

CS1110 Lab 1 (Jan 27-28, 2015)

First Name: _____ Last Name: _____ NetID: _____

Completing this lab assignment is very important and you must have a CS 1110 course consultant “tell CMS” that you did the work. (Correctness does not matter.) This can be done any time up until the start of next week’s lab (Feb 3-4). Thus, if you have trouble with a problem, then you have a week to get help from the teaching staff. If you finish before the hour is over, then you can leave early or you can work on the current assignment. Indeed, you are not required to physically attend the labs at all. Just make sure your work is “checked off” by a consultant. And remember this: *The lab problems feed into the assignments and the assignments define what the exams are all about.*

1 Files, Directories, Running Python, and Editing

This handout is not the only part of this lab. In addition, we have two files for you to play with. Lab files are always located on the Labs section of the course website. For today’s lab you will notice two files.

- `hello1.py` (a text-based Python script)
- `hello2.py` (a graphical Python script)

Create a *new* directory on your hard drive and call it `lab01`. **Put this directory on your Desktop.** In future labs, you can put the folder wherever you want, but this lab is a lot easier if this folder is in your Desktop folder. Download all of the files into that directory.

This lab handout has several empty boxes that prompt you to answer a question. As part of the lab, you are to write the answers to these questions inside the boxes. When you are finished, you should show your written answers to your lab instructor.

Labs are graded on effort, not correctness. The instructor will ask you a few questions to make sure you understand the material and then swipe your ID card to record your success. This physical piece of paper is yours to keep.

If your primary computer is a laptop, bring it to the lab to work on, as lab is an *excellent* opportunity to get started with Python on your machine. You should follow the instructions on the course website. Ask a consultant for help if you have problems with your installation. However, you do not need to spend lab time installing Python on your machine. If you want get started with Python now and install it later, you should work on a machine in the lab.

The first part of the lab is to help you understand the tools that we will be working with this semester. Make sure that you have created the folder `lab01` with the two files for this lab: `hello1.py` and `hello2.py`.

1.1 Working with the Command Shell

Start the command shell for your computer. This is the Command Prompt on Windows (Located in **Accessories** in the Start Menu on Windows 7, and in **Apps > Windows System** in Windows 8), or the Terminal on OS X (Located in **Utilities** in the **Applications** folder). This program works like a Window in your operating system, allowing you to manipulate files and folders. However, it uses typed text commands instead of a mouse.

Like a Window in your operating system, the command shell looks at a specific folder. We call this folder the *active directory*. You can use the command shell to list, copy, and move files in the active directory. You can also change the active directory of the command shell, just like you can change the current folder of a Window.

When the command shell starts out, the active directory is your *home directory*. In both Windows and OS X, this is the folder with your name on it. Open up a Window for your home directory, and put it next to the command shell. Go back to the command shell. If you are using Windows, type

```
dir
```

and hit the **Return** key. If you are using OS X, type

```
ls -l
```

(that is a “dash ell”) and hit the **Return** key. In a few words, describe what you see and how it compares to the Window next to the command shell.

We want you to change the active directory to the folder **lab01**. If you followed the instructions above, this folder should be on your Desktop. Your Desktop is actually a folder stored inside your home directory. So the first thing to do is to move to the Desktop. To get there from the home directory, type the command (on either OS)

```
cd Desktop
```

and hit **Return**.

Once again enter either **dir** or **ls -l** (depending on your operating system) into the command shell. In a few words, explain what is different this time and why.

Since `lab01` is a folder inside the Desktop, you can now type

```
cd lab01
```

and hit **Return**. Your active directory should now be `lab01`. One last time, either `dir` or `ls -l` (depending on your operating system) into the command shell and tell us what you see.

To go back to the previous directory, you can use the command “`cd ..`”. This should be enough to familiarize you with the command shell for now. If you want to learn more, visit the course website.

1.2 Working with Python

There are two ways to run Python. One is to execute “scripts”, or files that contain Python commands. The other is to use Python *interactively*, typing in just one command at a time.

