LECTURE 1-1
INTRODUCTION & PYTHON I

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Outline

- Grading Policy & Project Examples
- Installing Python
- Python Basic I
  - Input & Output
  - Variable & Value
  - Importing Packages
- Appendix
  - Python Install

Grading Overview

|	
Project 50 (Proposal 20 + Final Report 30)	• Papers only (no presentation). • Progress-to-plan is evaluated. • Extra points for novelty of research.
Interim Presentation 20	• Progress-to-plan and communication skill. • Fluency or cogency.
Peer-evaluation 10	• Communication skill and cogency.
Participation 20	• Short present of exercise problem. • 5 points per activity.
Homework 20	• 3 – 5 questions every week.
Attendance 10	• Two points deduction for every absence.

- Total points are 130, not 100, while A+ for 95 points and more.
- More chance to build-up your scores.

Project

- Project has two ingredients: reproduction (RP) of already-known results and elementary research (ER) of unknown result.
- Grading is designed such that RP is just enough to get the maximum score (see the previous page). ER will get extra 10 points.
- Novelty of the work for ER will be judged at the proposal level. When students claim the novelty of their idea, they should provide enough materials (references etc.) to verify their claim.

RP
(proposal 16+paper 24)

ER
(4+6)

0   40   50

Progress-to-plan
Clarity
Etc.

Novelty
Etc.
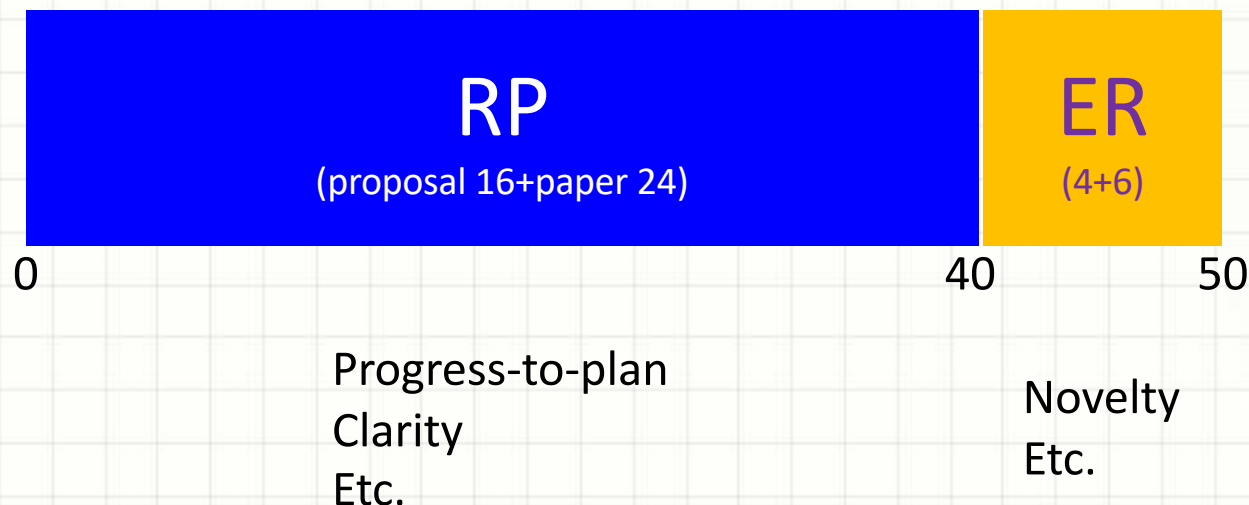
Examples of Project Subject

- Project has two ingridea, they should provide enough materials (references etc.) to verify their claim.

Development Environment

- **IDE** (Integrated Development Environment) is the environment, where the source code editor, debugging tools, compiler and other useful tools are integrated for efficient development of programs.
- You can use any IDE you want; e.g. jupyter, vscode, etc.
- The IDE package management and update can be easily done in the ***Anaconda Navigator*** platform. Look at https://docs.anaconda.com/anaconda/install/
- Install Anaconda with python version 3 or more (if any).

Data science technology for
human sensemaking.

A movement that brings together millions of data science practitioners,
data-driven enterprises, and the open source community.

Get Started

Python is installed together!

This website uses cookies to ensure you get the best experience on our website. Privacy Policy   Accept
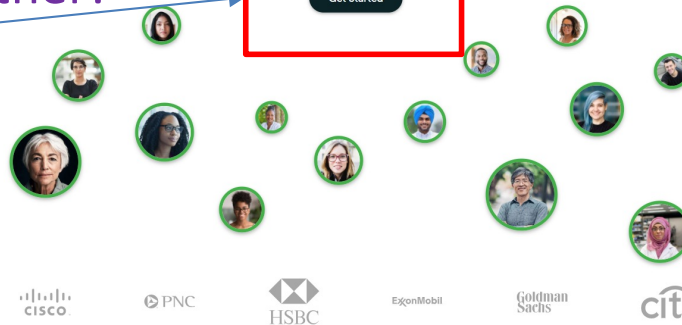
Development Environment

Individual Edition

Your data science toolkit

With over 20 million users worldwide, the open-source Individual Edition (Distribution) is the easiest way to perform Python/R data science and machine learning on a single machine. Developed for solo practitioners, it is the toolkit that equips you to work with thousands of open-source packages and libraries.

