APS106

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Tutorial 1 – Week 1

We'll be starting at the 10 minute mark

Agenda

1. TA Introductions
2. Logistics
3. Install Anaconda Navigator and VS Code
4. Set up a Folder Structure for APS106
5. VSCode/Jupyter Notebook
6. UofT JupyterHub
7. Questions?

Introduction – TA

Ali Tohidifar

(TUT01, TUT07)

Current studies: 4th year PhD CIV Student

Research/other interests: Computer Vision, Basketball, Snowboard, Learning Guitar

Tutorial Logistics

- Tutorials are for your benefit – **no grading**
  - We will review previous weeks labs & lecture content
  - From Week 2, we will focus on **coding problems**!

- Be sure to **ask lots of questions** and have Python open.
  We are here to help you!

Tutorial Logistics

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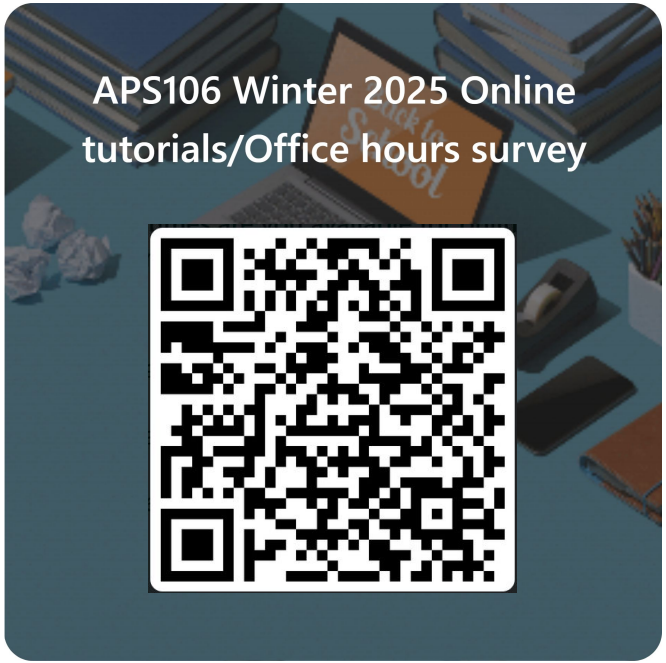
- Questions outside of tutorial time?
  - **Coffee Time** – drop-in hours for 1on1 help

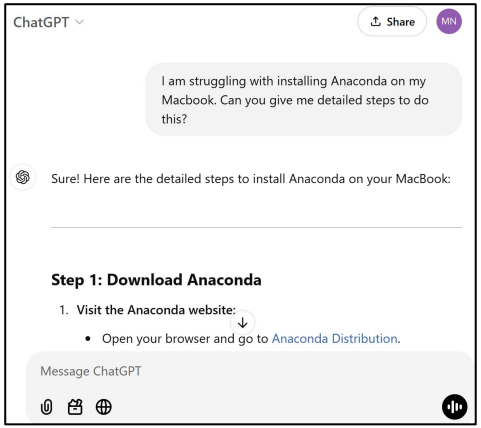
Online Tutorials/Office Hours Survey

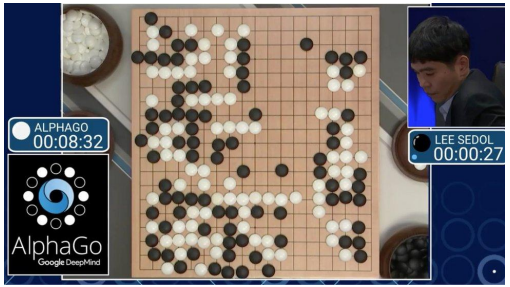
- URL – https://forms.office.com/r/n8e4k8seyK

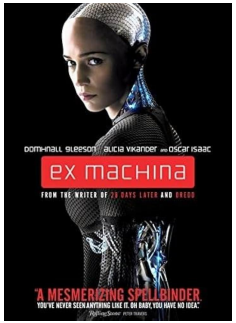


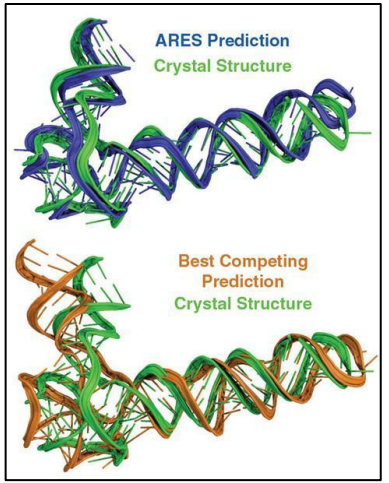
Why code?[1]

- Programming is awesome!
- Computers are everywhere, programming is a boundless opportunity
- Software engineering can be applied to almost any context in the world





