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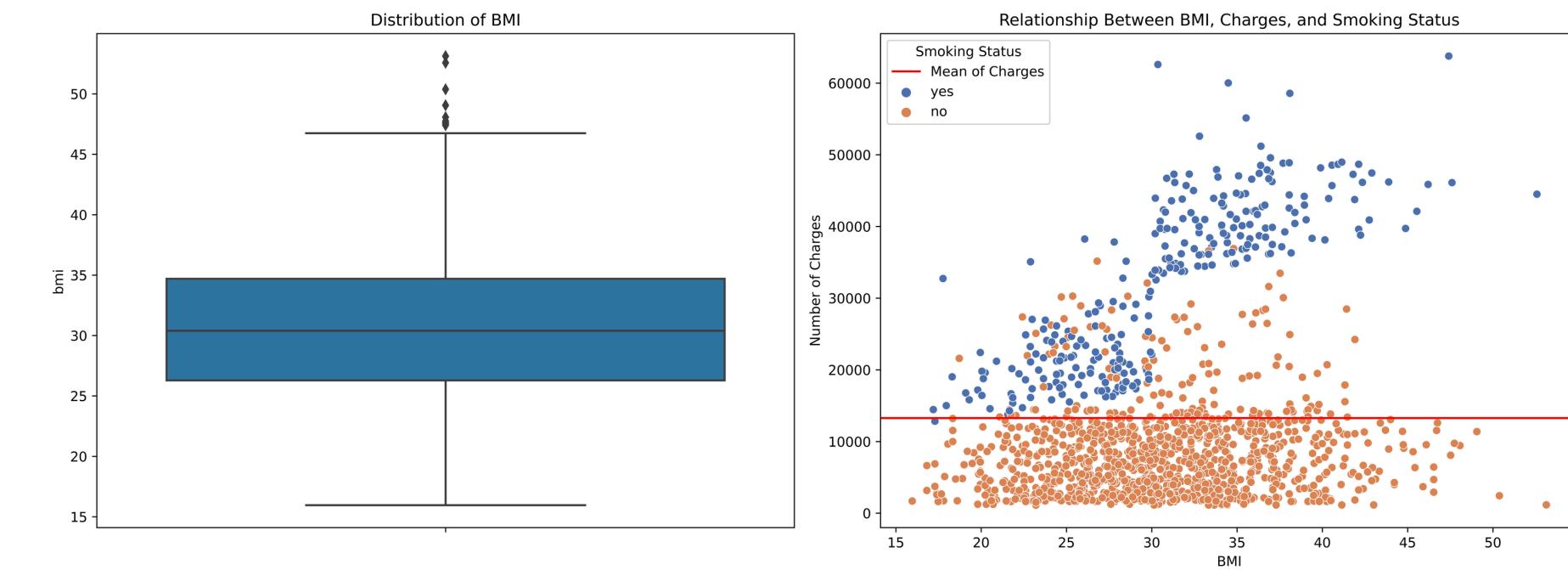
SUNRISE INSTITUTE

INTRO.