Download

Open Source

Anaconda Individual Edition is the world's most popular Python distribution platform with over 20 million users worldwide. You can trust in our long-term commitment to supporting the Anaconda open-source ecosystem, the platform of choice for Python data science.

Conda Packages

Search our cloud-based repository to find and install over 7,500 data science and machine learning packages. With the conda-install command, you can start using thousands of open-source Conda, R, Python and many other packages.

Manage Environments

Individual Edition is an open source, flexible solution that provides the utilities to build, distribute, install, update, and manage software in a cross-platform manner. Conda makes it easy to manage multiple data environments that can be maintained and run separately without interference from each other.
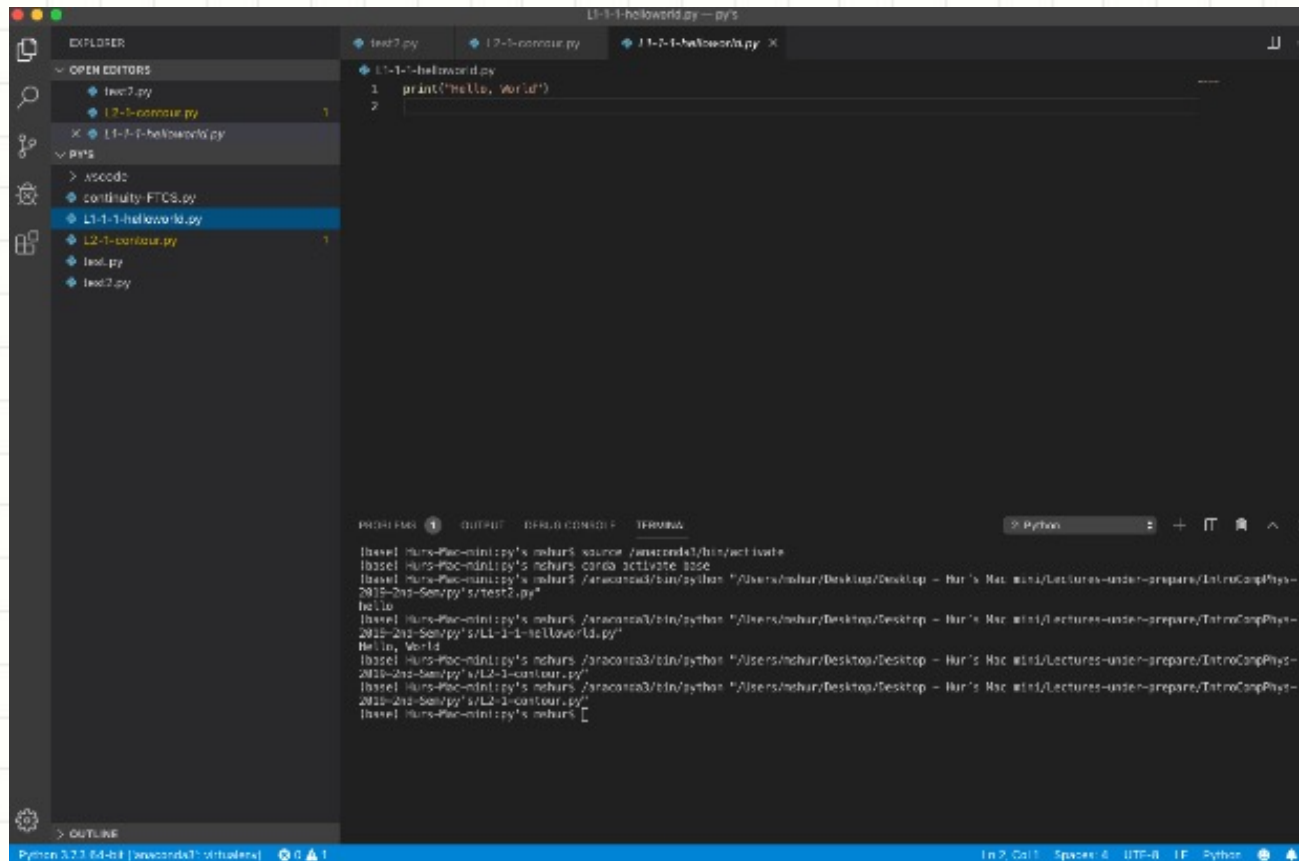
Development Environment