The files `hello1.py` and `hello2.py` are both scripts. To run a script, you type `python`, followed by the name of the script, into the command shell. Type

```
python hello1.py
```

and hit **Return**. Does anything happen?

Now open up the file `hello1.py` with Komodo Edit. It is a file with just one line in it:

```
#print 'Hello World!'
```

Delete the `#` character and save the file. Once again, run the script `hello1.py` by typing “`python hello1.py`”. What do you see this time?

Finally, run the script `hello2.py`. What happens this time?

To run Python interactively, type the word `python` by itself and hit **Return**. Do that now. You should see several lines of text followed by the symbol `>>>`. This is the *Python prompt*. Like the command shell, it responds to commands that you type. The purpose of the `>>>` is to let you know that you are currently running Python, and that you are no longer working with files and folders.

At the Python prompt, type

```
>>> 1+1
```

and hit **Return** (do not type the `>>>`). What happens?

2 Using the Interactive Mode to Learn Some Basics

In this section, you use Python in interactive mode. For each example, write down what you think the result should be. Then use Python in interactive mode to find out if your mental reasoning is OK or not. If not, try to figure out why Python gave the answer that it did. Ask a staff member for clarification if necessary. Leave a paper trail of your mistakes and recoveries in the "notes column" as a reminder not to make the same mistakes in the future!

The labs will often be like this. You are acquainted with a Python construction in lecture. You then nail down the rules associated with that construction in the lab by working examples two ways: mentally and then with the computer.

2.1 Useful Shortcuts

If you press the *up-arrow key*, you get the previous expression that you typed in. Pressing up-arrow repeatedly scrolls through all the expressions that you have typed this session; if you go too far back, you can press the *down-arrow key* to get to a later expression. The *left and right-arrow keys* move the text cursor on a single line. Using all of these keys together, you can take a previously-used expression, modify it, and try it again.

2.2 Integer and Float Arithmetic

	Expression	I Think the Value Is	Python Says	Notes
1	10/4			
2	10./4			
3	float(10/4)			
4	1.0 + 10/4			
5	1 + 10/4.			
6	int(10/4)			
7	int(3.14159)			
8	float(int(10.)/4)			
9	int(float(10/4))			
10	1.0/3.0			

	Expression	I Think the Value Is	Python Says	Notes
11	10 % 4			
12	4 % 10			
13	9**2			
14	9**0.5			
15	9**(1/2)			
16	4**3**2			

2.3 Strings

Reproduce this example of string slicing by entering the first two commands

```
>>> s = 'abcdef'
>>> s[0:3]
'abc'
```

Now look at these other examples

	Expression	I Think the Value Is	Python Says	Notes
1	s[1]			
2	s[0]			
3	s[1:2]			
4	s[0:2]			
5	s[:3]			
6	s[3:]			

2.4 Strings and Numbers

Reproduce this "dialog":

```
>>> s1 = '12.34'
>>> 2*float(s1)
24.68
>>> 2*int(s1[0:2])
24
>>> s2 = str(12)
>>> s2+s2
'1212'
>>> s3 = str(12.34)
```

Now look at these other examples

	Expression	I Think the Value Is	Python Says	Notes
1	s2+s2+s2			
2	float(s1[2:4])			
3	s3[2]			
4	s3+s3			

2.5 Errors

If you do something illegal, Python complains. Roughly, it tries to tell you the type of error and where it occurs. In time, you will learn how to decipher error messages. For now, let's ignore the "where it occurs" part and interpret the rest of the message.

1. If I enter

```
>>> 10(5+6) = x
```

then here is what Python tells me and why it is complaining:

```
File "<stdin>", line 1
SyntaxError: can't assign to operator

In an assignment statement, the expression has to be to the right of the = .
```

2. If I enter

```
>>> s = 'abcdef'
>>> c = s[7]
```

then here is what Python tells me and why it is complaining:

3. If I enter

```
>>> s = 'abc'
>>> t = s - s
```

then here is what Python tells me and why it is complaining:

4. If I enter

```
>>> s = 'abc'
>>> t = s(2)
```

then here is what Python tells me and why it is complaining: