CDS 230
Modeling and Simulation I

Module 2

Setting up your Python environment

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Topics covered

1. Python programming language
2. Installing Python
3. Running Python

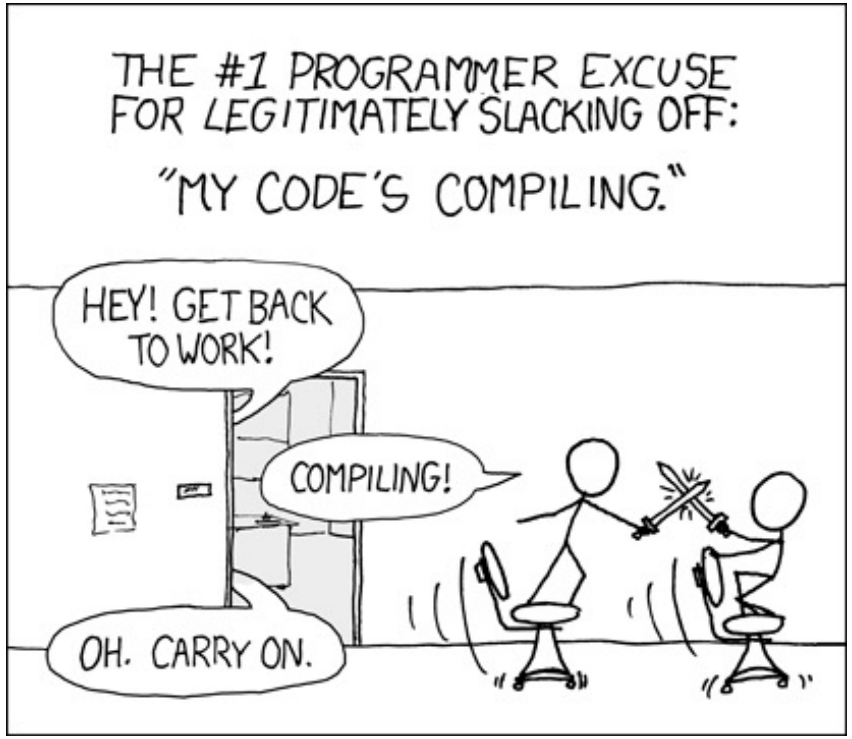
Conception of Python

- Dates back to the late 1980s
- Developed by Guido van Rossum while at the National Research Institute for Mathematics and Computer Science in the Netherlands.
- Inspired by the ABC language
  - More clear syntax (indentation, namespaces,…)
  - More comprehensive standard library
  - Extensible (C language support)

Figure source: python.org, https://gvanrossum.github.io

Python programming language features

- General purpose
- Interpreted (vs. compiled)
- Procedural, object-oriented, and supports functions
- Comprehensive standard library



https://xkcd.com/303/

Python version history

V.1 (1990-2000)

- 1.0: 1994
- …
- 1.5.2: April 1999
- 1.6.1: September 2000

V.2 (2000-2020)

