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
4. Set up a Folder Structure for APS106
5. VSCode/Jupyter Notebook
6. UofT JupyterHub
7. Questions?

Introduction – TA

Nazib Chowdhury

(TUT0101, TUT0112)

Current studies: MEng Student, Dept. of MIE, U of T

Research/other interests: AI, Robotics, Optimization, Industry 4.0

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!

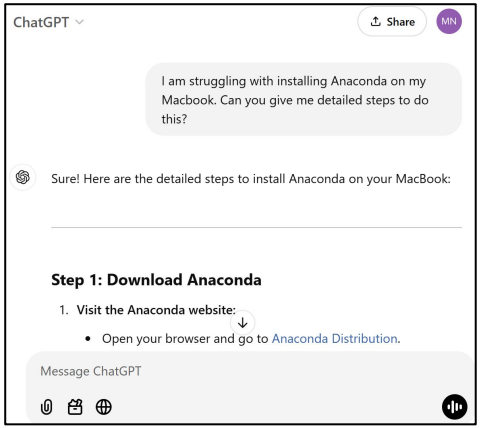
- Questions outside of tutorial time?
  - Post to **Piazza** – all TAs/instructors and your peers can answer questions quickly
  - **Coffee Time** – drop-in hours for 1on1 help

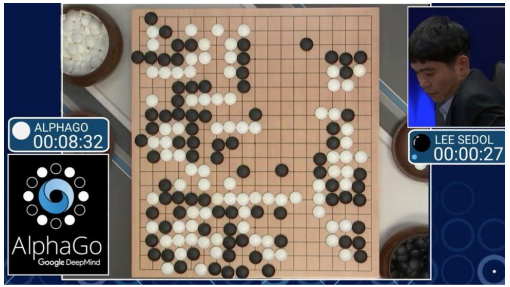
Online Tutorials/Office Hours Survey

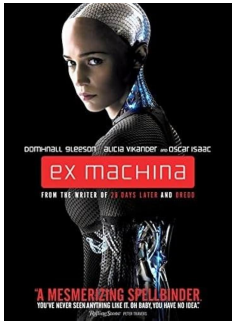
- URL – https://forms.office.com/r/4PZtA1hegq

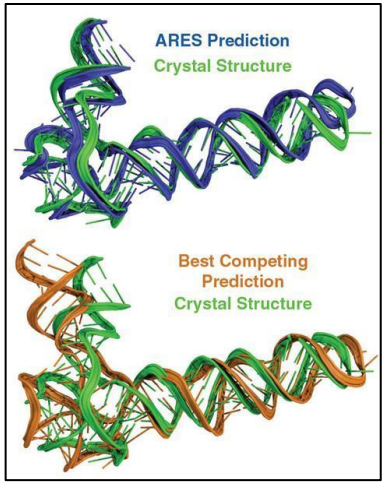
Why code?[1]

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





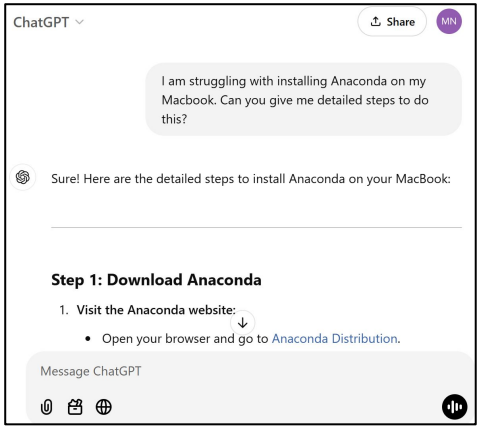


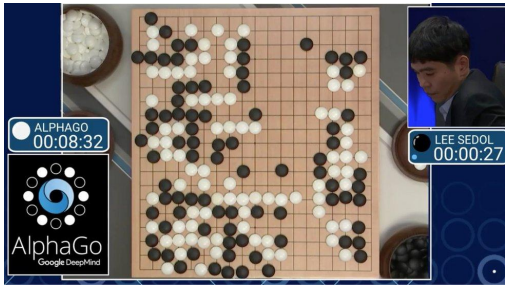


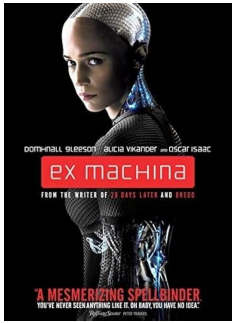
Source: © Townshend et al, 2021 Science

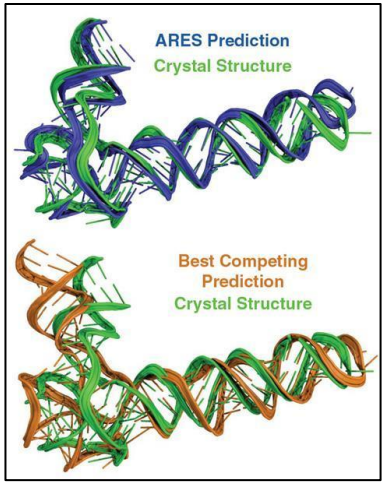
Why code?[2]

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









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What would you want to ideally learn to program computers for?

slido

What would you want to ideally learn to program computers for?

ⓘ Click **Present with Slido** or install our Chrome extension to activate this poll while presenting.

Coding experience?

slido

Coding experience?