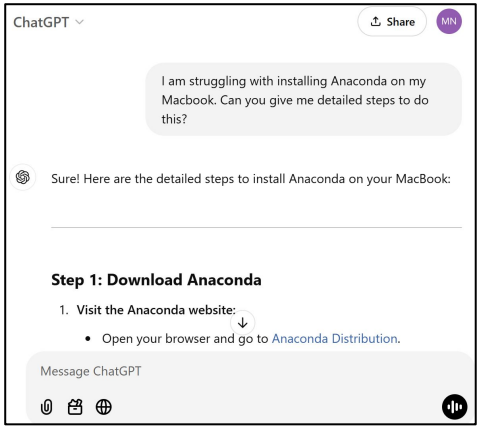


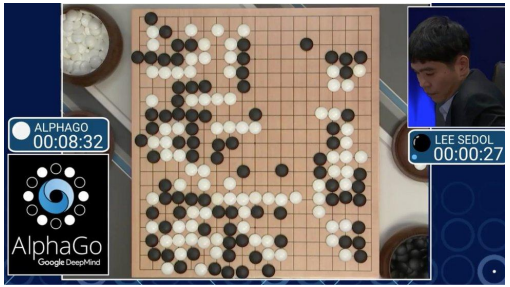


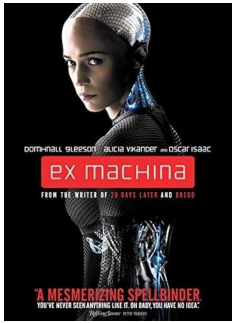
Source: © Townshend et al, 2021 Science

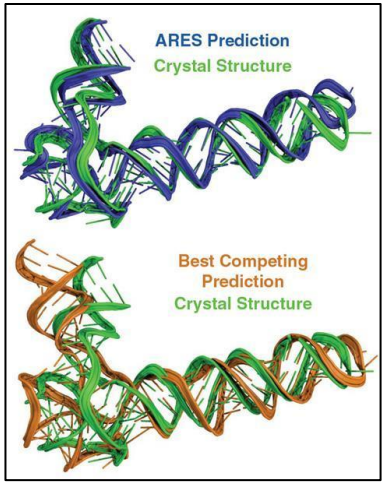
Why code?[2]

- Regardless of background, coding is always an achievable skill
- Software engineering can be applied to almost any context in the world
- **NEVER THINK THAT YOU "CAN'T UNDERSTAND" CODING**









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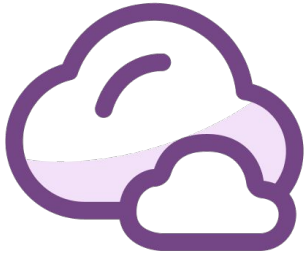
Do not edit
How to change the design

What would you want to ideally learn in this course?

Presenting with animations, GIFs or speaker notes? Enable our Chrome extension

slido

Do not edit
How to change the design



Coding experience?

Presenting with animations, GIFs or speaker notes? Enable our Chrome extension

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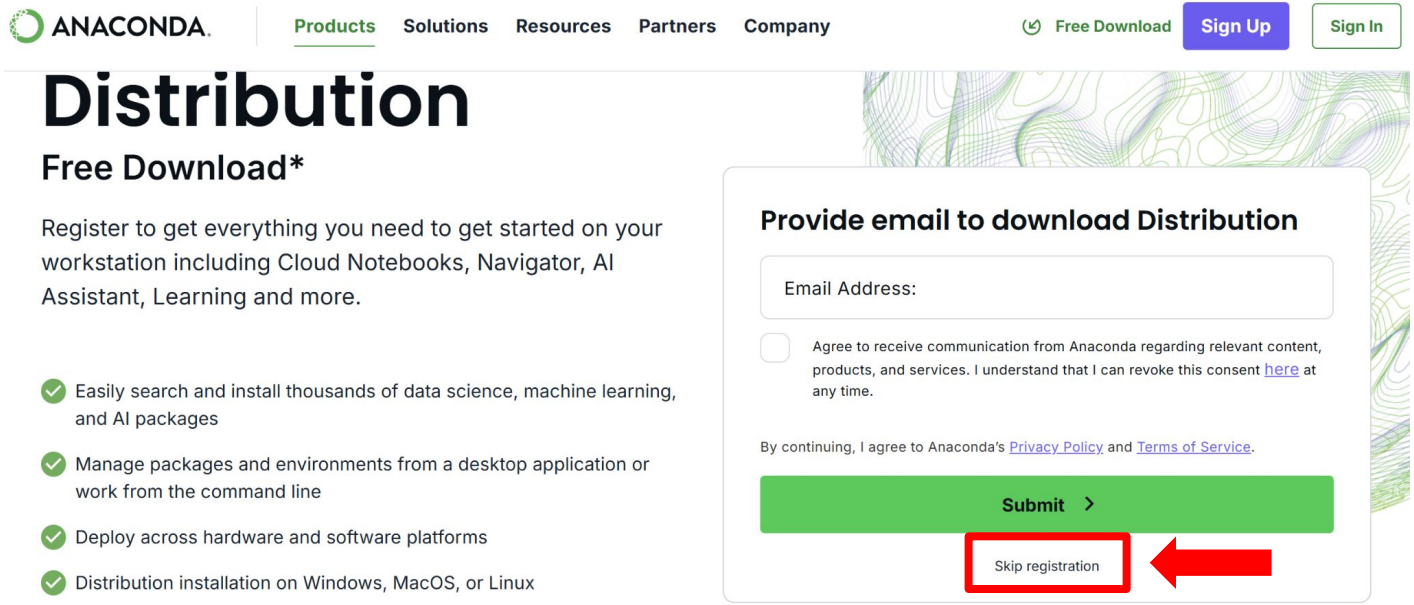
Install Anaconda Navigator

Anaconda

- Anaconda is a distribution of Python that includes tools and packages geared towards scientific computing (such as data science and machine learning)
- **Anaconda Navigator** is the graphical user interface (GUI) allowing users to install and manage their programming environment without command line (terminal) prompts

Install Anaconda

- You can install Anaconda from the following link:
  - https://www.anaconda.com/download