- Once you install the Anaconda Navigator, you can find the page where you can one-click-install the IDE.
- For this class, click the vscode, but if you insist using different IDE, it is up to you.
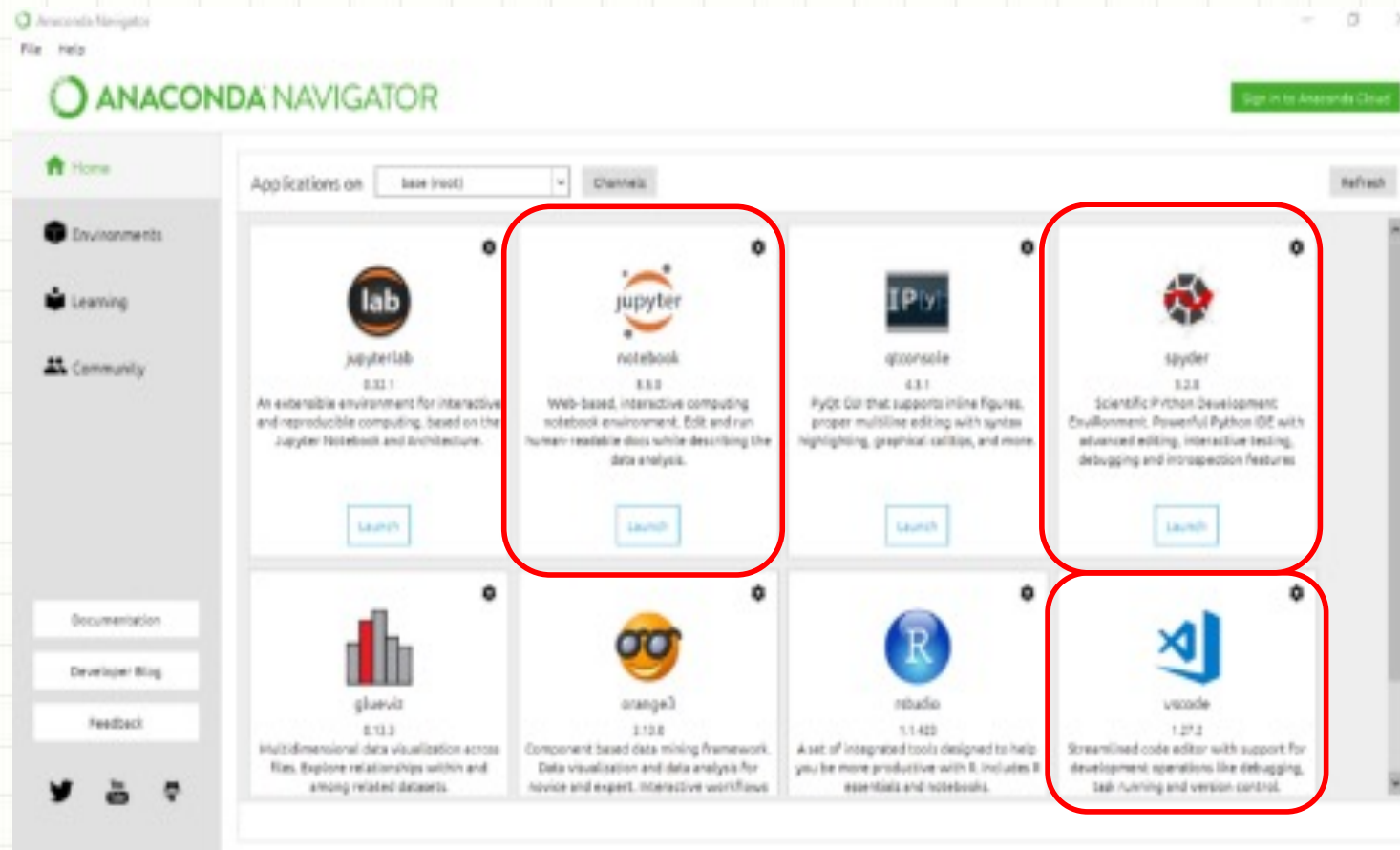
Python Script

- You may want to reuse your commands repeatedly.
- The best way is saving them to a file, and reopen it.
- Save your commands to .py files. The contents in these files are called 'source code'.

Printing Data

- How can a program say something to the user? One way is printing messages to the screen.
- In the Python, *print()* function can be used for that.

Example 1. Print 'Hello, World.' to the screen.
Answer: >>> print ('Hello, World.')
            Hello, World.
            >>>

Example 2. Print the sum of 2 and 5 to the screen.
Answer: >>> print (2+5)
            7
            >>>

Printing Data

Example 3. In the Python prompt, run *print('hello,' + 'world.')*.
Answer: >>> print('hello,' + 'world.')
        hello,world.   ← The + operator concatenates the strings.
        >>>

Example 4. In the Python prompt, run *print('Hi' + 3)*.
Answer: You come across the error message. Data of different types cannot be summed.

Example 5. Print multiple data to the screen, e.g. 'Hi' and 3.
Answer: >>> print('Hi',3)
        >>> ('Hi',3)
        >>>

Getting User's Data

- How can a program hear something from the user? One way is getting input from typing.
- In the Python, *input()* function can be used for that.

Example 6. Make a command which displays a prompting message 'Put your name: ' and wait for the user's typing. The typed data should be saved to a variable, e.g. *name,* for later use. Print a message '*name* is smart.'

