Setting Up Python

Required Files

- `guess_the_answers.py`
- `lotus.jpg`
- `lotus.py`
- `waves.py`

The objective of this task 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 have included a simple exercise to help you familiarize yourself with the basics of Python. This task does NOT contribute to any grade and you do NOT have to submit anything online. (It would be good, however, to try submitting this to get yourself familiarized with Coursemology)

In case you encounter any problem during the setup process, please visit and ask questions in the forum in Coursemology. We recommend that you check previous posts there first because your problem may already be mentioned by someone else.

Part 1: Installing Python 3.7.8 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. 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.**

The following installation divides into two parts, Windows Users or Mac Users, depending on which machines you are using. Of course, you only need to perform either one of the installations.

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

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

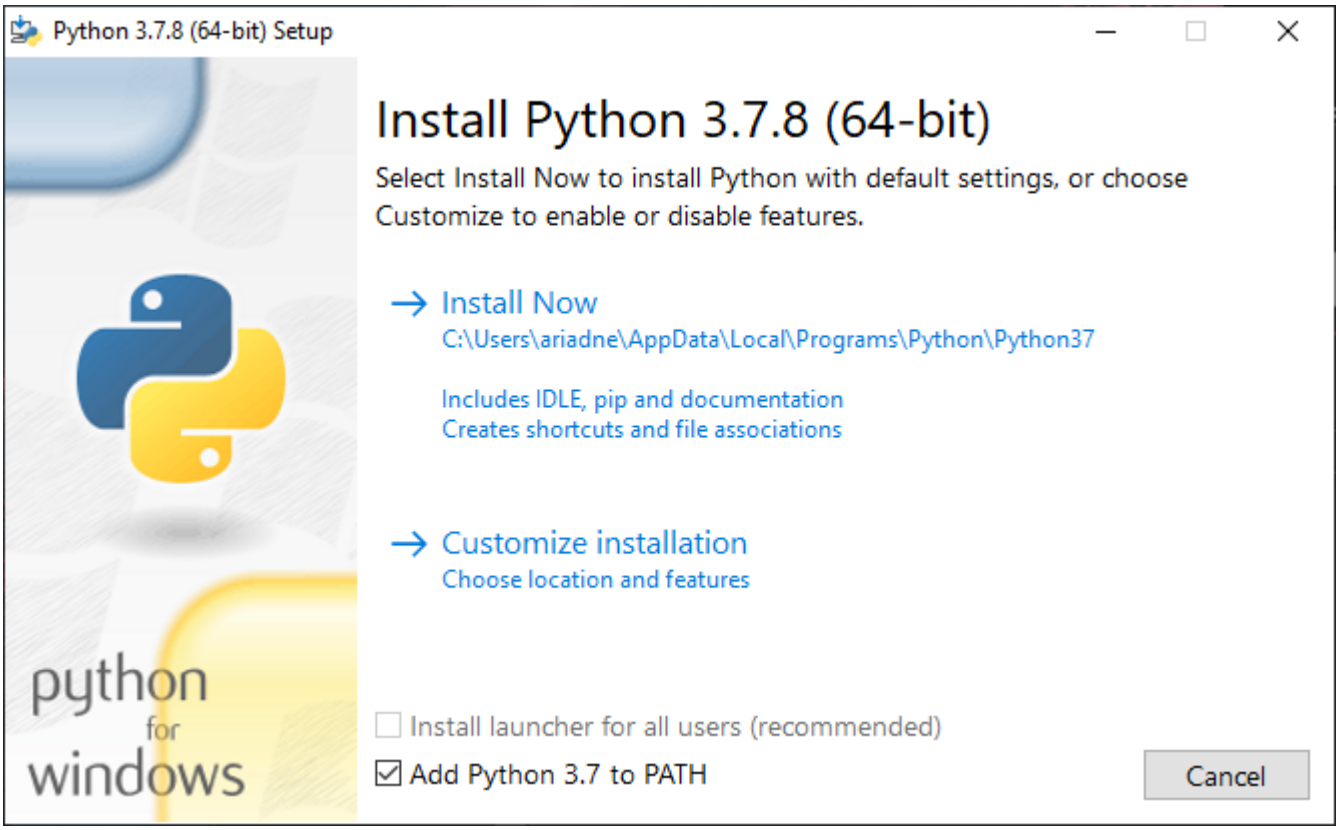
- 32-bit: https://www.python.org/ftp/python/3.7.8/python-3.7.8.exe
- 64-bit: https://www.python.org/ftp/python/3.7.8/python-3.7.8-amd64.exe

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**".