ⓘ Click **Present with Slido** or install our Chrome extension to activate this poll while presenting.

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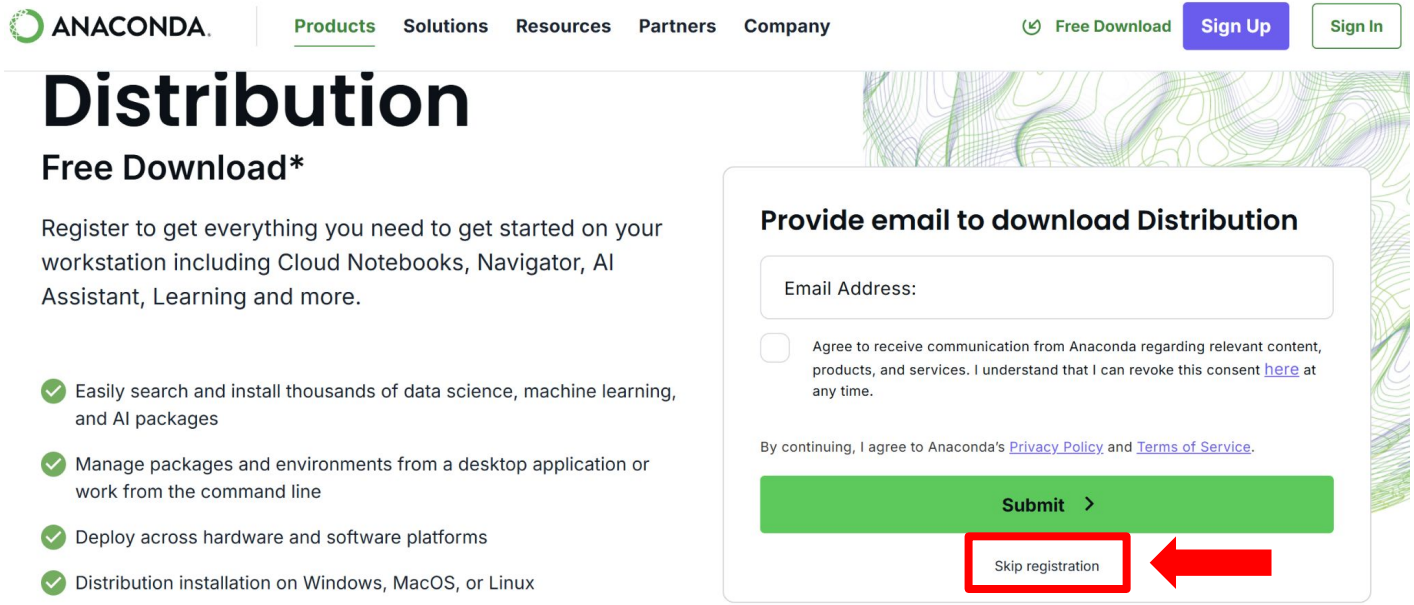
Install Anaconda Navigator

