National University of Singapore
IT1007 Introduction to Programming with Python and C

Lab 0: Setting Up Python

Required File

- `Lab 00 - plotting waves.py`

The objective of this lab is to guide you in the installation and setting up of the programming tool, called **IDLE**, that you will be using for the rest of the semester. Also, we include a simple exercise to help you familiarize yourself with the basics of Python. This lab does NOT contribute to any grade and you do NOT have to submit anything online.

Part 1: Installing Python 3.6.0 and required packages

Before you start on your quest to master the Python programming language, you have to install the necessary tools. Please follow the following instructions to set up your programming environment for the class.

PIL is required to render images that will be used in the later missions. We will be using PILLOW, which is a modern replacement for PIL. Scipy/Numpy packages are also required in the later missions.

Note: The highest priority package to install is PILLOW, as we will be using it over the next few weeks. Please contact your tutors if you face any difficulty during the setup/installation process. Or you can find your answers in https://docs.python.org/3/using/index.html

Please follow the following instructions carefully. **Before continuing, check that you are connected to the Internet as some packages will be downloaded by the installer.**

Windows Users: (Mac users please skip to the Mac section)

You may download the appropriate `.zip.exe` file from the links below. Please install the correct version (32 or 64 bit) depending on your OS.

- 32-bit: http://www.comp.nus.edu.sg/~hcheng/IT1007/python-installer-32-bit.zip.exe
- 64-bit: http://www.comp.nus.edu.sg/~hcheng/IT1007/python-installer-64-bit.zip.exe

You may check if your OS is 32 or 64 bit by either:

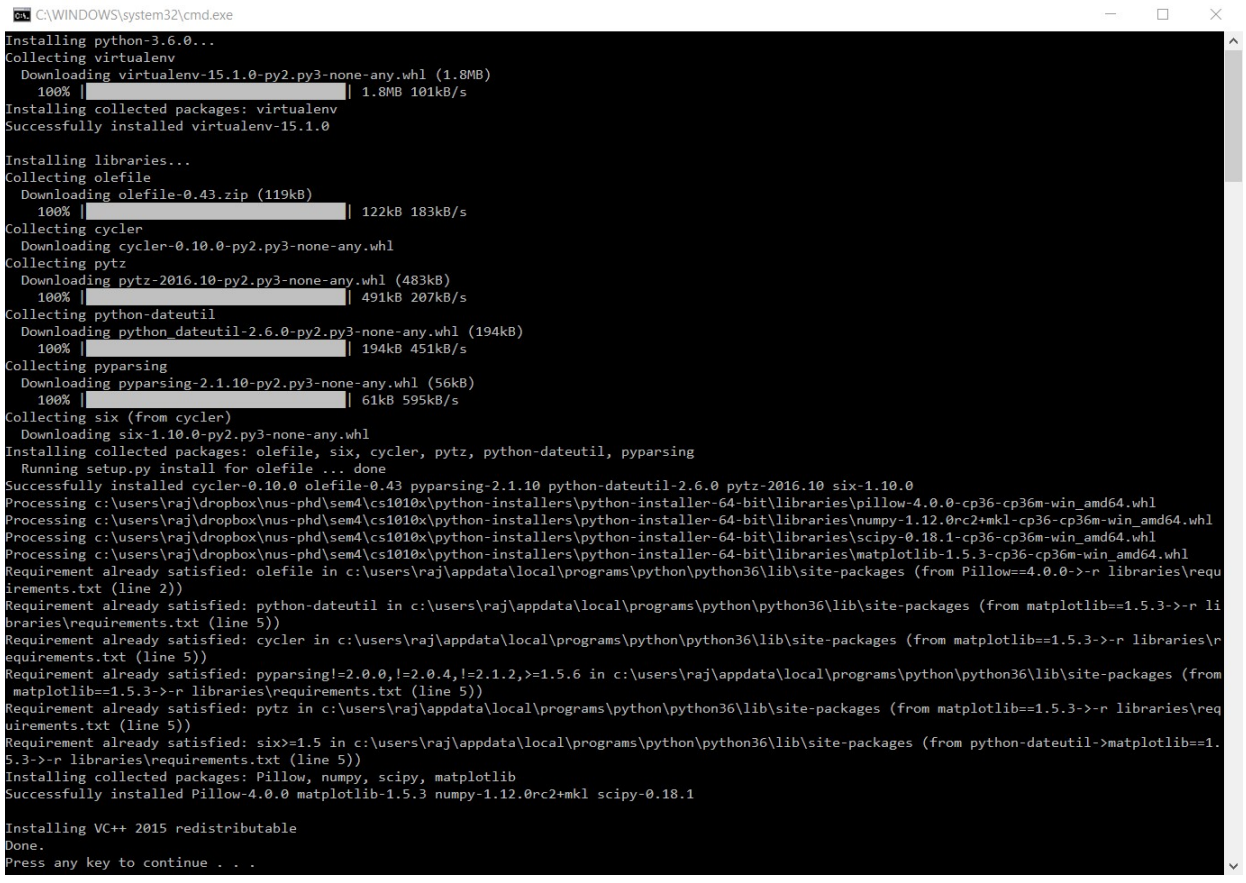
- Start menu > right-click "My Computer" or "This PC" > Properties, or
- Press WIN + Pause/Break