Double click the file to run the installer.



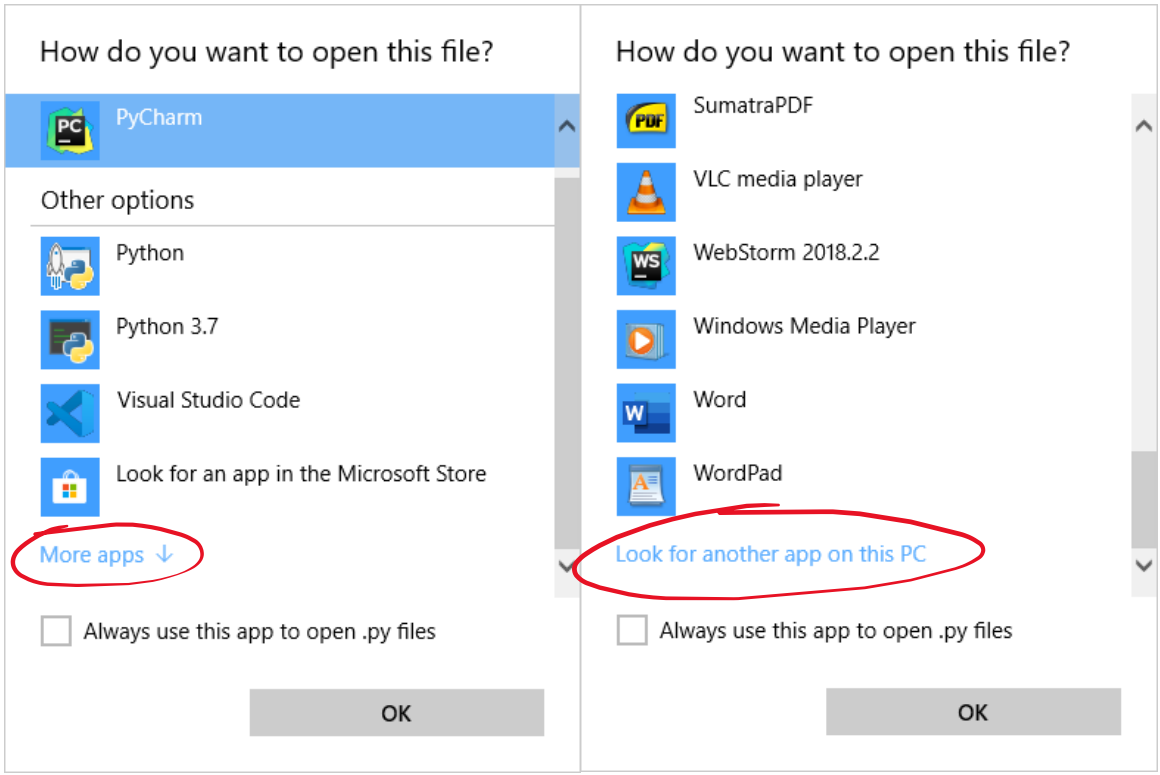
Keep a note of where Python is installed to for later. **Also, check the "Add Python 3.7 to PATH" option so it will be easier to install certain libraries later.** Click on the "Install Now" button and let it do its thing.

The installation should go smoothly and you will be notified when it is done. Close the window afterwards.