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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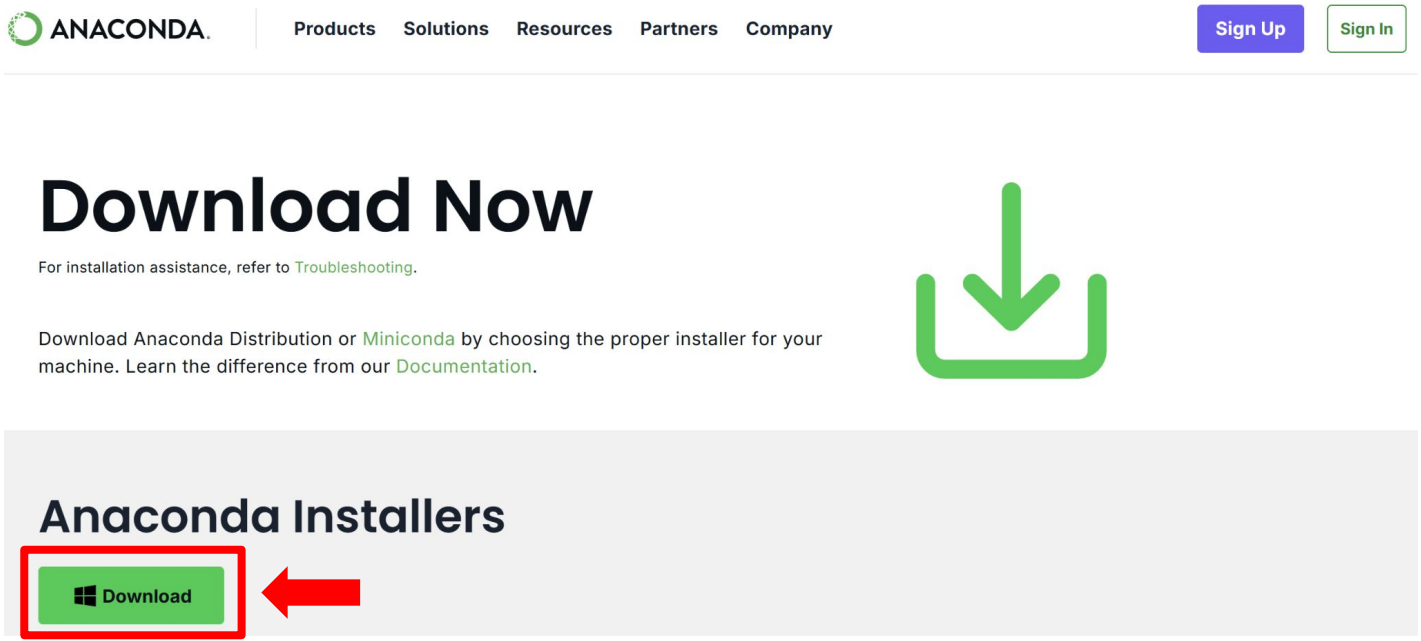
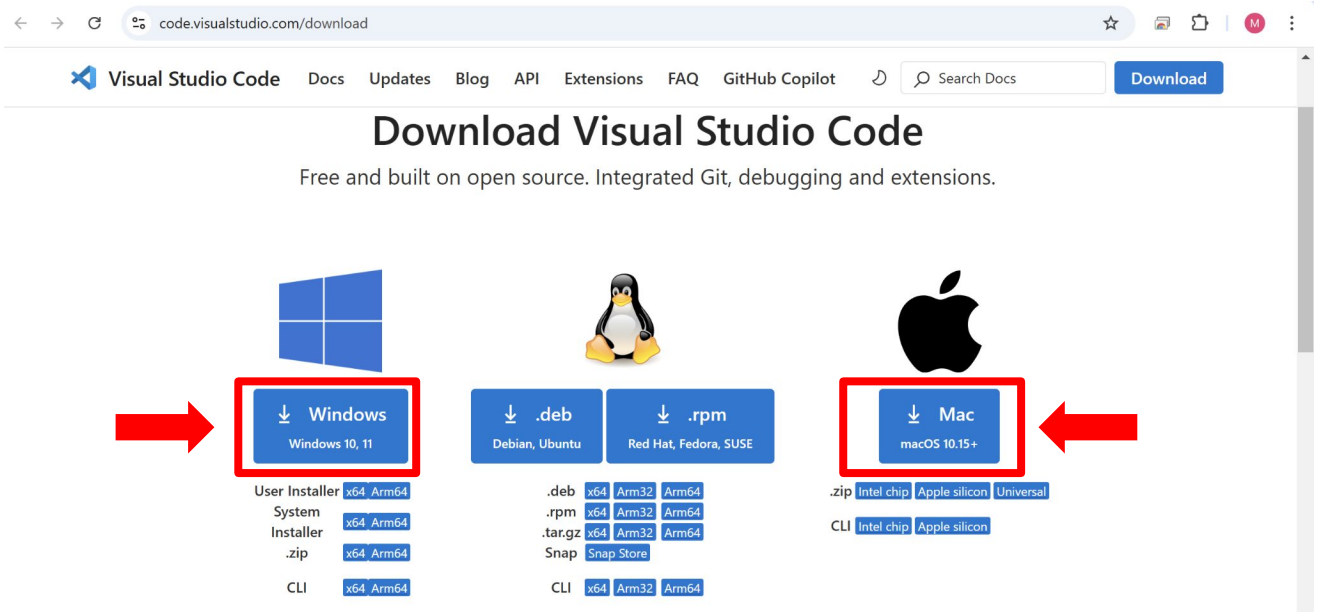


Install VS Code[1]

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



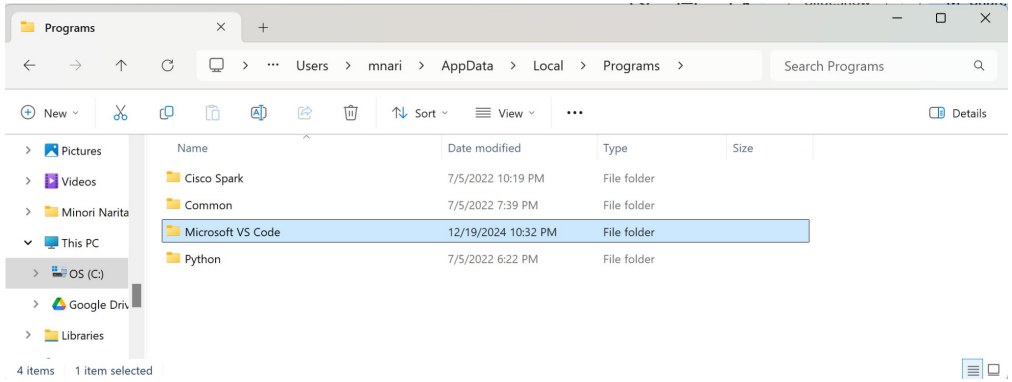
Install VS Code[2] (Windows)

- 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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- Restart Anaconda Navigator