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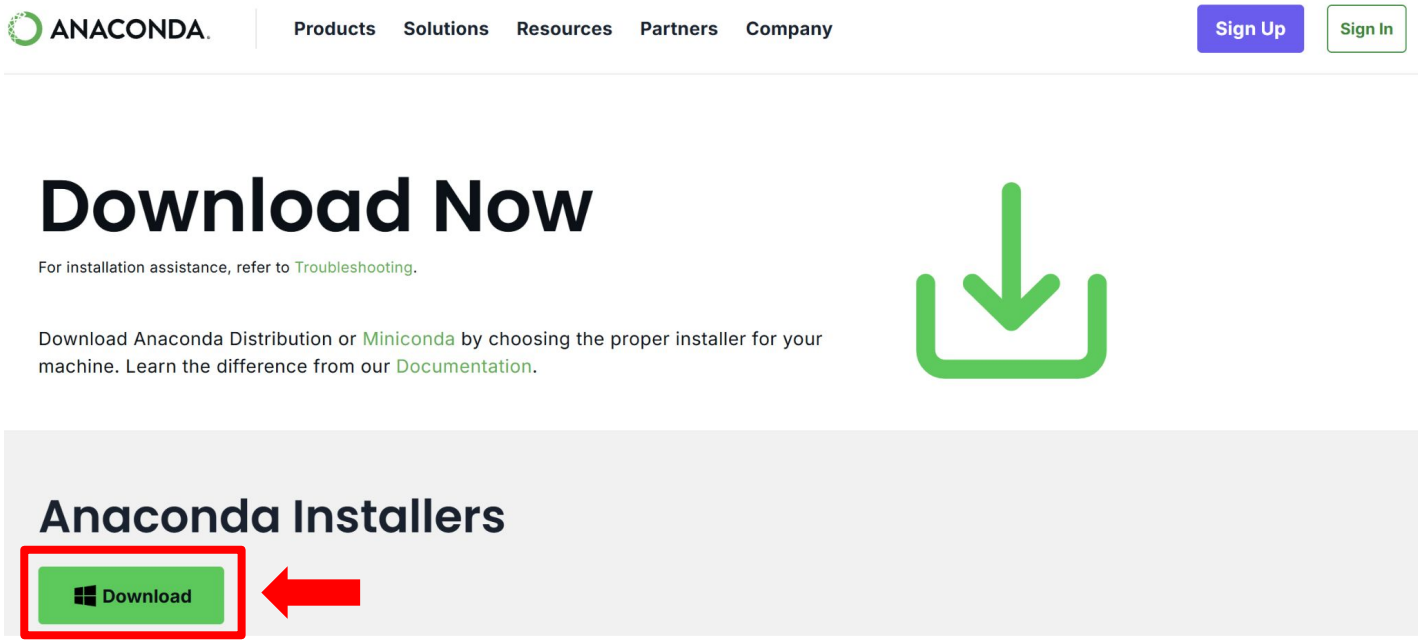
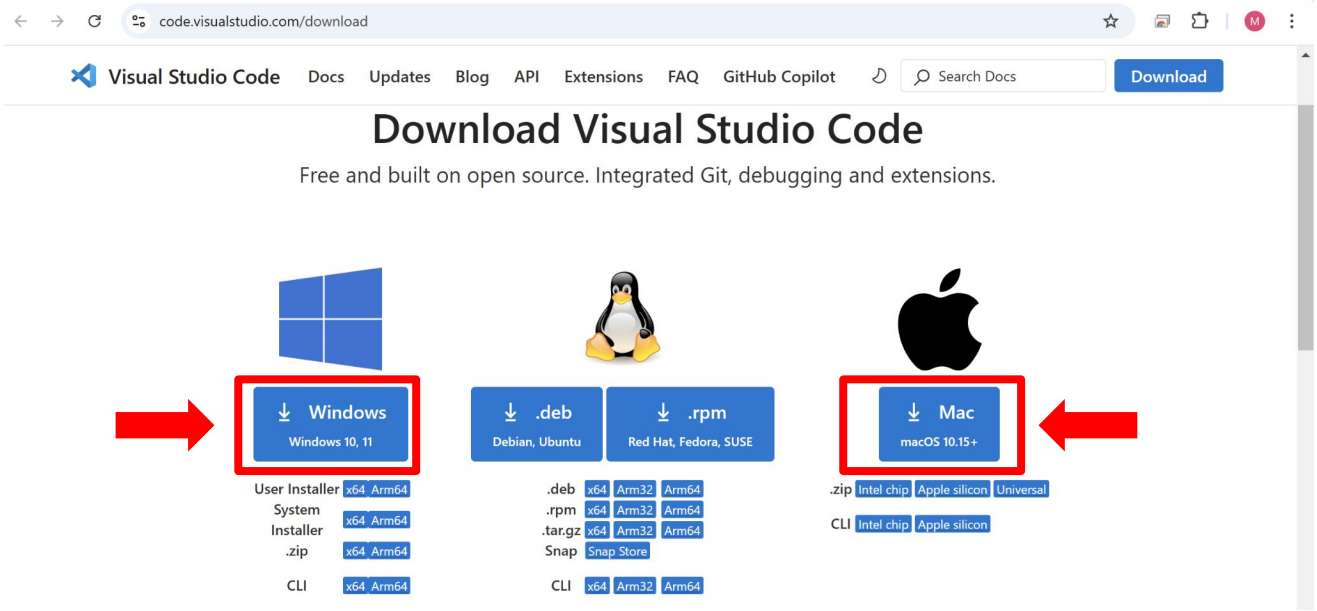


Install VS Code[1]

- You can install VS Code from the following link:
  - https://code.visualstudio.com/download