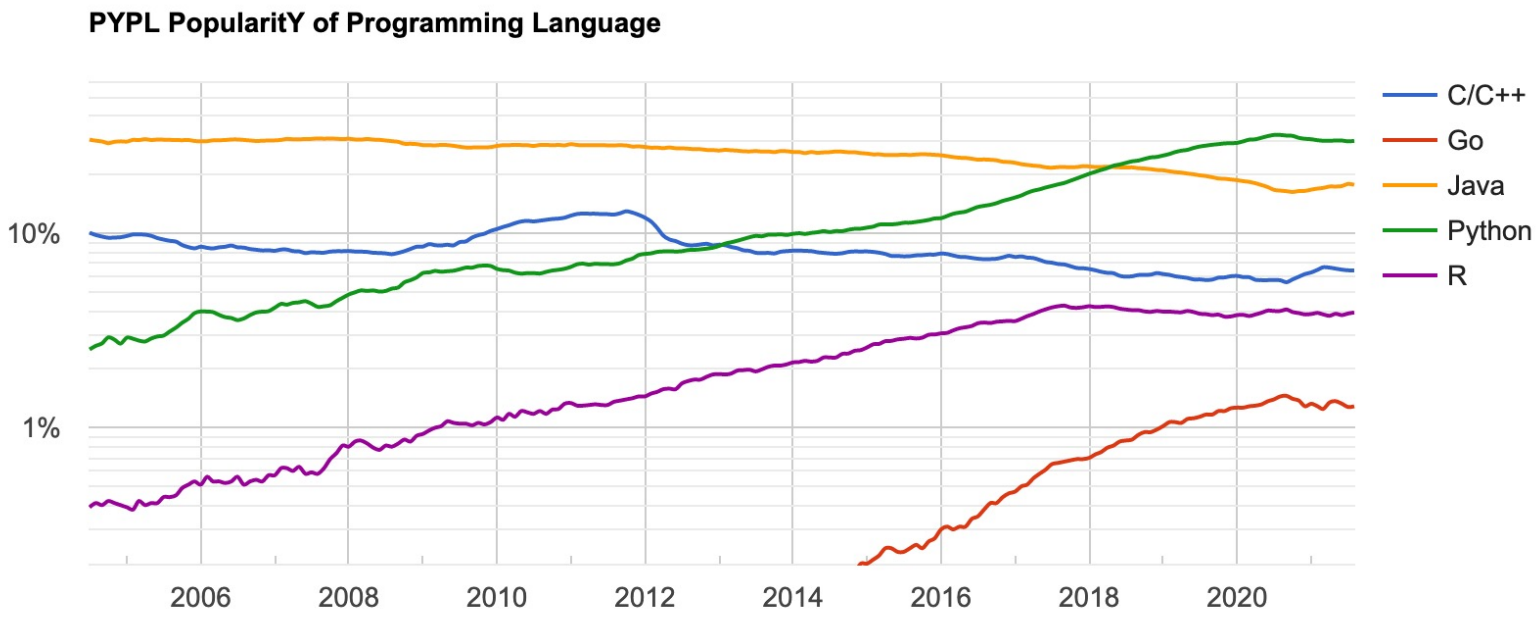
- 2.0: October 2000
- 2.0.1: June 2001
- …
- 2.6: October 2008
- ….
- 2.7.17: October 2019

V.3 (2008-…)

- 3.0: December 2008
- 3.0.1: February 2009
- …
- 3.4: March 2014
- …
- 3.9.6: June 2021

See the release list at https://www.python.org/downloads/

Popularity of Python



"how often language tutorials are searched on Google"

Worldwide, Aug 2021 compared to a year ago:

Rank	Change	Language	Share	Trend
1		Python	29.93 %	-2.2 %
2		Java	17.78 %	+1.2 %
3		JavaScript	8.79 %	+0.6 %
4		C#	6.73 %	+0.2 %
5	↑	C/C++	6.45 %	+0.7 %
6	↓	PHP	5.76 %	-0.0 %
7		R	3.92 %	-0.1 %
8		Objective-C	2.26 %	-0.3 %
9	↑	TypeScript	2.11 %	+0.2 %
10	↓	Swift	1.96 %	-0.3 %
11	↑	Kotlin	1.81 %	+0.3 %
12	↓	Matlab	1.48 %	-0.4 %
13		Go	1.29 %	-0.2 %

Source: http://pypl.github.io/PYPL.html

Popularity of Python

- Used in companies like
  - Netflix
  - Google
  - Dropbox
  - Facebook…
- Contributions come from these companies too…

Sources: https://www.techrepublic.com/article/how-netflix-uses-python-streaming-giant-reveals-its-programming-language-libraries-and-frameworks/ https://ncube.com/blog/6-huge-tech-companies-that-use-python-does-it-fit-your-project

Installing Python

Option 1: Python 3 Installer

- Global installation
- Need to follow different ways for Different OSs
- No native notebook support

Option 2: Anaconda Distribution

- Standard but portable installation
- Package management using `conda`
- Native Jupyter Notebook support

Installing Python

This is our way to move forward

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The Jupyter Notebook

👍 pros

- A web application to make it easier to develop and share code
- Open source
- Contain live **code**, **equations**, **visualization**, and **text** on a web page.
- Portable (share your notebook easily,.. even on GitHub).
- Very popular among Python programmers (esp. data scientists).

👎 cons

- No code management and organization imposed
- Challenging to make a product

What if you have a lightweight computer?

- You can use Google's Colaboratory or Colab
  - https://colab.research.google.com/notebooks/intro.ipynb
- Colab is a web-based environment allowing you to run Python code on your browser.
- Easy to run and share.
- You're free to use it but we will install and use Anaconda.