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

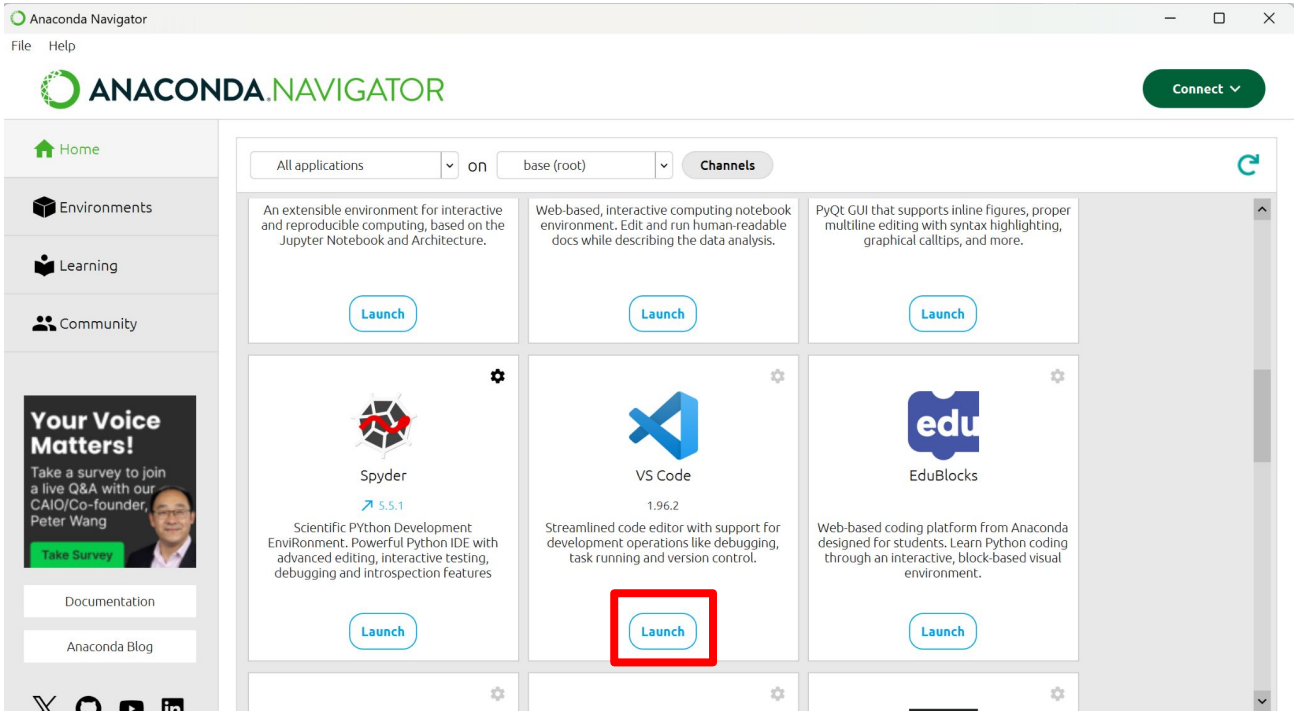
Microsoft VS Code might be under C:\Program Files (x86) - if so, vscode_path should be **C:\Program Files (x86)\Microsoft VS Code** instead

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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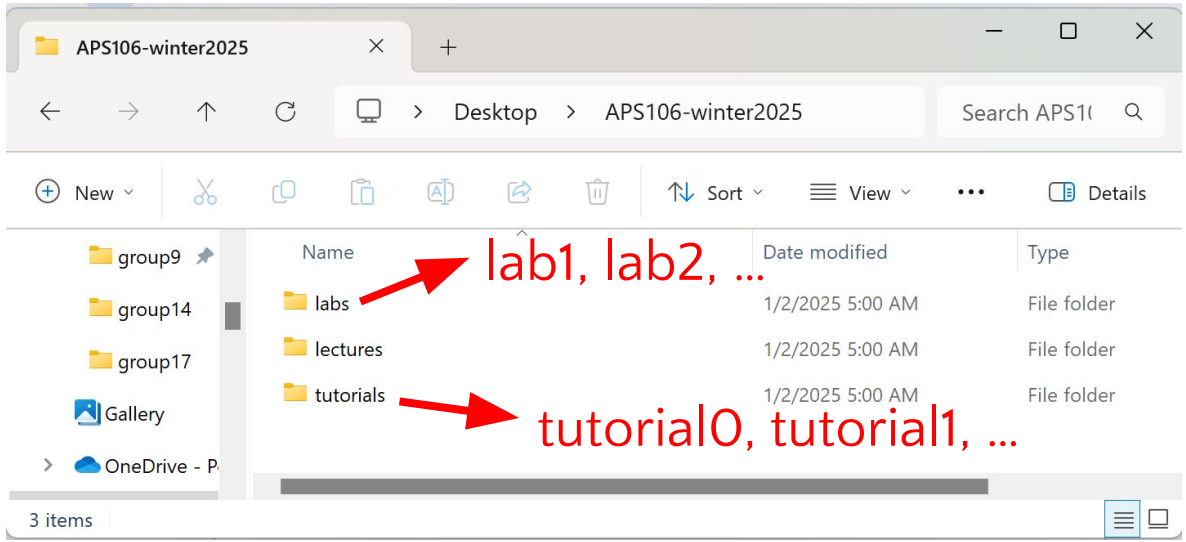
Set up a Folder Structure for APS106