You should see your 32- or 64-bit version under "**System Type**".

Run the self-executing zip file and extract the contents to an easily accessible a folder like your Desktop.

A new folder `python-installer-xx-bit` will be created at the extracted location. Open this folder and run the "install-python" file. Do NOT run the other files. You might need an administrator account for a system update of the C Runtime Library. Also, the Visual C++ 2015 redistribution will be installed for some of the Python libraries to work.

If successful, you should not get any error along the way and see an output similar to this:



Note the version numbers will be different but the process is similar.

If you see any red text, it means something have gone wrong somewhere. Please check the forums for troubleshooting.

IMPORTANT: Please do **NOT** install both versions (32 and 64 bit) of Python in your computer at the same time. If you need to install the other version, please **uninstall** your existing Python installation first before installing the other version.

Mac Users (Window users can skip to Editing File):

You may download Python 3.6.0 from https://www.python.org/downloads. Download and install the appropriate `dmg` installer for the version of your Operating System. Be sure to install Python for "All Users", not just the current user. Once installation is completed, you should see that IDLE is available from your finder.

You may need to install Tcl/Tk to run IDLE, more instructions can be found at http://www.python.org/download/mac/tcltk/. Download the newest version from the recommended Tcl/Tk column according to your OS version.

Setting up Command Line Tools for Mac

Install the Command Line Tools (required for PILLOW installation). Follow the instructions depending on your OS X version. You can determine the version by clicking on the Apple Icon (in the menu bar) > About This Mac.

1. **Mavericks (10.9) or later**

   Run the following commands in your terminal. (You can find the terminal by clicking on Finder on the dock, Go > Utilities > Terminal.)

   ```
   xcode-select --install
   ```

   A popup will appear, asking if you wish to install the command line developer tools. Click on Install to begin the installation.

2. **Mountain Lion (10.8) and earlier**

   Install Xcode from the App Store. Open Xcode and go to Preferences. Click on the Downloads tab, and you'll see Command Line Tools. Click the Install button to install the Command Line Tools.

Setting up Homebrew and dependencies

After installing the Command Line tools, Run the following commands in your terminal. (You can find the terminal by clicking on Finder on the dock, Go > Utilities > Terminal.) You will need to be **connected to the Internet** as the installer will download the required files.

First, we will install Homebrew - a package manager for MacOS, with the following command. **Note the command is a single continuous line**, broken down into two due to space constraints on this page. Do not copy both lines into the terminal at the same time.

```
/usr/bin/ruby -e "$(curl -fsSL
https://raw.githubusercontent.com/Homebrew/install/master/install)"
```

Follow up with the next 2 commands:

```
brew install freetype
brew install pkg-config
```

Setting up PILLOW, Scipy/Numpy, Matplotlib

In the same terminal, run the following commands. This will install pip - a package manager for Python, with the following command.

```
curl https://bootstrap.pypa.io/get-pip.py | sudo python3
```

Follow up with the next 3 commands:

```
sudo pip3.6 install PILLOW
sudo pip3.6 install scipy numpy
sudo pip3.6 install matplotlib
```

Note: You may be prompted to enter your Mac password when you run the above commands. It is normal for there to be no change in the Terminal and no asterisks (*) as you key in your password.

Linux Users:

If you are *really* using Linux, then you are 1337 and do not need any help installing Python. :)

Editing Python Files

The default behavior of double clicking on the Python file executes the content of the Python file. You should see the command line window briefly opens, and close when Python has finish executing the file.

In order to make changes to the Python file, you will need to edit the file using the IDLE program.