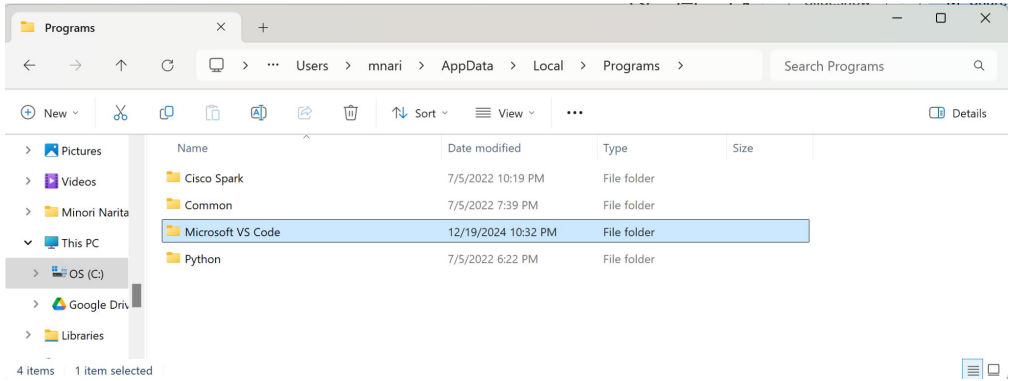
Install VS Code[2] (Windows)

- Open the .exe file (e.g., VSCodeUserSetup-x64-1.96.2.exe) and install VS Code
- Go to Anaconda-Navigator → File → Preferences → Configure Navigator → Change the following lines of code

```
[home]
vscode_enable = True
[applications]
vscode_path = C:\Users\{USERNAME}\AppData\Local\Programs\Microsoft VS Code
```

- Restart Anaconda Navigator

(If you don't see AppData, click on View -> Show -> Hidden items)



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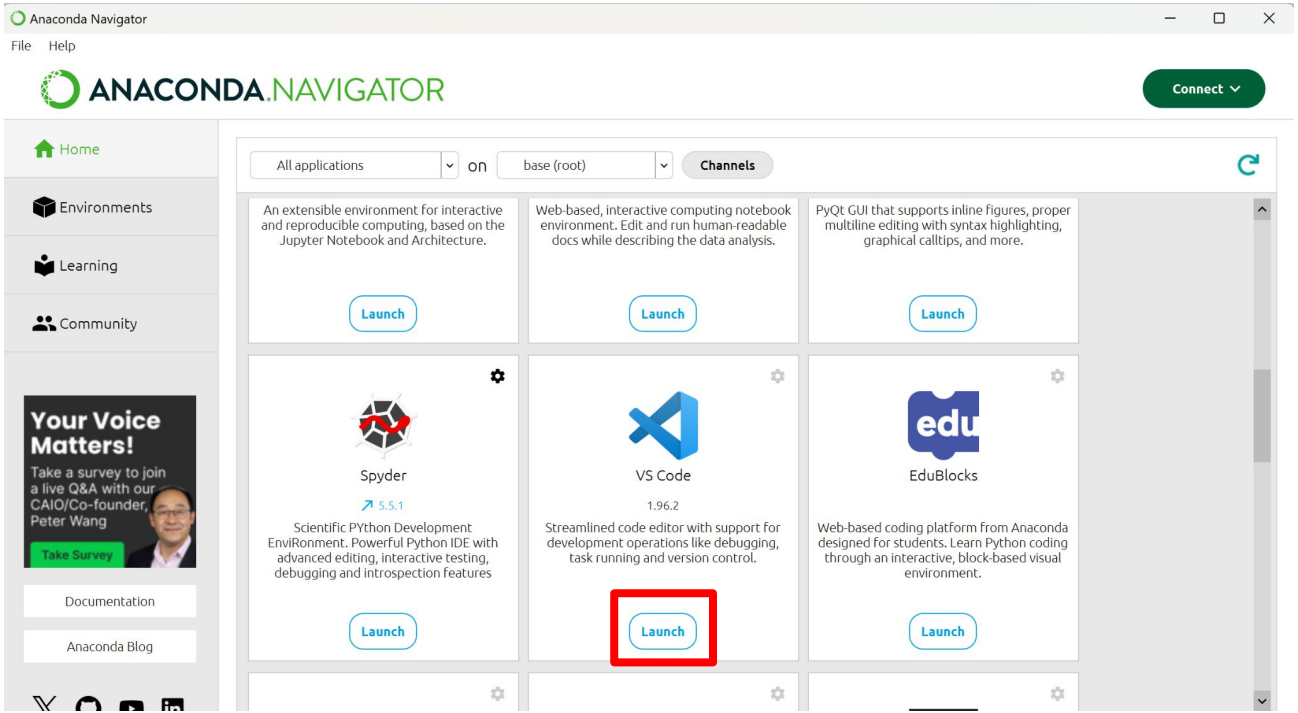
Microsoft VS Code might be under C:\Program Files (x86) - if so, vscode_path should be **C:\Program Files (x86)\Microsoft VS Code** instead

Install VS Code[2] (MacOS)

- If archive, extract the archive contents (e.g., VSCode-darwin-universal.zip).
- Drag **Visual Studio Code.app** to the **Applications** folder
- Double click the VS Code icon from the Applications folder
- Open **Anaconda Navigator** and see if you can find ***VS Code*** in **Home**. If not:
  - Open **Terminal** (from **Finder**, open the Applications/Utilities folder and double-click Terminal) and type in the following command and press Enter:
    - **conda config --set vscode /usr/local/bin/code**

Anaconda Navigator

- We will be mainly using "**VS Code**" in this course. Let's click on "Launch"!