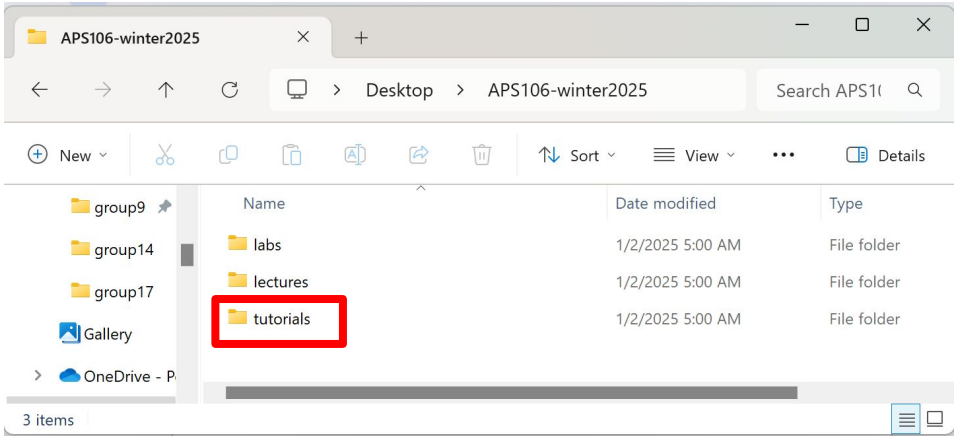
Stay Organized, Stay Efficient

- 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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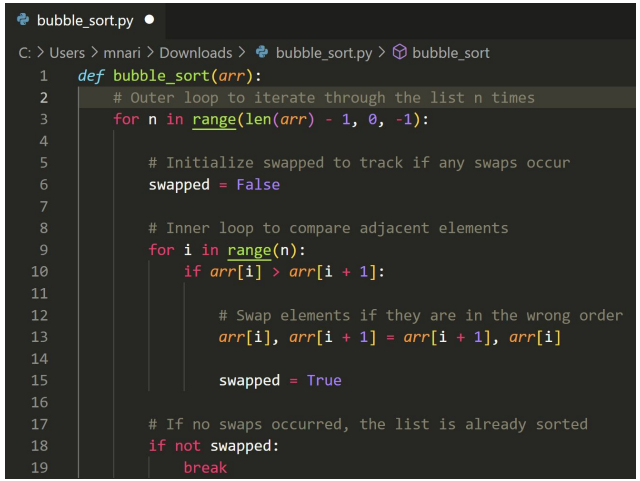

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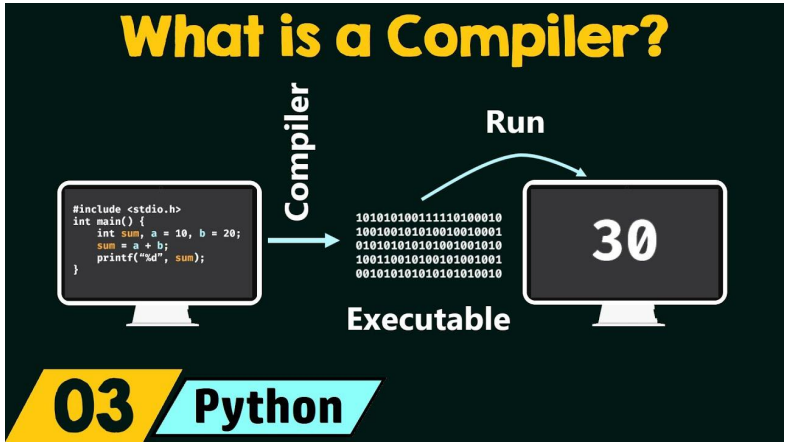


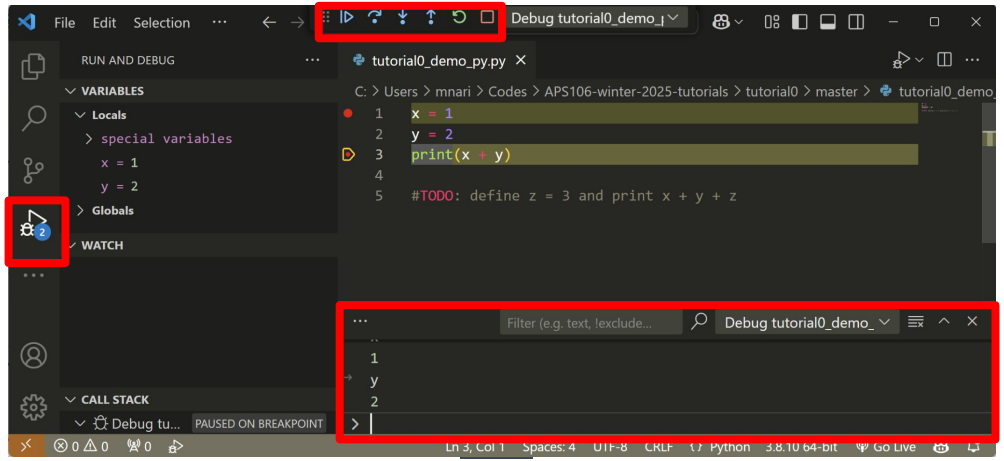
Source

VSCode is an IDE

- Integrated Development Environments (IDEs) are programs that provides tools and features to programmers in a unified environment
- IDEs often include:
  - **Debuggers**
    - Pause the code at pre-determined locations and go line-by-line through your code

