6.1 (r261:67515, Jun 24 2010, 21:47:49)
[GCC 4.2.1 (Apple Inc. build 5646)] on darwin
Type "copyright", "credits" or "license()" for more information.

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*****

IDLE 2.6.1
>>> x = "hello world"
>>> print(x)
hello world
>>>
```

At the bottom right of the window, there is a status bar showing "Ln: 16 Col: /".

Dissecting Hello World

- `x` is a variable
- `"Hello World"` is a string
- `x = "Hello World"` stores the string in `x`
- `print` is a function
- `print` takes a string as an argument
- `print(x)` replaces `x` with `"Hello World"` and prints it

Primary Data Types

- Words and Letters
 - Strings - "Hello World", "C", 'c', 'This is great!'
- Numbers
 - Integers – 12, 23
 - Floating point – 2.7, 3.14159
 - Complex - 2j
- Booleans – True, False

Strings

- Single double or triple quotes work
- String can be indexed - "abc"[0] is "a"
- Strings can be added together - "abc" + "def" is "abcdef"
- Strings can be multiplied - "h4cdc" * 3 is HacDC's wireless password!
- Strings have length – len("abc") is 3

Numbers

- The regular arithmetic functions all work - '+', '-', '*', '/', '%', '**'
- $1 + 1$ is 2
- $(1 * 3) ** 2 / 2$ is 4 (what?)
- An integer divided by an integer is an integer – $7/2$ is 3
- An integer divided by a float is a float – $7/2.0$ is 3.5
- A float divided by an integer is a float – $7.0/2$ is 3.5
- A float divided by a float is a float – $7.0/2.0$ is 3.5

Booleans

- Either True or False
- Are good for testing things
- `True == True` is True
- `True == False` is False

Logical Expressions

- Evaluate to a boolean
- Logical operators are 'and', 'or', 'not', 'is', 'in', '==', '!=', '<=', '>=', '<', '>'
- True == not False is True
- True is False is False
- 3 >= 4 is False
- "a" in "abc" is True

Class Resources

- Wiki
 - Slides, sample code, useful links
http://wiki.hacdc.org/index.php/Intro_to_Programming
- Mailing list
 - Ask questions, share code, help each other
<http://hacdc.org/cgi-bin/mailman/listinfo/prog101>

Workshop Time!

- Download `wrapper_turtle.py`
- There are 7 functions: `forward`, `backward`, `left`, `right`, `penup`, `pendown`, `done`.
- `from wrapper_turtle.py import *`
- `help(function_name)` to see a description of what it does