OPTIONAL but strongly recommended: Open with IDLE on double click

While everything has technically been set up for you, it may be troublesome to open IDLE and then open up the file again within IDLE. If you'd like to have a quick access option to edit a Python file from anywhere in Windows, follow these steps:

1. Right click any Python file (the provided one that came along with this task is sufficient)
2. Select the "Properties" tab.
3. Next to "Opens with: .." , select "Change…"
4. Scroll down to select "More apps", then scroll down even further to "Look for another app on the PC"
5. A File Explorer should open. Navigate to `C:\Users\<Your username>\AppData\Local\Programs\Python\Python37\Lib\idlelib`, or wherever you had Python installed.
    a. *Typing %localappdata% in the search bar will automatically bring you to the \AppData\Local folder.*
6. A "idle.bat" file should be present in that directory, click on it to let the files open in IDLE automatically.
7. Click on "Apply" and close the Properties tab
8. Double click on the file again and you should be able to see it pop up in IDLE automatically.



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 Python Files"):

You may download Python 3.7.8 from https://www.python.org/ftp/python/3.7.8/python-3.7.8-macosx10.9.pkg. 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
```

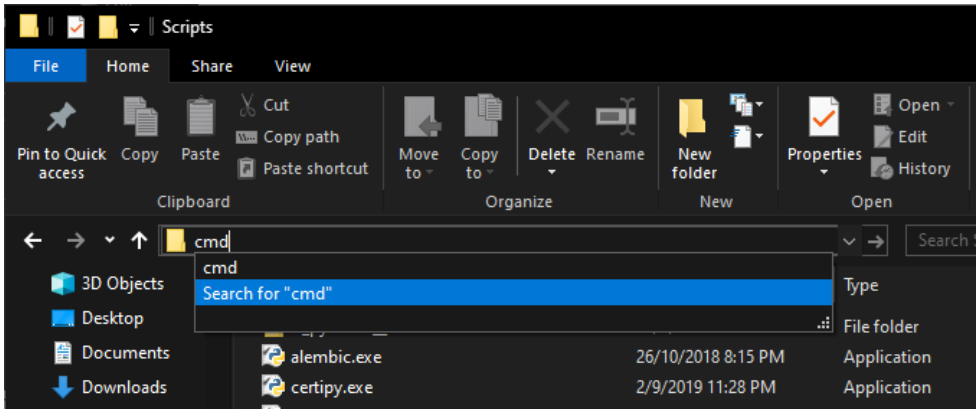
Linux Users:

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

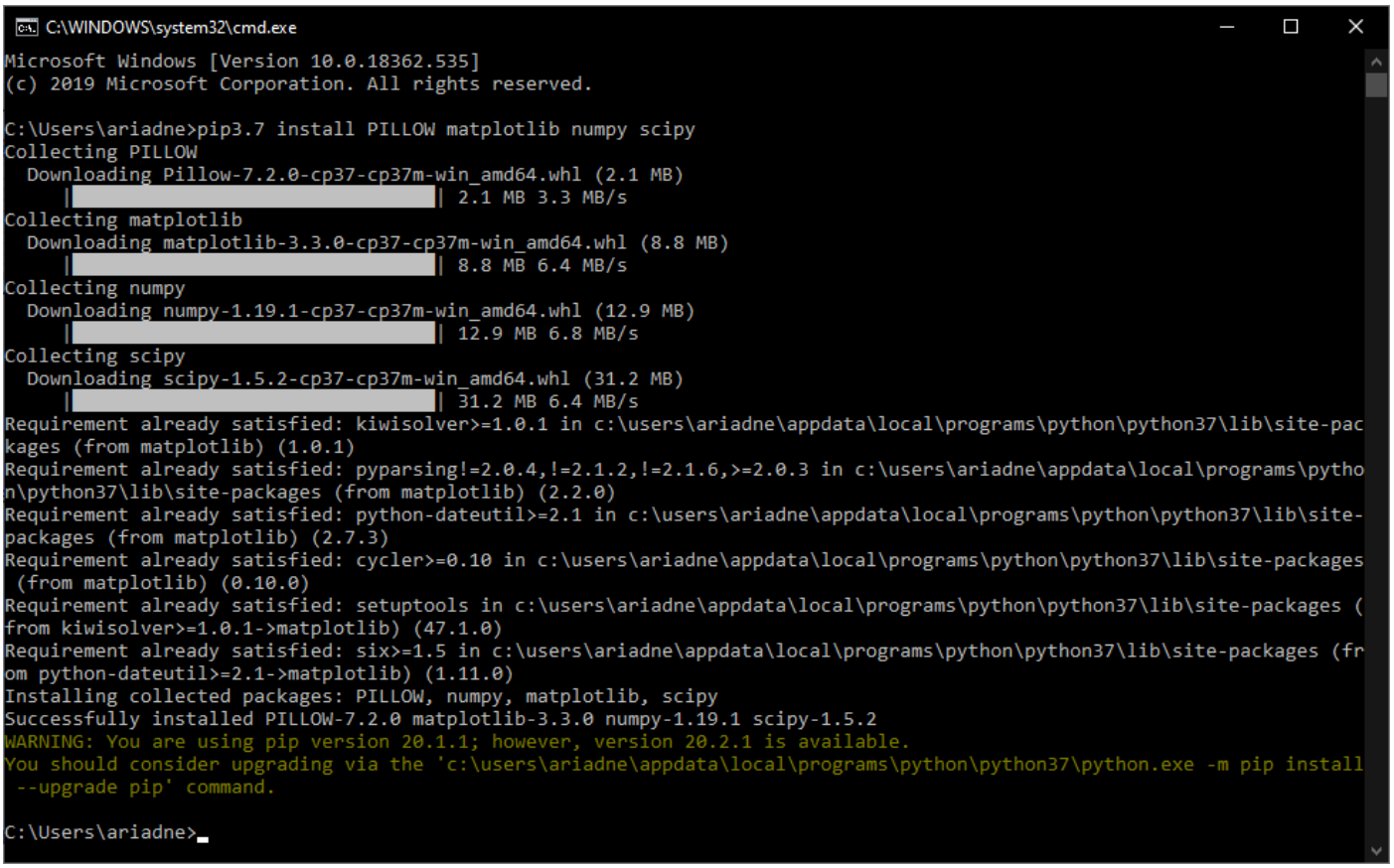
Installing Additional Libraries

Do follow the steps below to get the additional libraries that will be used for this course.