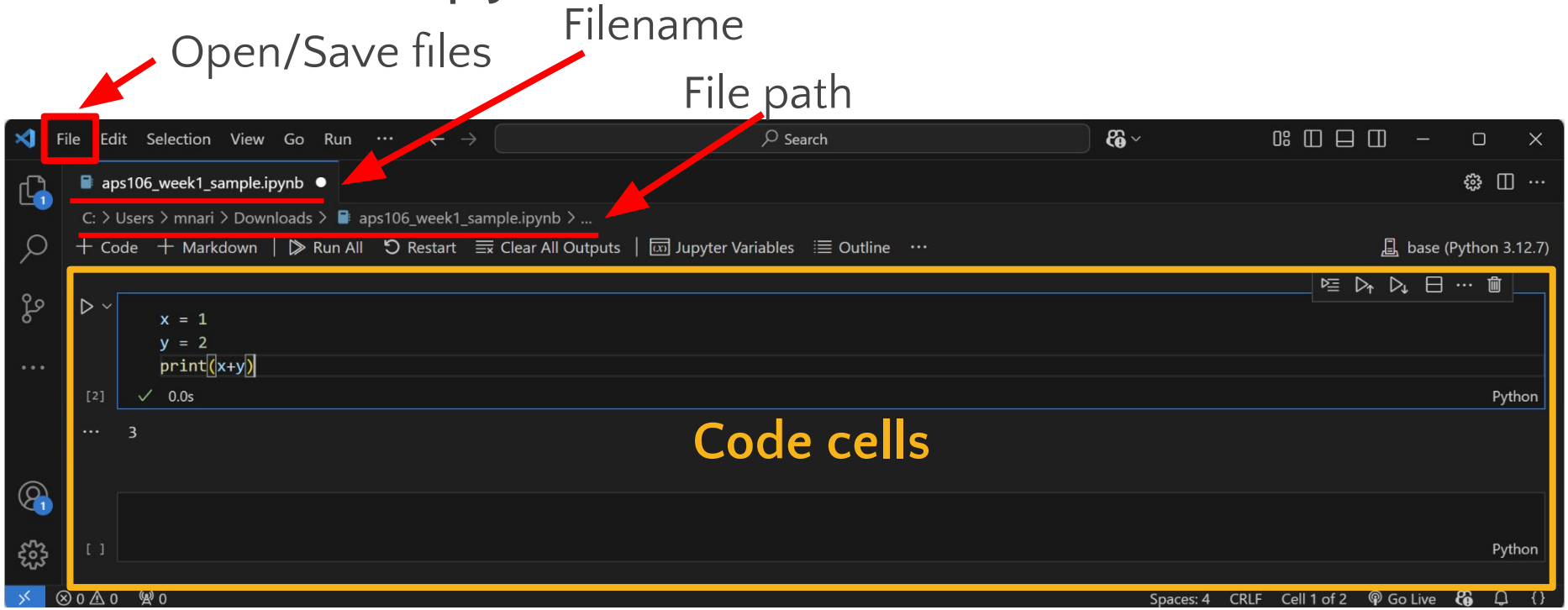
Continue, step over, step in/out, restart, stop

Run and Debug



Debug console

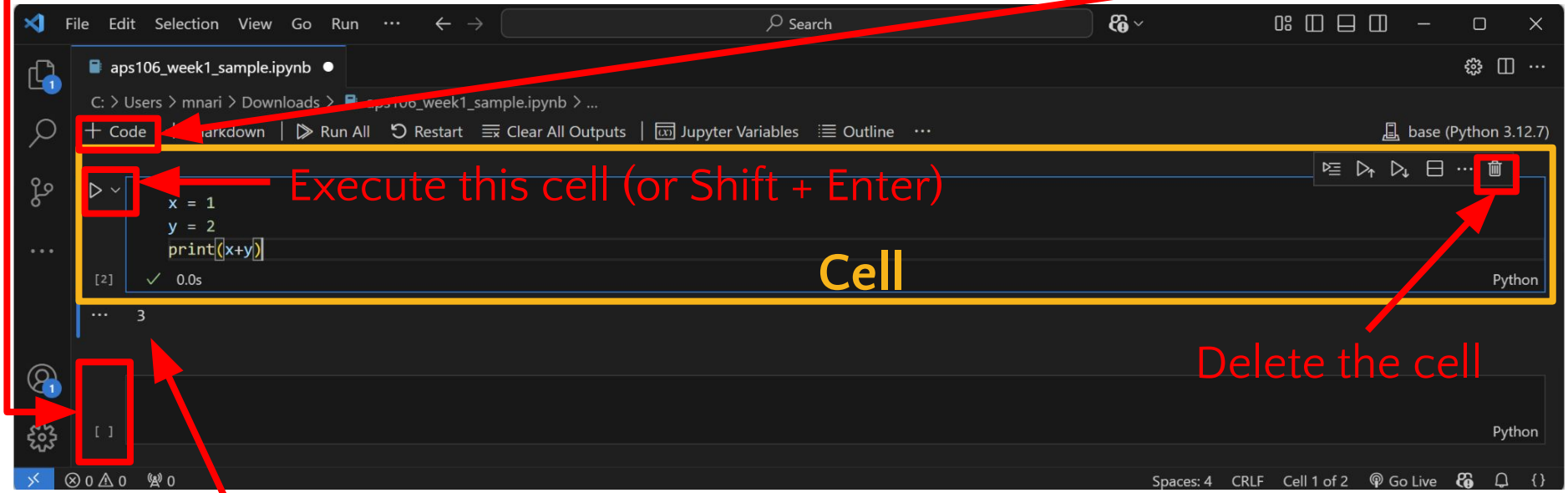
VS Code (Jupyter Notebook)