Installing plain version (vanilla) Python

- Perhaps, you already have it installed if you have a Mac or Linux?
- Open command line (or Terminal) and type `python --version` hit enter ⏎
- Version number 3.7 or later is preferred. Version 2.X is NOT suitable for this class.

Installing plain version (vanilla) Python

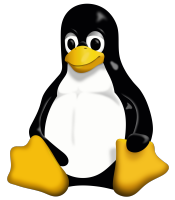
- If you have python 2.X or don't have anything at all

Microsoft Windows

- Visit https://www.python.org/downloads/windows/ Download `Windows x86-64 executable installer` and install. Don't forget to check "Add Python 3.X to PATH"

Mac

- install `homebrew` first, then type `brew install python` ⏎



- use your package manager (e.g., `sudo apt-get install python3.8` for Debian, Ubuntu, etc.)

Installing Python via Anaconda

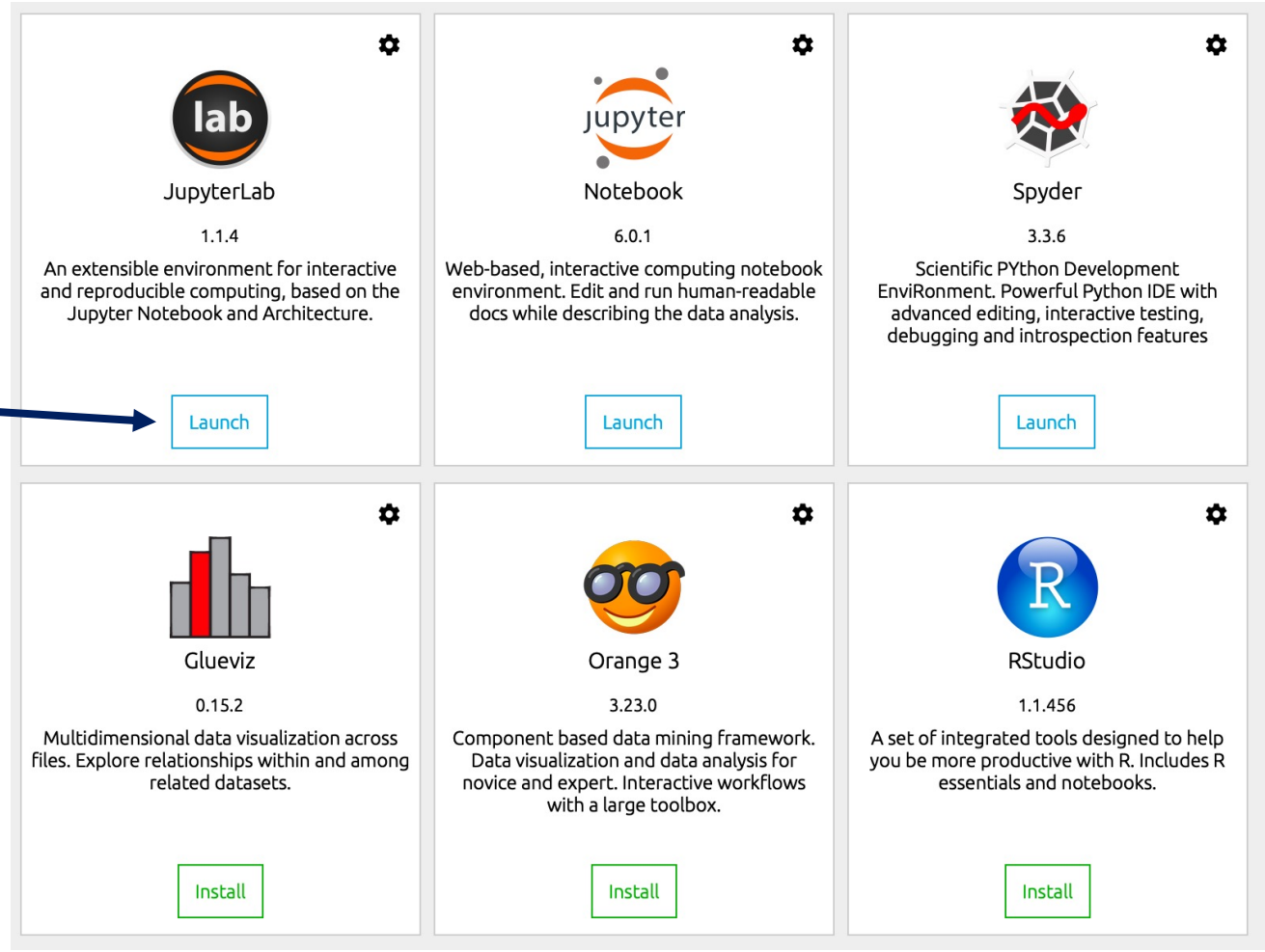
https://www.anaconda.com/products/individual-d