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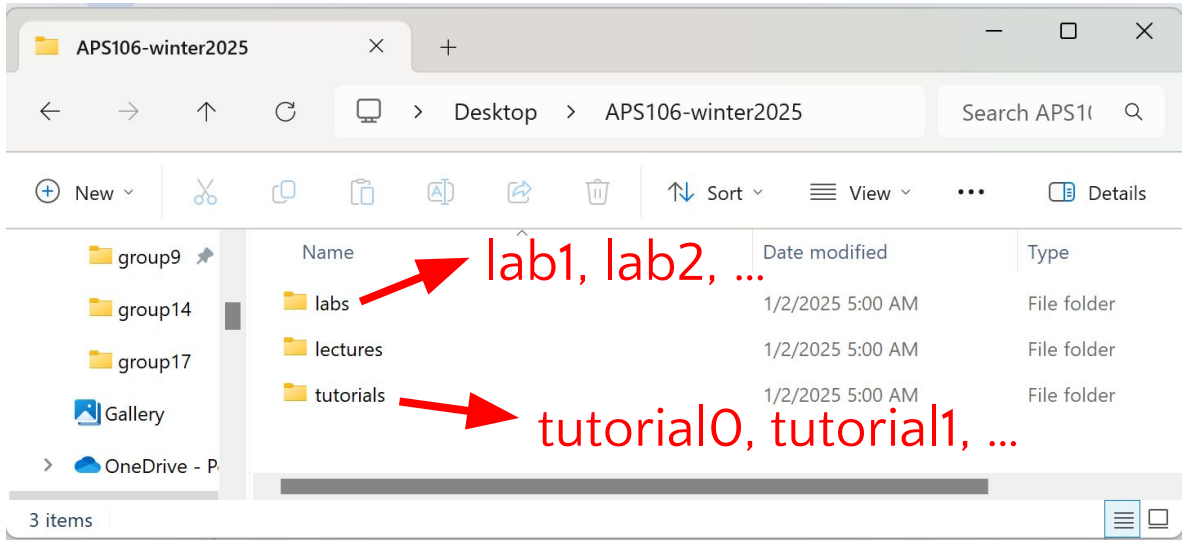
Set up a Folder Structure for APS106

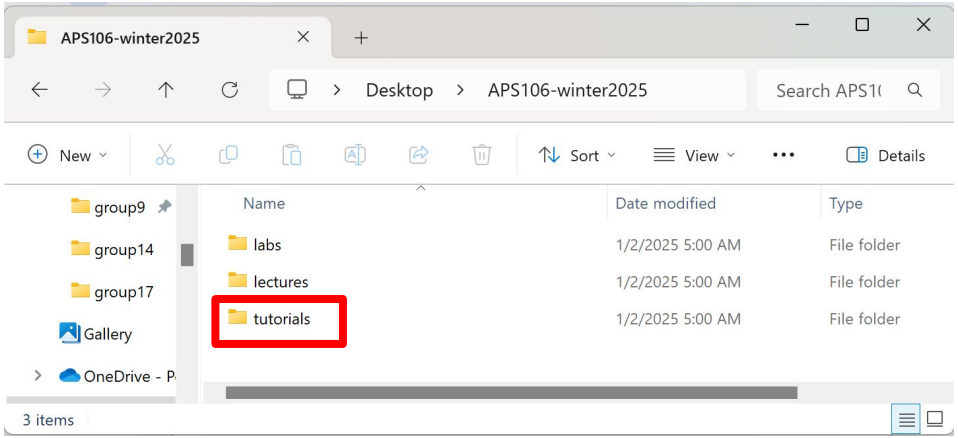
Stay Organized, Stay Efficient

- It's not a good idea to store all your files in the Downloads folder!
- Let's create a folder for APS106 (e.g., on Desktop) and organize your files there



Let's download files from Quercus!

- Go to Quercus -> Modules -> **Tutorial Homepage**
  - Click on **Tutorial 0 – Setting Up A Development Environment** in week1
  - Download "**tutorial0.zip**"
  - Unzip the zip file and move it in your folder for APS106



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VSCode/Jupyter Notebook

VSCode is an IDE

- Integrated Development Environments (IDEs) are programs that provides tools and features to programmers in a unified environment
- IDEs often include:
  - **A code editor**
    - A place to type and edit code, usually with colour-coded syntax highlighting to improve readability
  - **Code compilers or interpreters**
    - Turns the readable Python code into something the machine can understand
  - **Debuggers**
    - Pause the code at pre-determined locations and go line-by-line through your code
- So IDEs basically contain everything you need to code!

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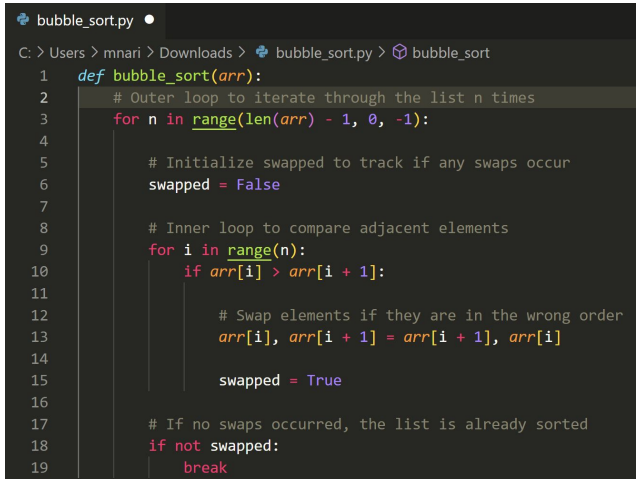

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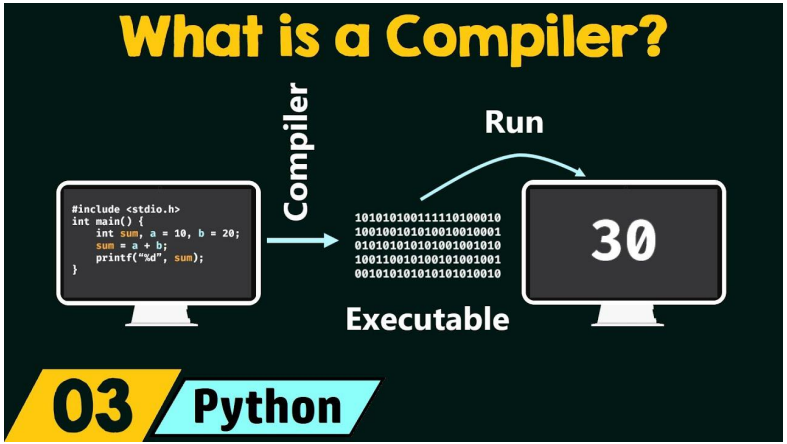