1. Before anything, if you did not select the "Add Python 3.7 to PATH" option, you will first need to find your Python scripts in the file explorer. The default Windows installation path is 'C:\Users\<username>\AppData\Local\Programs\Python\Python37\Scripts'. From there, type 'cmd' into the 'URL box' and press Enter to bring up a new command-line window at the current file location. If you had checked the option during installation, do you not need to do this step, running 'Command Prompt' from the Windows menu (you may need to search for it) will work fine.



2. Once at the command line, simply type "`pip3.7 install PILLOW matplotlib numpy scipy imageio`" and let it do its thing. (You may see a few more progress bars in your installation, that is completely fine, do not panic.)



3. Once done, you should be able to import 'numpy' and the other libraries in Python and everything will be good to go! Running the 'import numpy' line should NOT produce any errors, if it does you probably might have installed numpy to a different version of Python. (You will be able to check this later in one of the exercises provided.) Do check that you're executing the correct version of Python in your IDLE.

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.

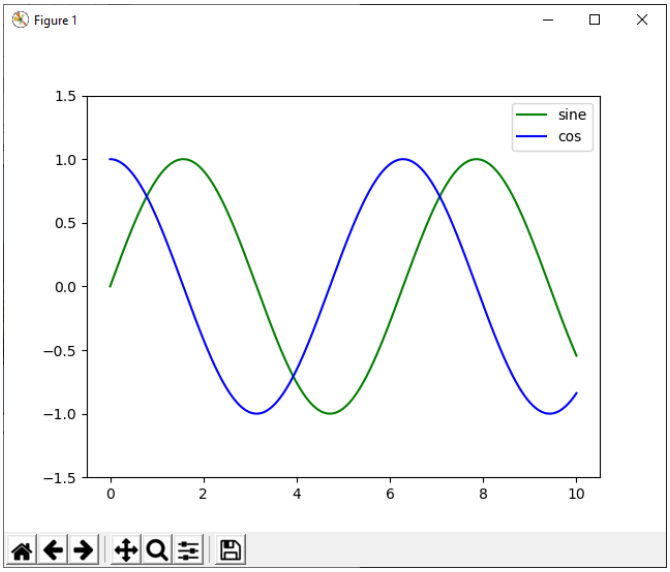
For Windows, if you had followed the optional part just now when installing Python, double clicking the file should automatically open it in IDLE instead. If not, you will have to open up IDLE (it's an installed program), then open up the Python file again by selecting "File" > "Open". For Mac users, the option to edit should appear by right clicking on the Python file, then choosing "Open With" > "IDLE".

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

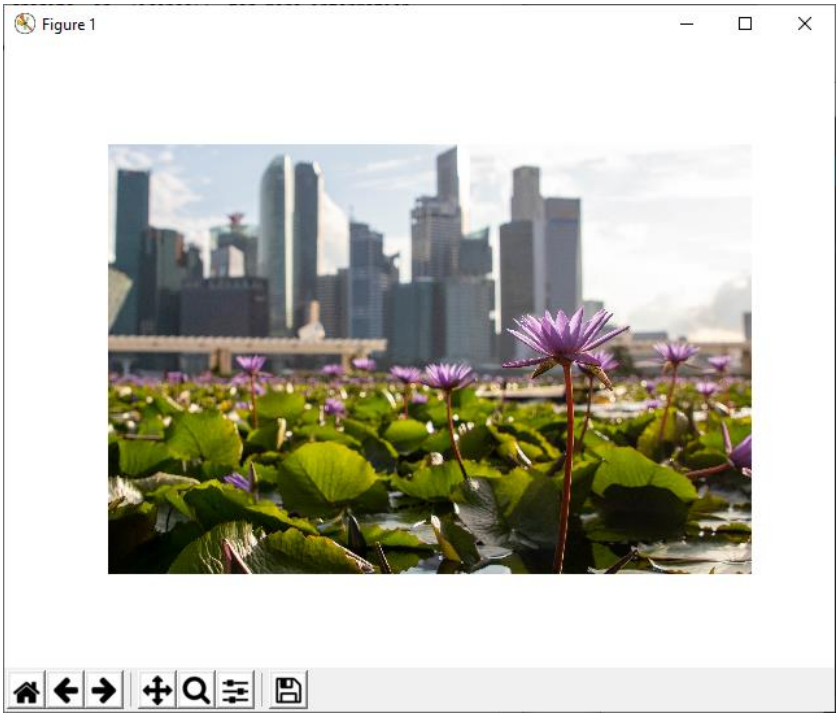
To execute the Python file, go to Run > Run Module (or F5). The output of your Python file should then appear in the Shell Window.

Run Your First Python Programs