VS Code (Jupyter Notebook)

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

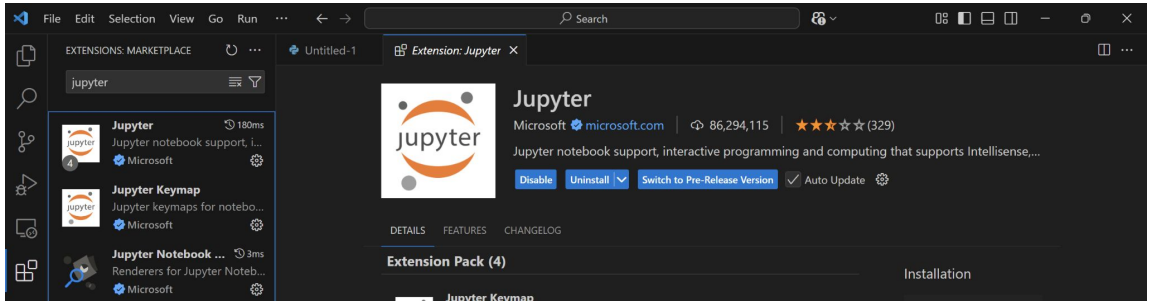
Create a new cell under the current one



Cell output

VS Code (Jupyter Notebook)

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



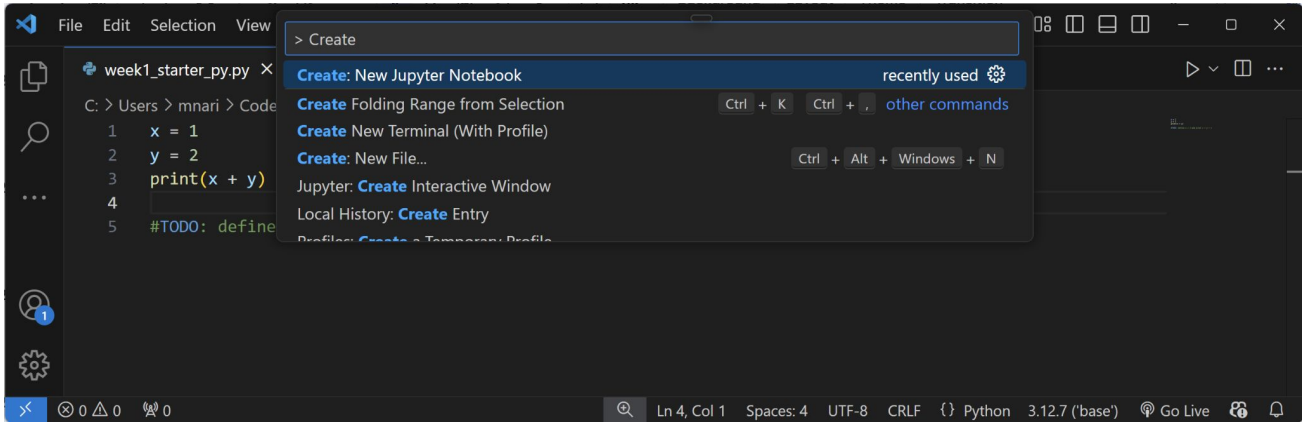
Let's practice![1]

- 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**"