Source

VSCode is an IDE

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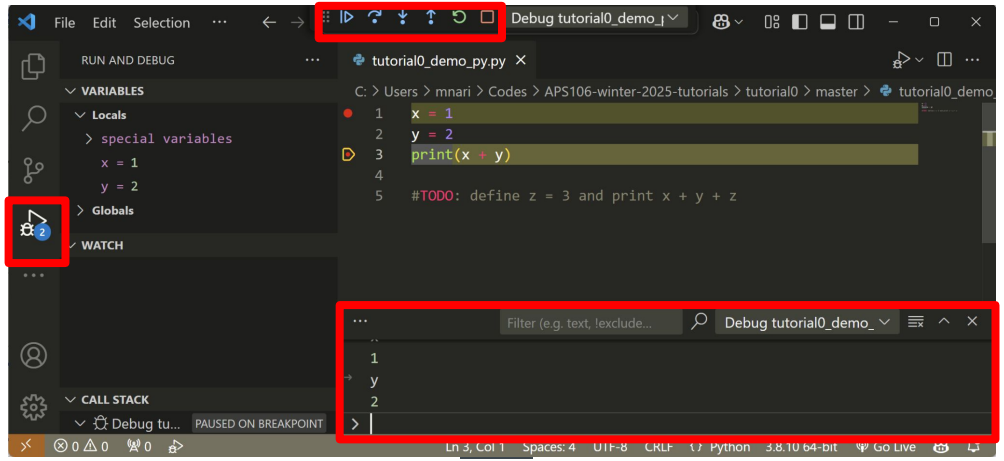
- IDEs often include:
  - **Debuggers**
    - Pause the code at pre-determined locations and go line-by-line through your code

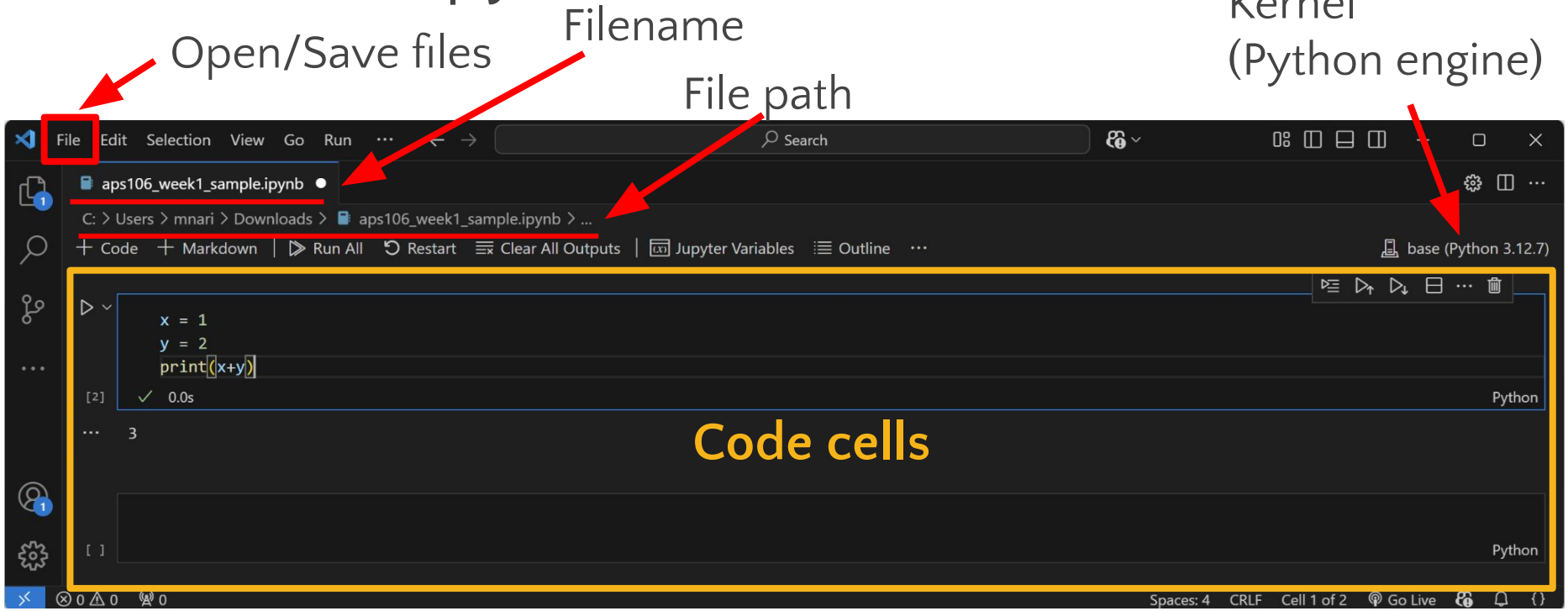
Continue, step over, step in/out, restart, stop