Download the file “waves.py” and open it with IDLE. Run the file and you should see the following after a few seconds.



Download the file “lotus.py” and open it with IDLE. Make sure that the image “lotus.jpg” is in the same directory. Run the file and you should see the following after a few seconds.



If you managed to produce both images, that means your Python and IDLE were installed correctly. Congratulations!

Basic Python Exploration

Open the file “guess_the_answers.py”. Your job is to predict the output when each expression is evaluated in IDLE.

Before checking your answers with IDLE, write down briefly **ALL** your guesses of what the interpreter would display when the expressions are evaluated sequentially as listed. If you do not expect any output, you may write “no output” and if you expect an error, you may write “error”.

Now, run the code by removing the # in the front of the respective lines in the template file. You should comment out error-causing definitions by adding # to the front of such definitions to allow IDLE to skip processing them. (Or by choosing the area that you would like to comment out and then pressing IDLE’s hot-key alt+3 for windows, control+3 for macOS)

After you have checked your answers, if any expression has evaluated differently from your expected answer, write down what it evaluated to below your expected answer.

However, if any expression would generate an error message after running, please specify the type of error (such as TypeError) together with the error message in your final answer. You do not need to include the full error output. The required answer is usually only the last line of the error output.

Reminder: Lines that begin with a # are comments (text that do not affect the Python execution). To execute a particular expression, ensure it does not begin with a #.