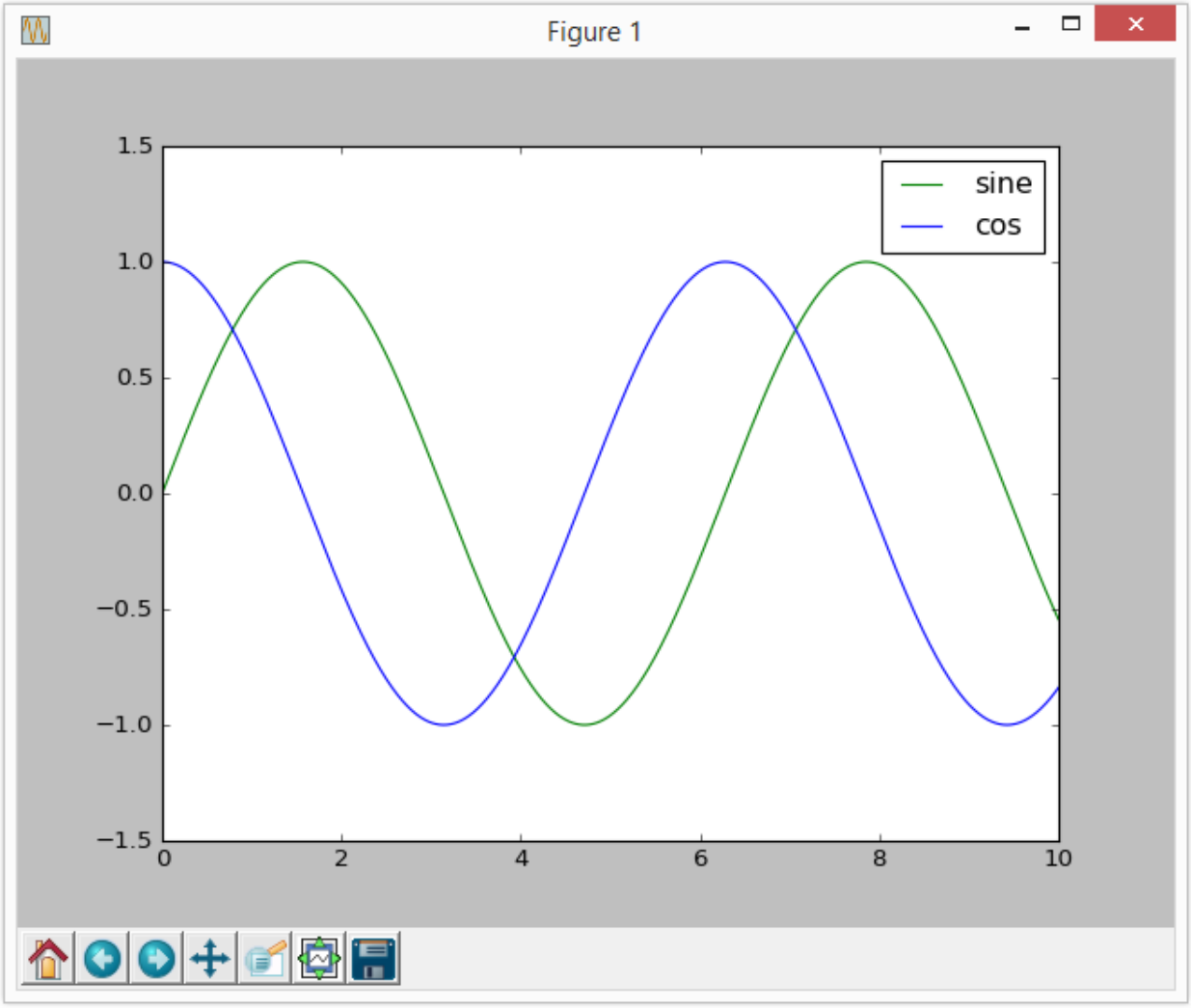
- Windows User: Right click on the Python file > Edit with IDLE
- Mac Users: Right click on the Python file > Open With > IDLE

The content of the Python file should now appear in the IDLE program. You can then make changes to the file, and execute it.

To execute the Python file, go to Run > Run Module. The output of your Python file should then appear in the Shell Window.

Part 2: Run Your First Python Program

Download the file "`Lab 00 - plotting waves.py`" from the workbin in IVLE. And open it with IDLE. Run the file and you should see the following after a few seconds



If the above figure is shown, that means your Python and IDLE are installed correctly. Congratulation!

Exploration

You can try changing ~~messing up with~~ the code and explore different fun things to do. Here are a few suggestions

- Change the horizontal range from $-\pi$ to π
- Change one of the curve to the function tangent
- Change the color of the curve
- Or even change the curve into any crazy function!