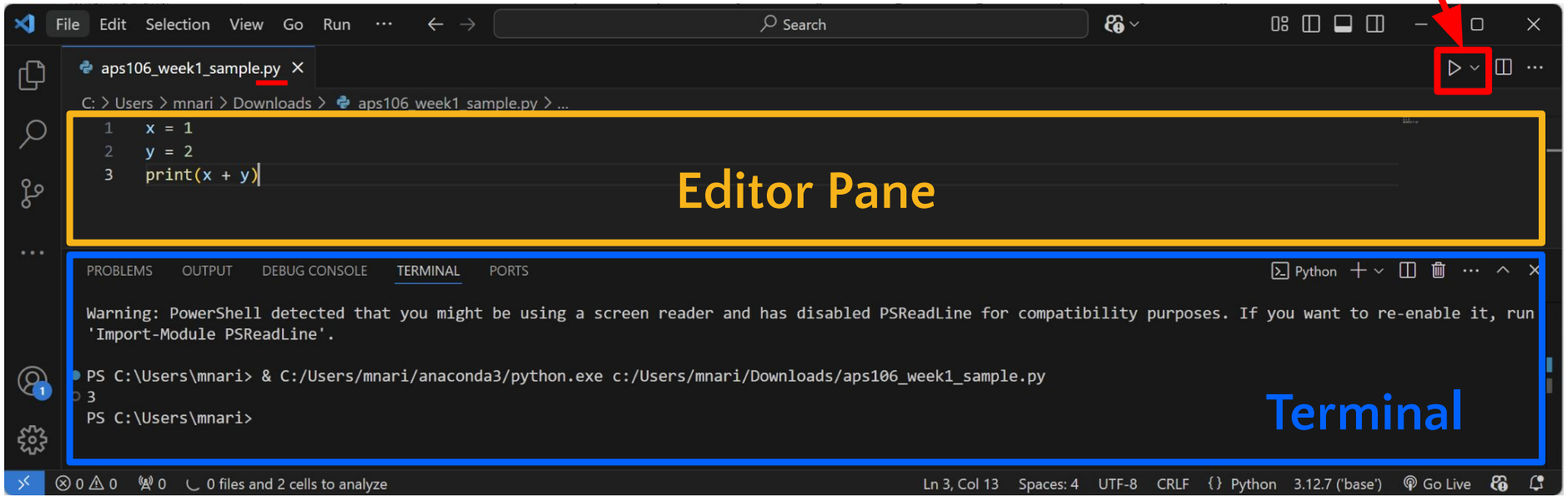
Create a new Jupyter Notebook

- 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



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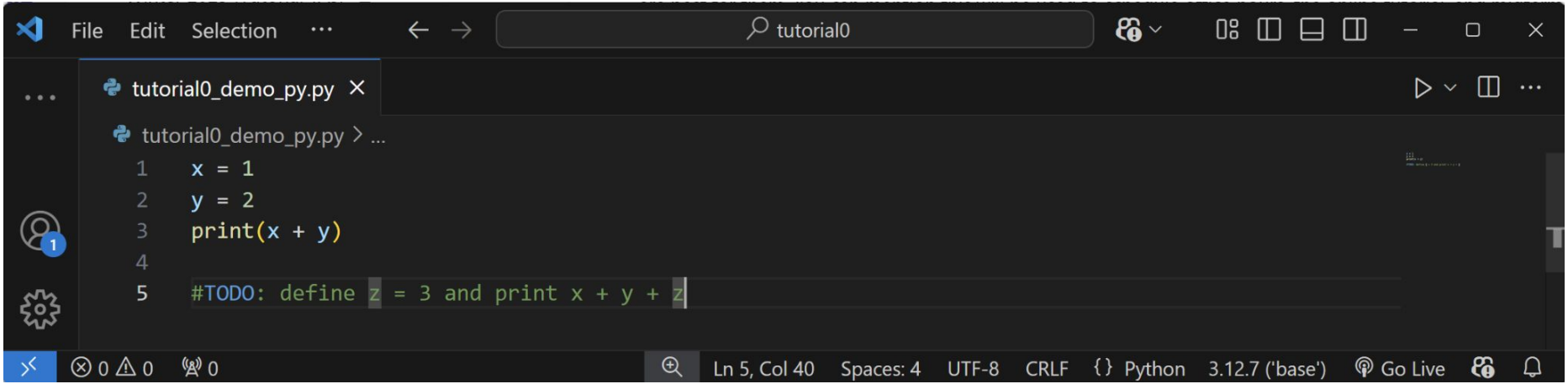
Coding on VS Code

Let's practice![2]

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



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UofT JupyterHub

Let's Begin Coding!!!

What is UofT JupyterHub?

- Access at https://jupyter.utoronto.ca/
- 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!

What is UofT JupyterHub?

- Access at https://jupyter.utoronto.ca/
- Go to Quercus

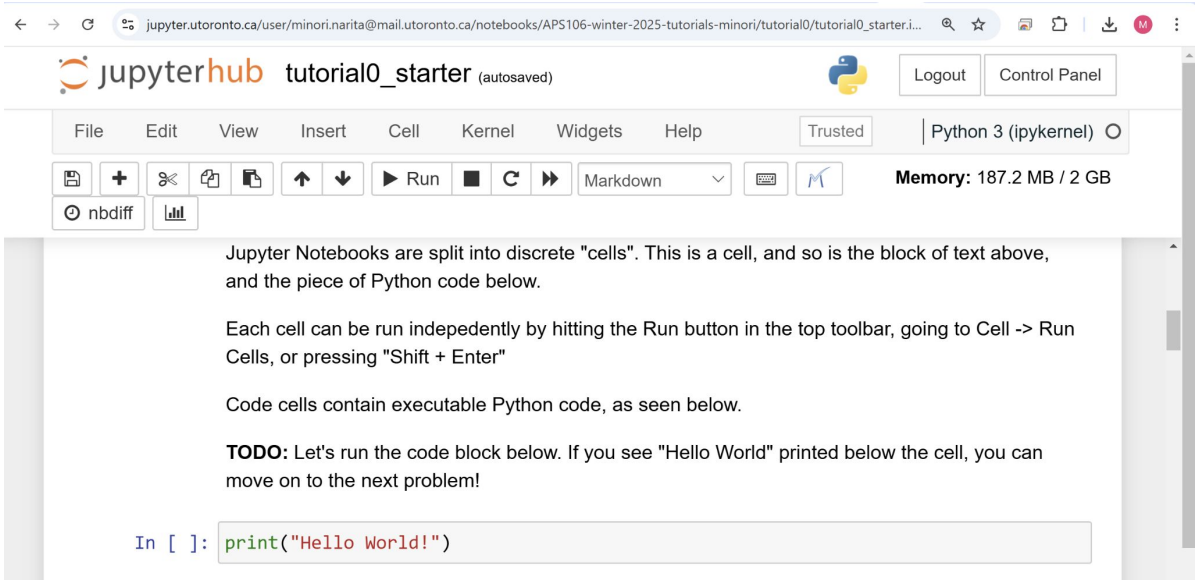
Tutorial 0 - Setting Up A Development Environment

Content

Section	TA	Links
TUT0101	Nazib Chowdhury	JupyterHub Starter Link JupyterHub Complete Link tutorial0.zip

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**



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**!