Answer: >>> name=input('Put your name: ')

       Put your name: 'John'   ← Use ' ' or " " to input a string.

       >>> print(name + ' is smart.')

       John is smart.

       >>>

Getting User's Data

Exercise 1. Make a command which gets a number with a prompting message 'Put any number: '. Print it.

Answer: >>> x=input('Put any number: ')
        Put any number: 5
        >>> print(x)

Exercise 2. Ask the user's name and age. Print a message which looks like '*name* is *age* years old.' You can use the input() function twice.

Answer: >>> name=input('Your name: '); age=input('Your age: ')
        Your name: John   ↑ Multiple commands is separated by ';'
        Your age: 21   ← *age* is a string, for concatenation with others.
        >>> print(name + ' is ' + age + ' years old.')
        8
        >>>   When *age* is typed as an integer, how can you
                                concatenate it with other strings?

Variable and Value

- In Example 6, the input **value** is stored to a **variable** (in that case, *name*).
- A variable is created as soon as a value is assigned to that, e.g. by doing like *x=5*.
- What happens exactly is, a space in the physical memory is secured, and the integer 5 is stashed in that space, which is then named *x*.
- The variable can be overwritten by other value of other **data type** any time. What happens actually is securing another space for the new value, and set free the old space for the old value.
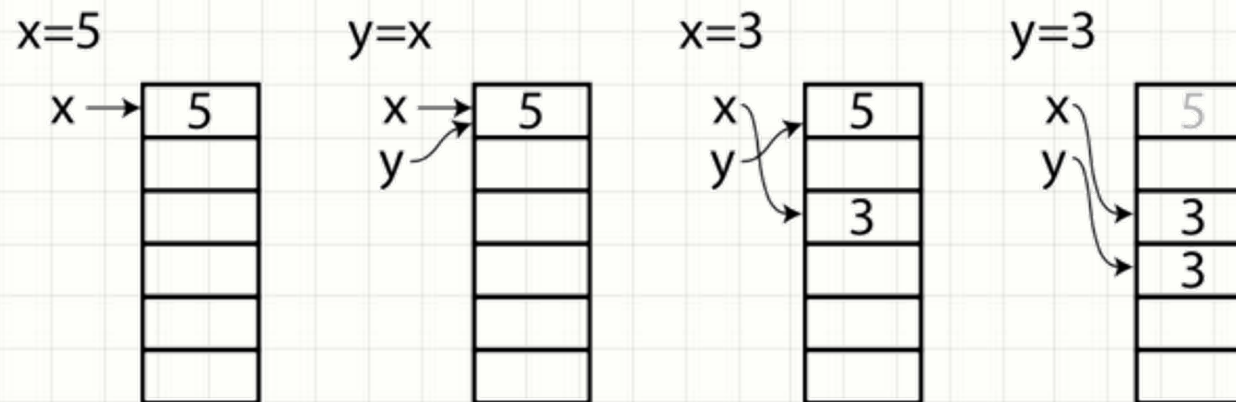
x=5　　　　　y=x　　　　　x=3　　　　　y=3

Figure is from 'Computational Physics with Python' by E. Ayars.

Development Environment

Example 7. Save the commands used in Example 6 to a .py file. Run the saved script in any DE you use.

Exercise 3. Write a python script file (i.e. the .py file), which gets two numbers and print the sum, product, and average of them.

You have to convert input characters into numeric data. The arithmetic operators are +, -, *, /

Exercise 4. Write a python script file, which gets a string and shows the number of characters in that string.

You can use len('string') function to get the length of the string.