Scroll down and you will see the following

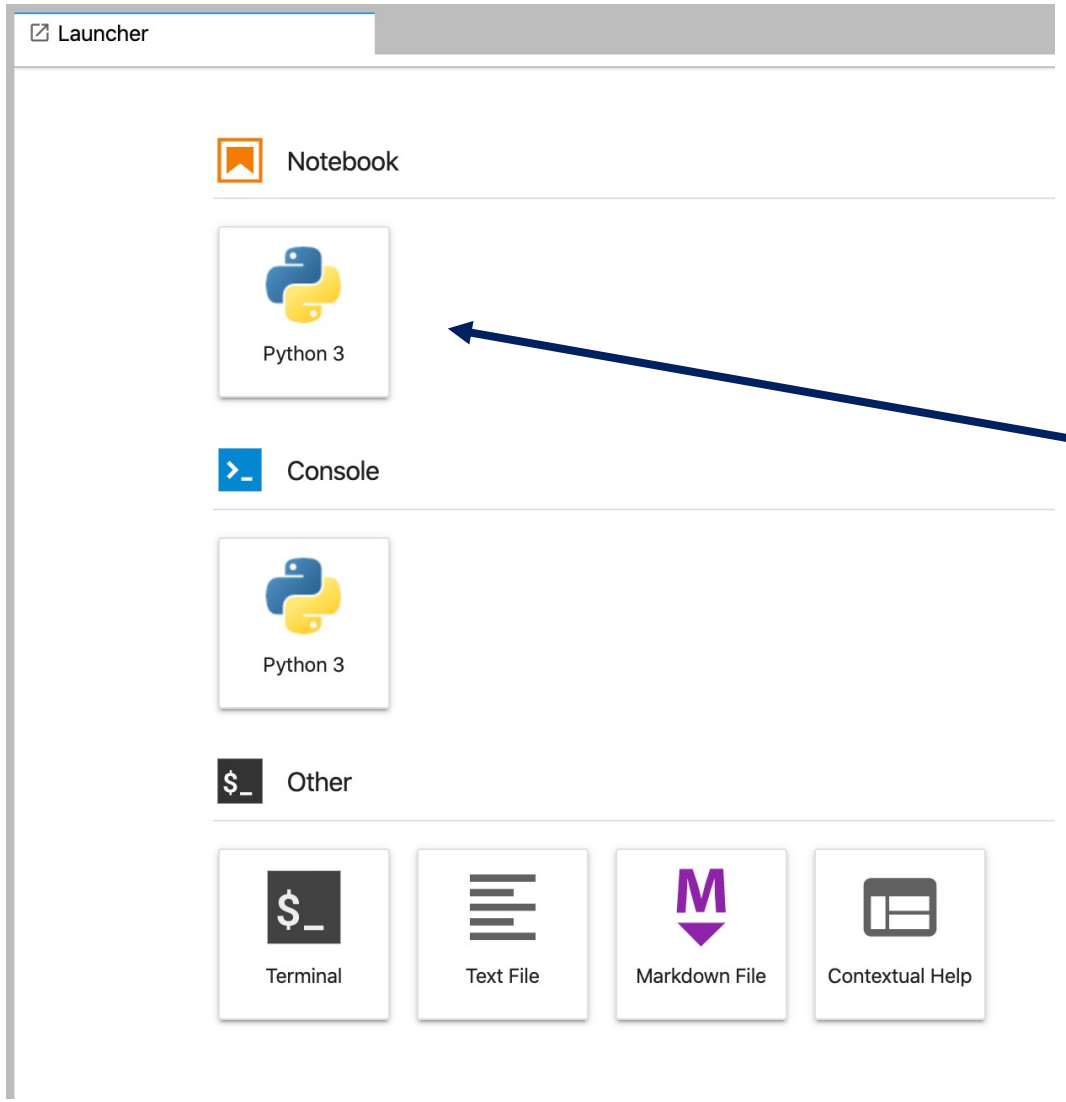
Anaconda Navigator

We will use JupyterLab

An interactive development environment for **Jupyter** Notebooks



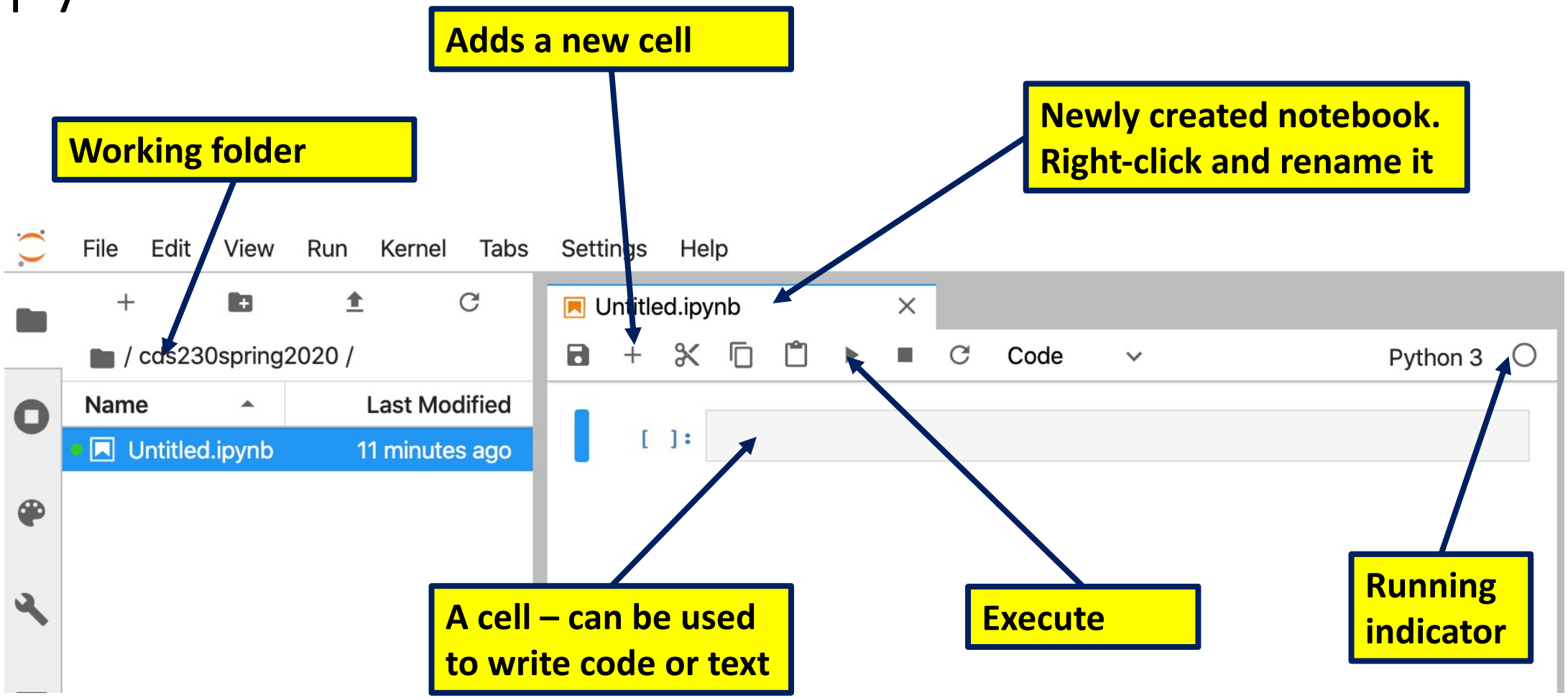
Launcher



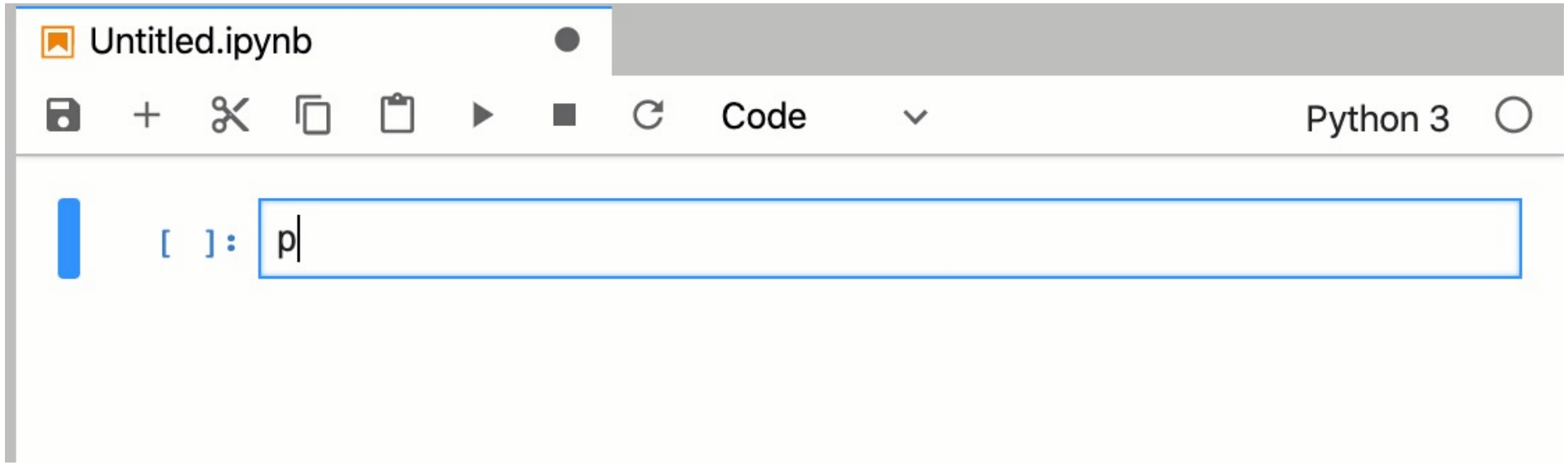
This is what you should see once you hit the “Launch” button in the previous slide.

This button starts a new Jupyter Notebook

JupyterLab


Adds a new cell
Working folder
Newly created notebook.