DATA SCIENCE

EMBARKING ON A JOURNEY
INTO DATA SCIENCE

Instructor: YA MANON

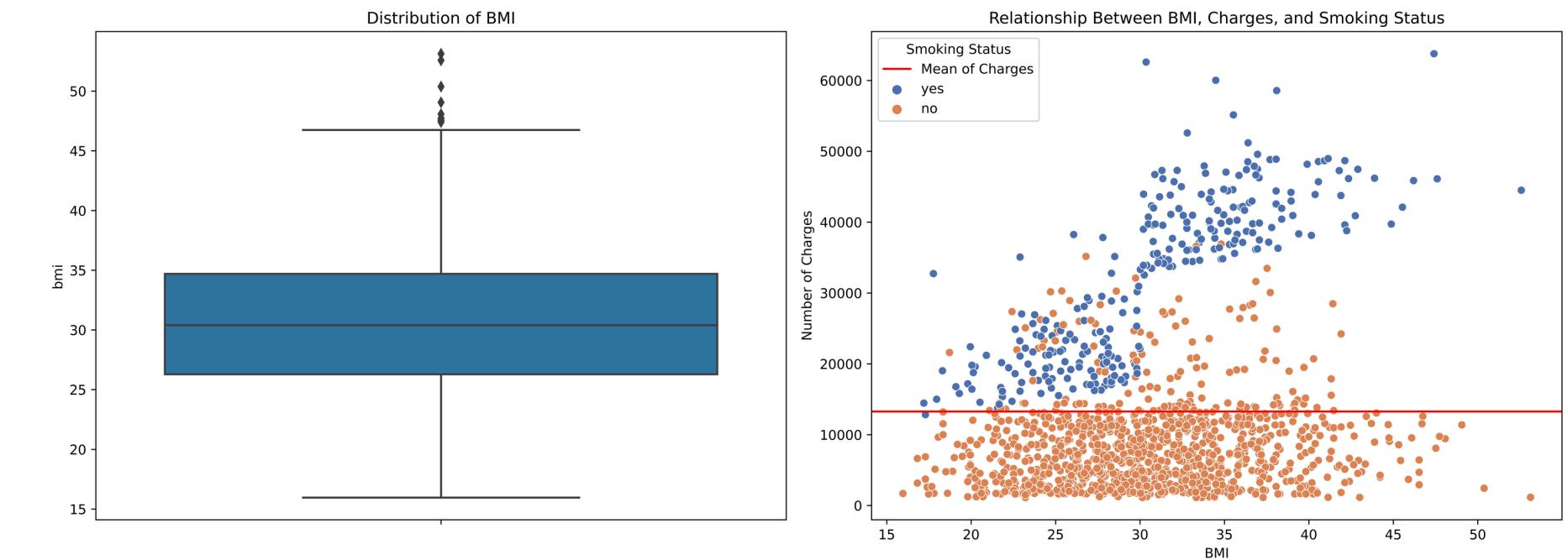




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SUNRISE INSTITUTE



Anaconda is a distribution of the Python
and R.

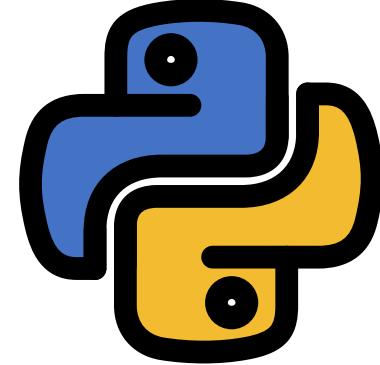




ເມືອງສູນສາລົ້າຍ໌
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JUPYTER NOTEBOOKS

JUPYTER NOTEBOOKS



In this section we'll install Anaconda and introduce **Jupyter Notebooks**, a **user-friendly coding environment** where we'll write our first Python program

TOPICS WE'LL COVER:

Installation & Setup

Notebook Interface

Comments & Markdown

The Print Function

Google Colab

Helpful Resources

GOALS FOR THIS SECTION:

- Install **Anaconda** and **launch Jupyter Notebooks**
- Get comfortable with the Jupyter Notebook environment and interface
- Learn some very basic Python syntax and write our first simple programming

INSTALLING ANACONDA (MAC)

Installation & Setup

Notebook Interface

Comments & Markdown

The Print Function

Google Colab

Helpful Resources

1) Go to anaconda.com/products/distribution and click 

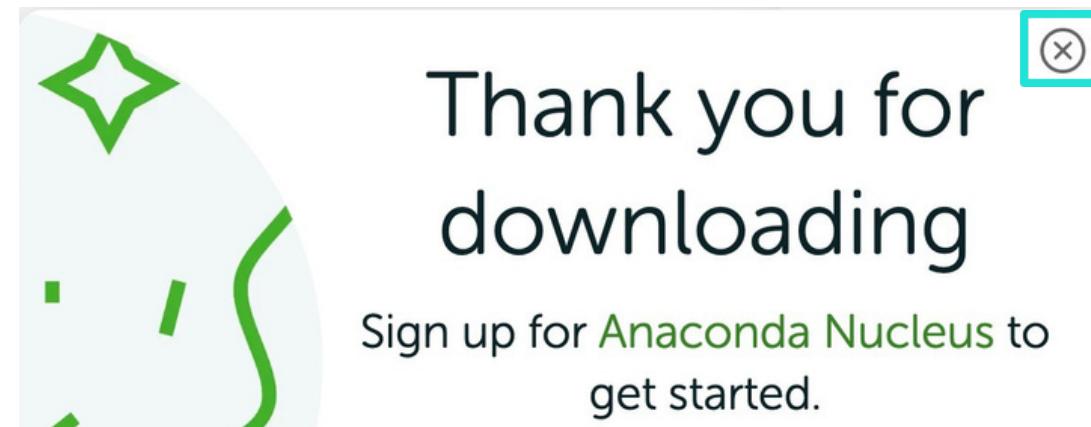
Individual Edition is now

ANACONDA DISTRIBUTION

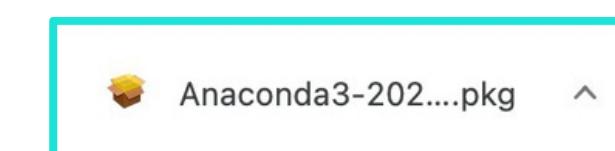
The world's most popular open-source Python distribution platform