Exercise 5. Write a python script file, which gets two strings and concatenates them.
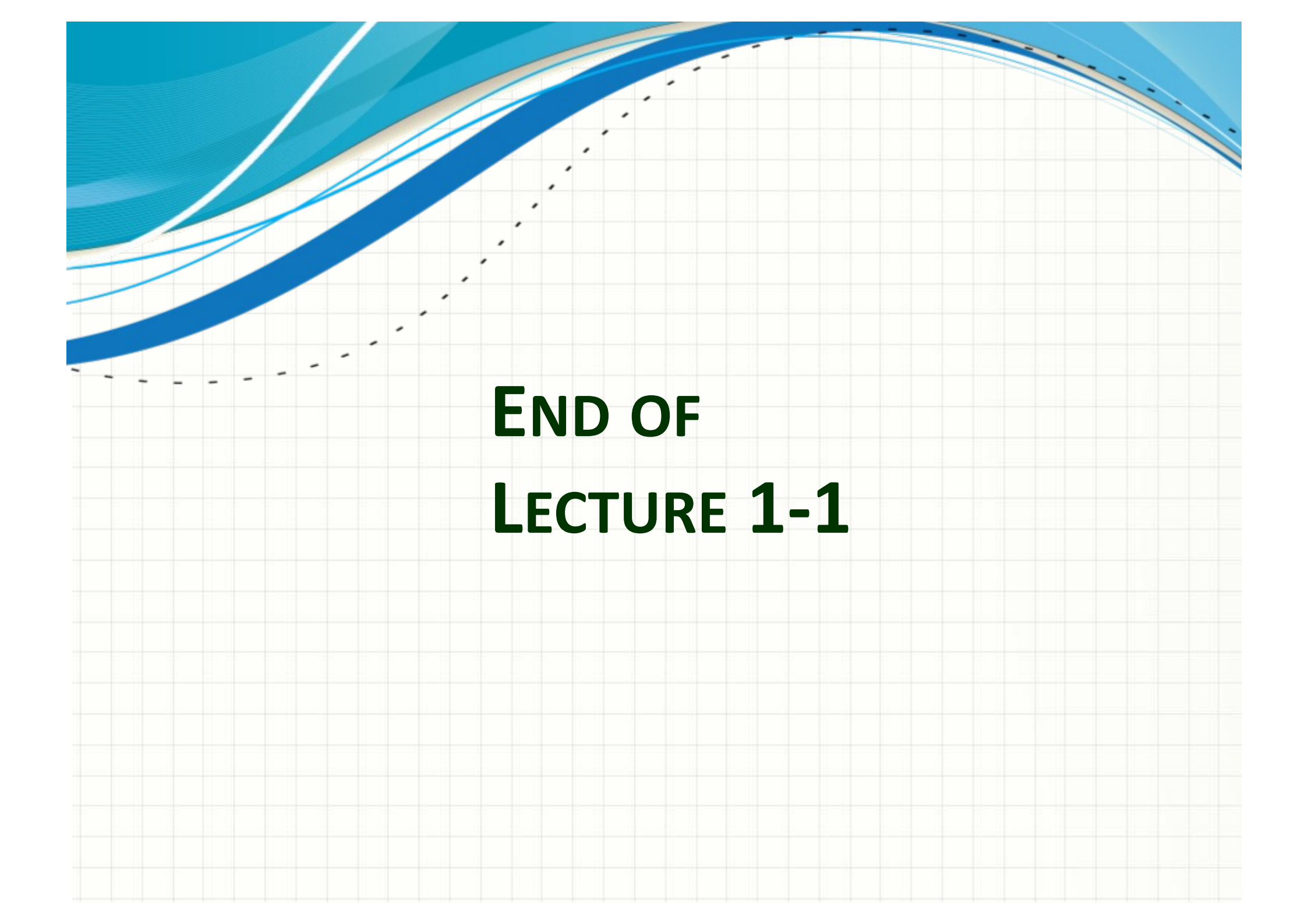
Import Module

Example 8. Print the value of sin(pi/3) using the numpy package.

Answer: >>> import numpy as np
>>> print(np.sin(np.pi/3.0))
0.8660254037844386

Exercise 6. Look around numpy websites.

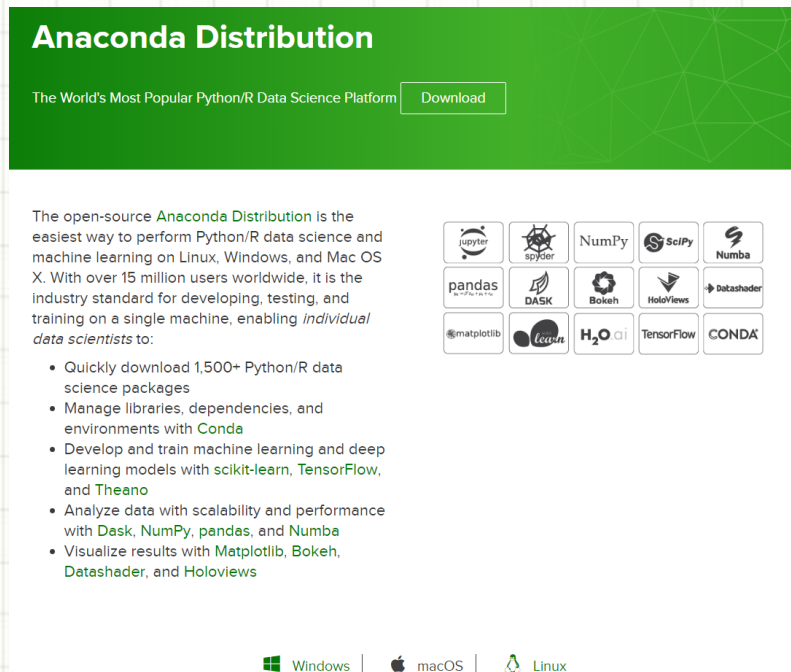*Exercise 7.* Look around pyplot websites.