Run and Debug



Debug console

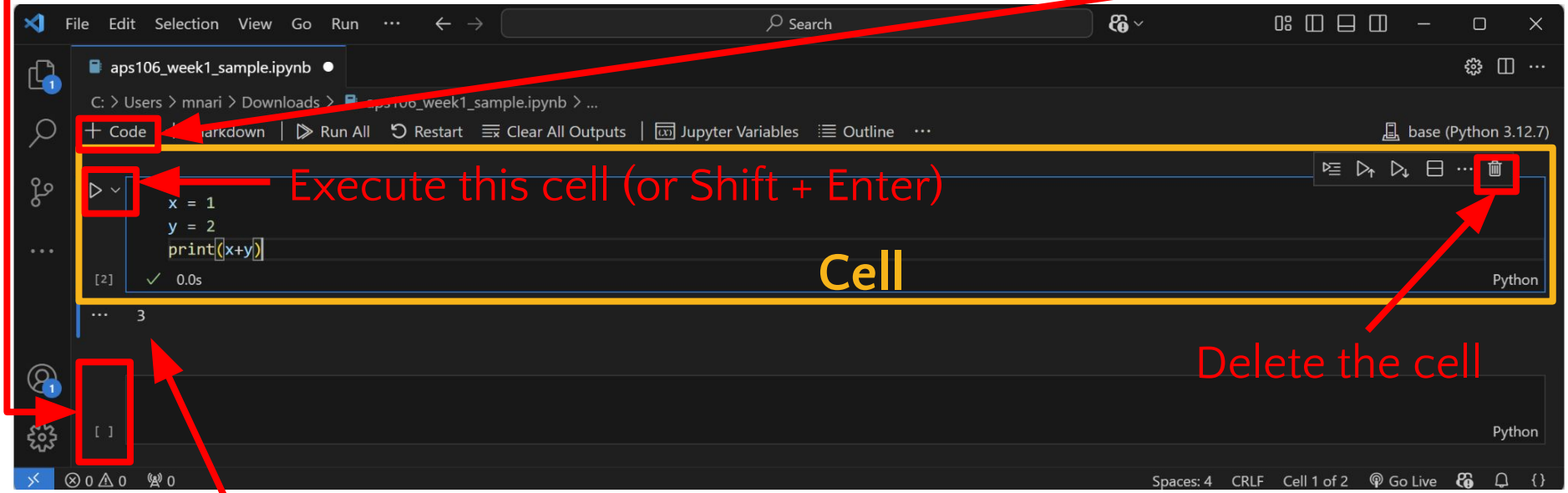
VS Code (Jupyter Notebook)



VS Code (Jupyter Notebook)

(drag&drop or Alt + ↑ /Alt + ↓)
Move up/down the cell

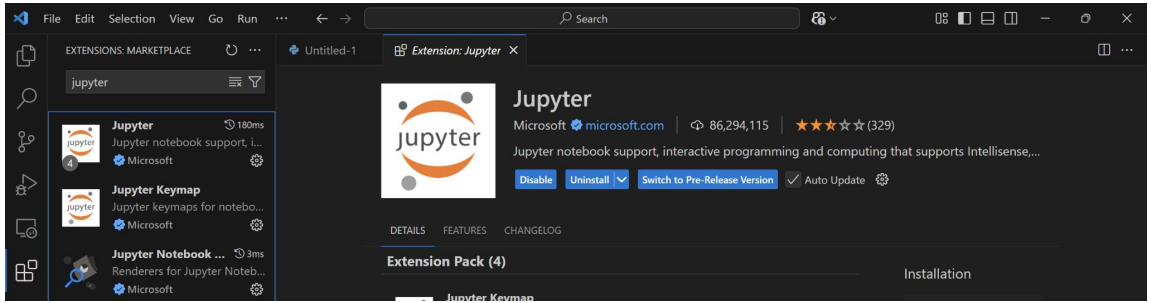
Create a new cell under the current one



Cell output

VS Code (Jupyter Notebook)

- Make sure you have "**Python**" and "**Jupyter**" extensions installed!



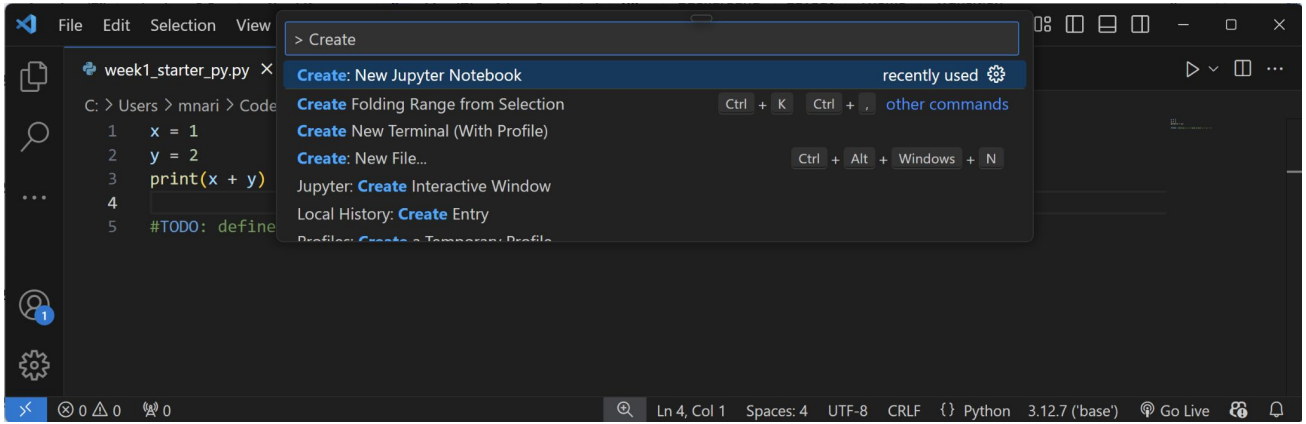
Let's practice![1]

- Let's open **tutorial0_demo_jupyter.ipynb**, write our first program, and save it!
- Steps:
  1. Launch VS Code through Anaconda Navigator
  2. File -> Open File -> Go to the APS106 folder and select tutorial0_demo_jupyter.ipynb
  3. In the first code cell, write

     print("Hello World!")
  4. Execute the cell (if asked, select "base (Python 3.12.7)")
  5. File -> Save as -> save it as "**tutorial0_demo_jupyter.ipynb**"