Right-click and rename it
File Edit View Run Kernel Tabs Settings Help
/ cds230spring2020 /
Name
Last Modified
Untitled.ipynb
11 minutes ago
Untitled.ipynb
Code
Python 3
[ ]:
A cell – can be used to write code or text
Execute
Running indicator

Hello, world!



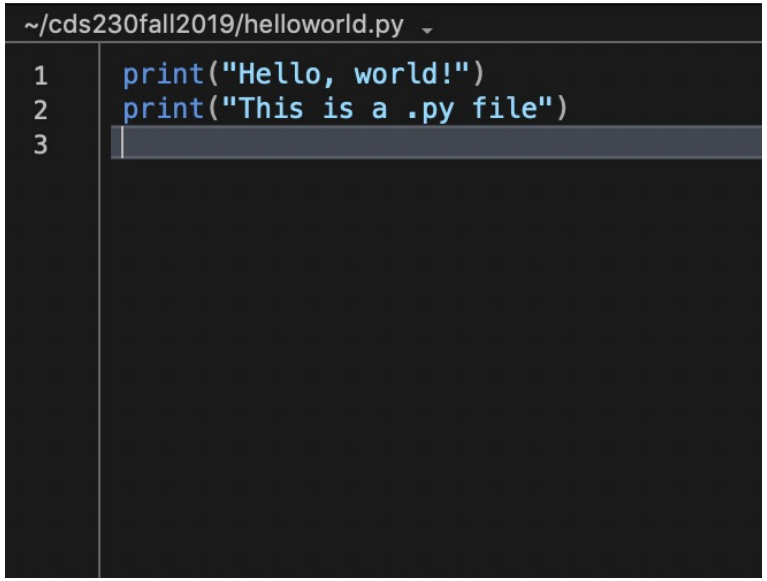

```
[1]: print('Hello, world! This is CDS 230 class.')

Hello, world! This is CDS 230 class.
```

How to run via command line (or terminal)

- Running Python via command line `python filename.py`

File



Running via command line

If you need help

- Google it (easiest way)
  - Make sure to check Python version
- python.org
- stackoverflow.com
- STARs
- Your instructor

Figure sources: https://stackoverflow.com/company/logos, http://python.org, Wikimedia Commons

Sources

- Bill Venners (2003). *The Making of Python*. https://www.artima.com/intv/pythonP.html
- https://gvanrossum.github.io
- http://www.python.org
- https://www.anaconda.com
- https://jupyter.org/