END OF LECTURE 1-1

APPENDIX
PYTHON INSTALL

Installing Python

For **EasyWay for Everyone**

Anaconda Distribution

The World's Most Popular Python/R Data Science Platform [Download]

The open-source Anaconda Distribution is the easiest way to perform Python/R data science and machine learning on Linux, Windows, and Mac OS X. With over 15 million users worldwide, it is the industry standard for developing, testing, and training on a single machine, enabling *individual data scientists* to:

- Quickly download 1,500+ Python/R data science packages
- Manage libraries, dependencies, and environments with Conda
- Develop and train machine learning and deep learning models with scikit-learn, TensorFlow, and Theano
- Analyze data with scalability and performance with Dask, NumPy, pandas, and Numba
- Visualize results with Matplotlib, Bokeh, Datashader, and Holoviews

⊞ Windows | 🍎 macOS | 🐧 Linux

Anaconda is a free and open-source distribution of the Python and R programming languages for scientific computing (data science, machine learning applications, large-scale data processing, predictive analytics, etc.), that aims to simplify package management and deployment. Package versions are managed by the package management system conda. The Anaconda distribution is used by over 15 million users and includes more than 1500 popular data-science packages suitable for Windows, Linux, and MacOS (https://en.wikipedia.org/wiki/Anaconda_(Python_distribution))

Installing Python

For **EasyWay for Everyone**

Anaconda 2019.03 for Windows Installer

Python 3.7 version

Download

64-Bit Graphical Installer (662 MB)
32-Bit Graphical Installer (546 MB)

Python 2.7 version

Download

64-Bit Graphical Installer (587 MB)
32-Bit Graphical Installer (493 MB)

Anaconda 2019.03 for macOS Installer

Python 3.7 version

Download

64-Bit Graphical Installer (637 MB)
64-Bit Command Line Installer (542 MB)

Python 2.7 version

Download

64-Bit Graphical Installer (624 MB)
64-Bit Command Line Installer (530 MB)

Anaconda 2019.03 for Linux Installer

Python 3.7 version

Download

64-Bit (x86) Installer (654 MB)
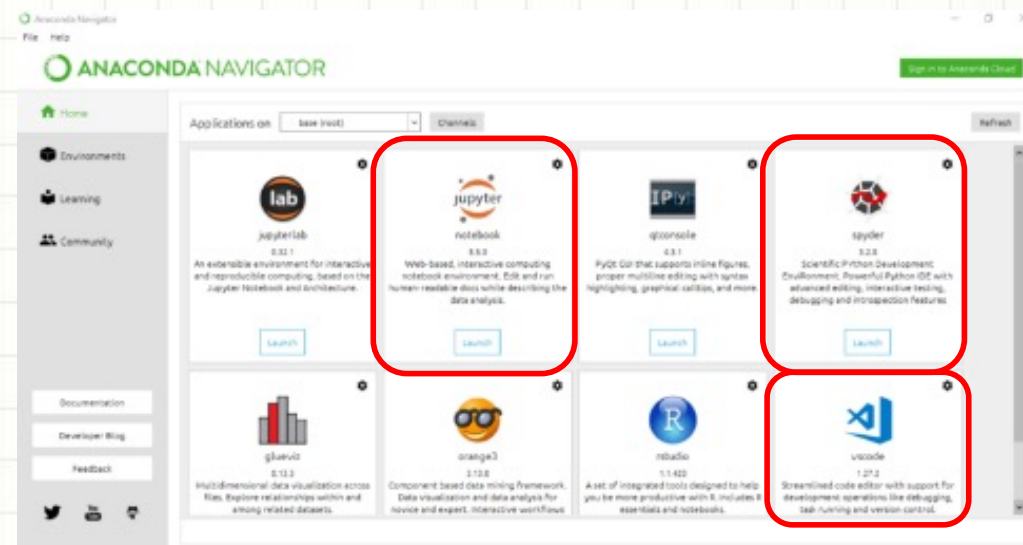64-Bit (Power8 and Power9) Installer (315 MB)

Python 2.7 version

Download

64-Bit (x86) Installer (630 MB)
64-Bit (Power8 and Power9) Installer (291 MB)

Select the installation file according to your OS type and download it. Then proceed with the installation.

After installation, run Anaconda navigator.

Installing Python

For EasyWay for Everyone

Spyder is an open source cross-platform integrated development environment (IDE) for scientific programming in the Python language.

Visual Studio Code is a source-code editor developed by Microsoft for Windows, Linux and macOS. It includes support for debugging, embedded Git control and GitHub, syntax highlighting, intelligent code completion, snippets, and code refactoring. It is highly customizable.

Jupyter Notebook (formerly IPython Notebooks) is a web-based interactive computational environment for creating Jupyter notebook documents. The "notebook" term can colloquially make reference to many different entities, mainly the Jupyter web application, Jupyter Python web server, or Jupyter document format depending on context.

With anaconda navigator, you can install three IDEs with just one click.
You can install your favorite IDE.

Installing Python

For **EasyWay for Everyone**

What are the top 7 Best Python IDEs in 2019

1. PyCharm
2. AWS Cloud9
3. Komodo IDE
4. Codenvy
5. KDevelop
6. Anjuta
7. Wing Python IDE

Alternatively, you can install other IDEs directly. The list above is a list of IDEs that people use mainly by year 2019.

(In particular, AWS Cloud9 is a cloud-based integrated development environment (IDE) that lets you write, run, and debug your code with just a browser.)

Installing Python

For **Window**

python is maintained at www.python.org. There are several installation methods.