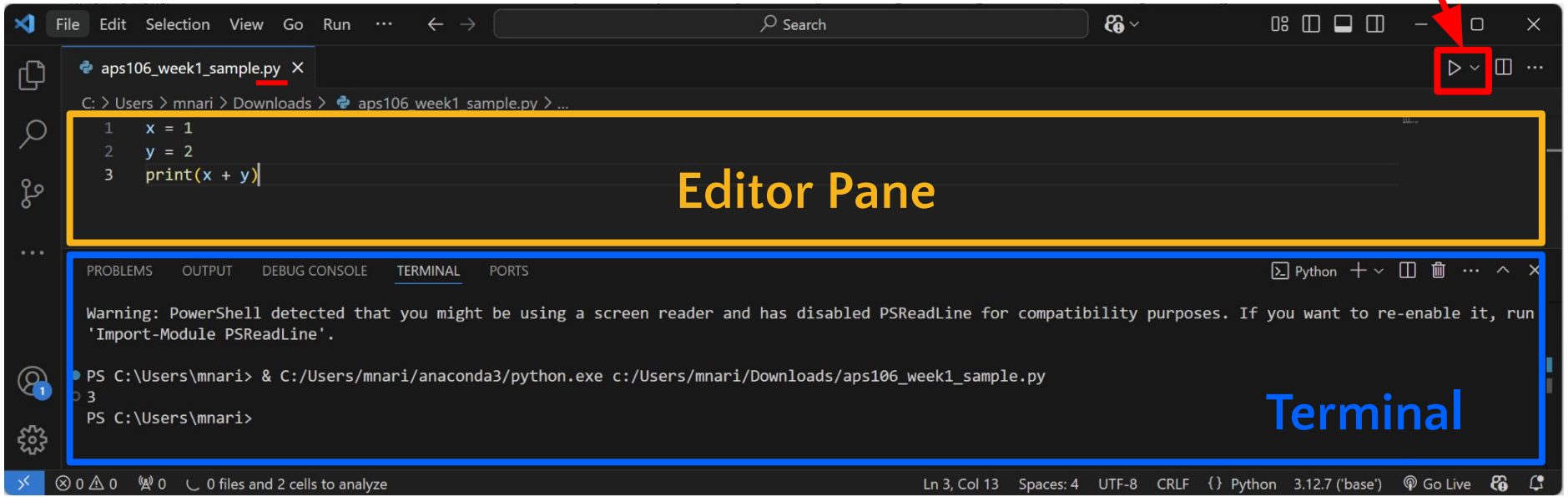
Create a new Jupyter Notebook

- You can create a new notebook on VS Code too!
- Steps:
  1. Launch VS Code through Anaconda Navigator
  2. In the command palette ("Search" on top), type in "**> create new jupyter notebook**" and select "Create: New Jupyter Notebook"



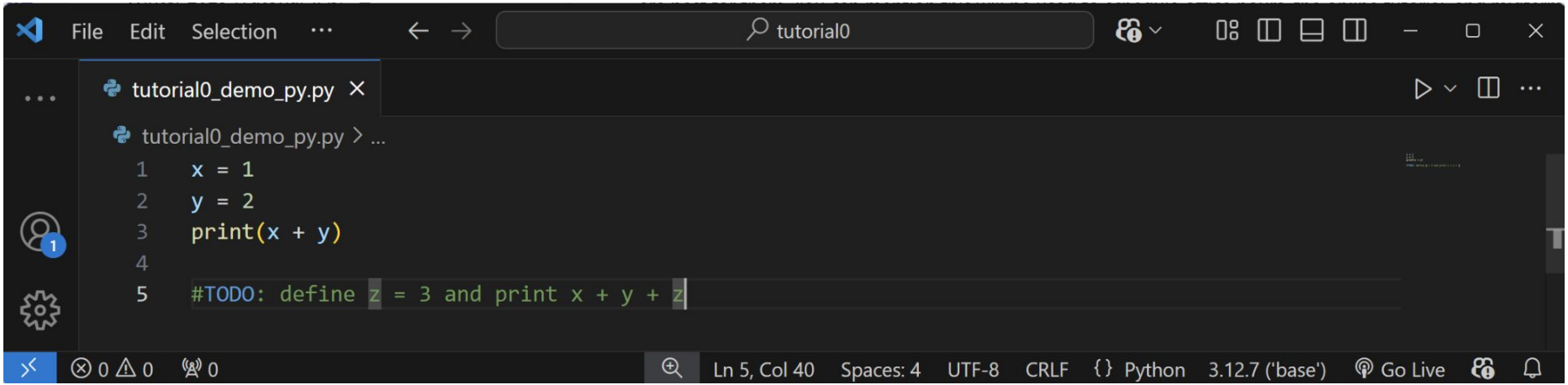
VS Code (Python script)

- When you open a .py file, an editor with a different layout appears



Let's practice![2]

- Let's open **tutorial0_demo_py.py** in VS Code, modify the code based on the instruction, and run it!



We'll switch from .ipynb to .py files later

- Jupyter Notebooks (.ipynb) are interactive and beginner-friendly
- Python scripts (.py) are **the standard format** for Python programs and are suited for building and running **larger projects**
- We'll switch to .py files in **lab5**!

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UofT JupyterHub

What is UofT JupyterHub?

- Access at UofT Jupyter Hub
- Cloud-based Jupyter Notebook service that allows us to run Jupyter Notebooks (.ipynb files) directly from a web browser
  - Don't need to install anything
- Linked to your UofT account, all lecture notes are stored as a copy in JupyterHub!

Let's try UofT JupyterHub!

- Go to **Tutorial Homepage** in APS106 Modules on Quercus
  - Click on **Tutorial 0 – Setting Up A Development Environment** in week1
    -> Click on **JupyterHub Starter Link**