1. **Manual**
   → Download the latest python version(python3.7.4) at
   https://www.python.org/downloads/windows/
   and Install. If you want to add PATH to your window machine then check box.

Installing Python

For **Window**

If you do not check it(add PATH) but want to manually register it later in your PATH
→ Follow

In the Windows Control Panel, click System Properties.

Click the red button on the left figure.
Then click the Register PATH button as shown below.
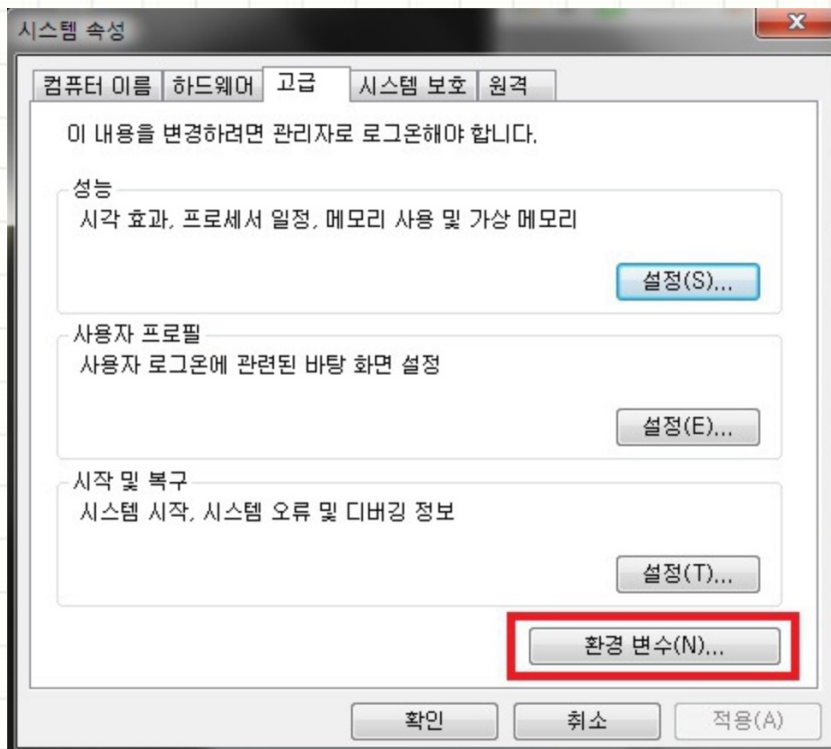
Installing Python

For **Window**
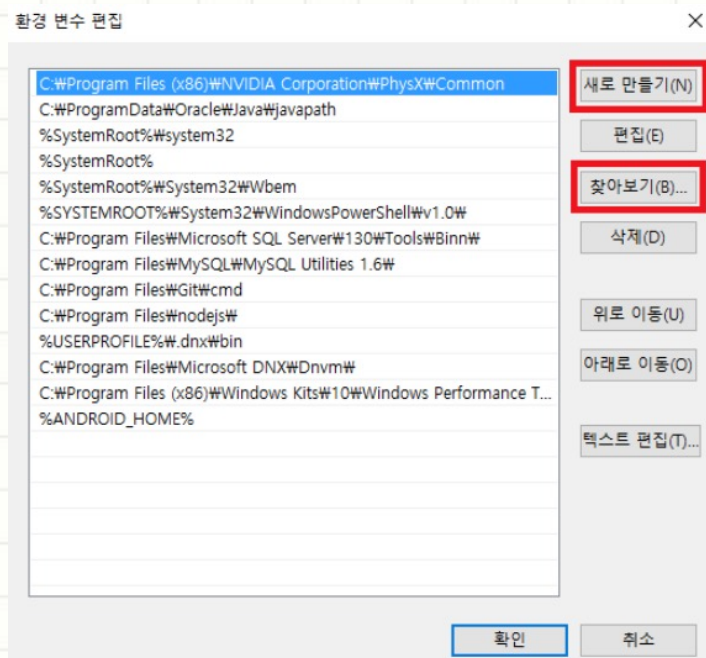
Then click the "Browse" button to add the Python installation path,

or

click the "New" button to enter the path directly.

Most Python Path
→ C:\User\Username(your user name)\AppData\Local\Programs\Python\Pythonversion(installed)

Installing Python

For **Mac**

Mac OS has Python installed by default(python2.X). So the first thing you should check is the version of Python installed.
Open terminal, and type

   python –V or python --version

then you can recognize. Most Mac OS have a default installation version of python2.
Therefore, also check the following commands.(Probably not installed.)

   python3 –V or python3 --version

If not, there are two choices.
It is a manual installation method and using a package management system.

Installing Python

For Mac

Manual

Connect to the link below to download and install(just double click) the latest pkg file.

https://www.python.org/downloads/release/python-374/

Files

Version	Operating System	Description	MD5 Sum	File Size	GPG
Gzipped source tarball	Source release		68111671e5b2db4aef7b9ab01bf0f9be	23017663	SIG
XZ compressed source tarball	Source release		d33e4aae66097051c2eca45ee3604803	17131432	SIG
macOS 64-bit/32-bit installer	Mac OS X	for Mac OS X 10.6 and later	6428b4fa7583daff1a442cba8cee08e6	34898416	SIG
macOS 64-bit installer	Mac OS X	for OS X 10.9 and later	5dd605c38217a45773bf5e4a936b241f	28082845	SIG
Windows help file	Windows		d63999573a2c06b2ac56cade6b4f7cd2	8131761	SIG
Windows x86-64 embeddable zip file	Windows	for AMD64/EM64T/x64	9b00c8cf6d9ec0b9abe83184a40729a2	7504391	SIG
Windows x86-64 executable installer	Windows	for AMD64/EM64T/x64	a702b4b0ad76debdb3043a583e563400	26680368	SIG
Windows x86-64 web-based installer	Windows	for AMD64/EM64T/x64	28cb1c608bbd73ae8e53a3bd351b4bd2	1362904	SIG
Windows x86 embeddable zip file	Windows		9fab3b81f8841879fda94133574139d8	6741626	SIG
Windows x86 executable installer	Windows		33cc602942a54446a3d6451476394789	25663848	SIG
Windows x86 web-based installer	Windows		1b670cfa5d317df82c30983ea371d87c	1324608	SIG

Installing Python

For **Mac**

Using a management system

1. First, you need to install the package program (homebrew). **open terminal**
2. Execute the following commands as they are.

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

3. After that, you can install python or python3
4. Type brew install python(or python3) in a terminal window to finish the installation.

   after that, also check the following command.

   python3 –V or python3 --version

Installing Python

For **Linux (Centos, Ubuntu, Fedora …)**

Linux System has Python installed by default(python 2.X). So the first thing you should check is the version of Python installed.
Open terminal, and type

python –V or python --version

then you can recognize. Most Linux systems have a default installation version of python2. Therefore, also check the following commands.(Probably not installed.)

python3 –V or python3 --version

If not, there are two choices.
It is a manual installation method and using a package management system.
(apt-get for Debian or Ubuntu,yum for centos,etc …)

Installing Python

For **Linux (Centos, Ubuntu, Fedora ...)**

Manual

Connect to the link below to download and install the latest source file.

https://www.python.org/downloads/release/python-374/

(If you are familiar with the wget command, you can access the file directly.)

Files

Version	Operating System	Description	MD5 Sum	File Size	GPG
Gzipped source tarball	Source release		68111671e5b2db4aef7b9ab01bf0f9be	23017663	SIG
XZ compressed source tarball	Source release		d33e4aae66097051c2eca45ee3604803	17131432	SIG
macOS 64-bit/32-bit installer	Mac OS X	for Mac OS X 10.6 and later	6428b4fa7583daff1a442cba8cee08e6	34898416	SIG
macOS 64-bit installer	Mac OS X	for OS X 10.9 and later	5dd605c38217a45773bf5e4a936b241f	28082845	SIG
Windows help file	Windows		d63999573a2c06b2ac56cade6b4f7cd2	8131761	SIG
Windows x86-64 embeddable zip file	Windows	for AMD64/EM64T/x64	9b00c8cf6d9ec0b9abe83184a40729a2	7504391	SIG
Windows x86-64 executable installer	Windows	for AMD64/EM64T/x64	a702b4b0ad76debdb3043a583e563400	26680368	SIG
Windows x86-64 web-based installer	Windows	for AMD64/EM64T/x64	28cb1c608bbd73ae8e53a3bd351b4bd2	1362904	SIG
Windows x86 embeddable zip file	Windows		9fab3b81f8841879fda94133574139d8	6741626	SIG
Windows x86 executable installer	Windows		33cc602942a54446a3d6451476394789	25663848	SIG
Windows x86 web-based installer	Windows		1b670cfa5d317df82c30983ea371d87c	1324608	SIG

Installing Python

For Linux (Centos, Ubuntu, Fedora …)

Manual

After download .xz file or .gz file in link, Type the following commands in a terminal window.

1. → tar –xvf filename(.xz file downloaded) or tar –zxvf filename(.gz file downloaded)
2. → cd foldername(extracted file's name)
3. → ./configure --enable-optimizations
4. → make altinstall

after install, type the command

→ python3 –V or python3 --version

Installing Python

For **Linux (Centos, Ubuntu, Fedora …)**

Using a package management system

1. First, you need to know what package programs are available in your linux system. **open terminal and type the command.**
2. cat /etc/*-release | uniq → You can check your Linux environment by running this command.
3. If you use centOS or Fedora, you can use yum and most others use apt or apt-get.

- Type the commands (For yum user)
1. yum install -y https://centos7.iuscommunity.org/ius-release.rpm
2. yum install -y python36u python36u-libs python36u-devel python36u-pip
3. ln -s /bin/python3.6 /bin/python3
4. ln -s /bin/pip3.6 /bin/pip

- Type the commands (For apt user)
1. apt update
2. apt install software-properties-common
3. add-apt-repository ppa:deadsnakes/ppa
4. apt install python3.7