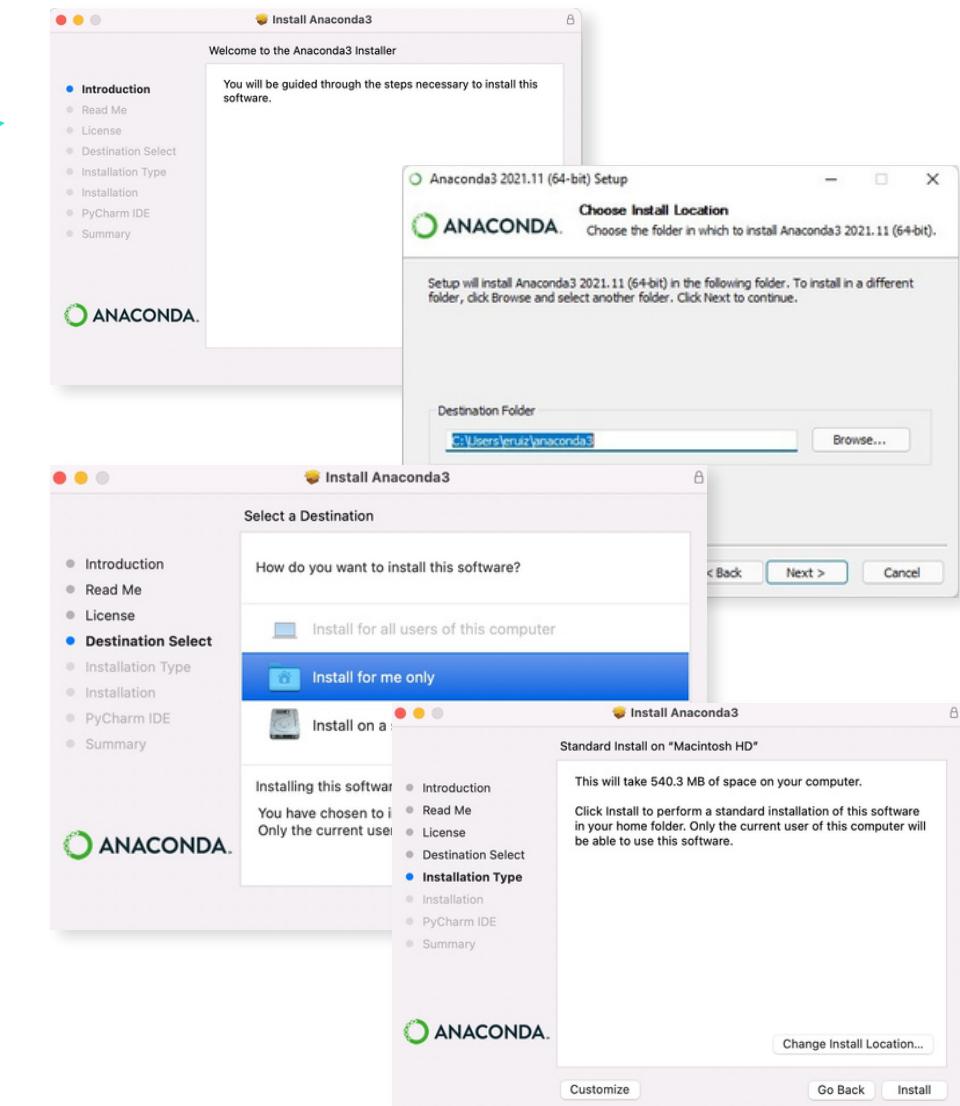
2) Click X on the Anaconda Nucleus pop-up (no need to launch)



3) Launch the downloaded Anaconda **pkg** file



4) Follow the **installation steps** (default settings are OK)



INSTALLING ANACONDA (PC)

Installation &
Setup

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Comments &
Markdown

The Print
Function

Google Colab

Helpful
Resources

- 1) Go to anaconda.com/products/distribution and click

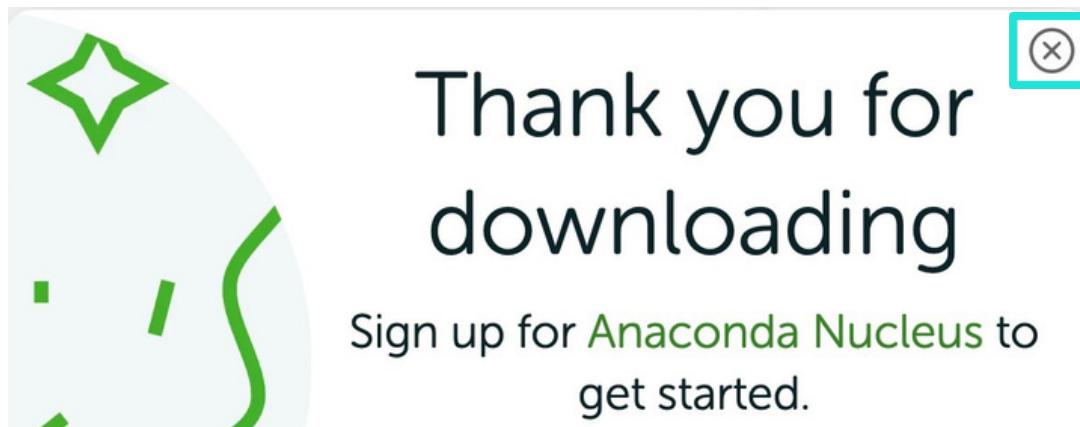
Download

Individual Edition is now
ANACONDA DISTRIBUTION

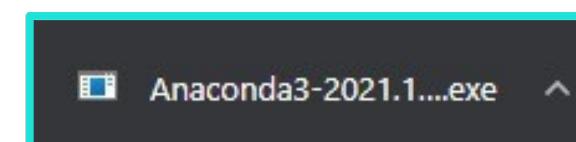
The world's most popular open-
source Python distribution platform



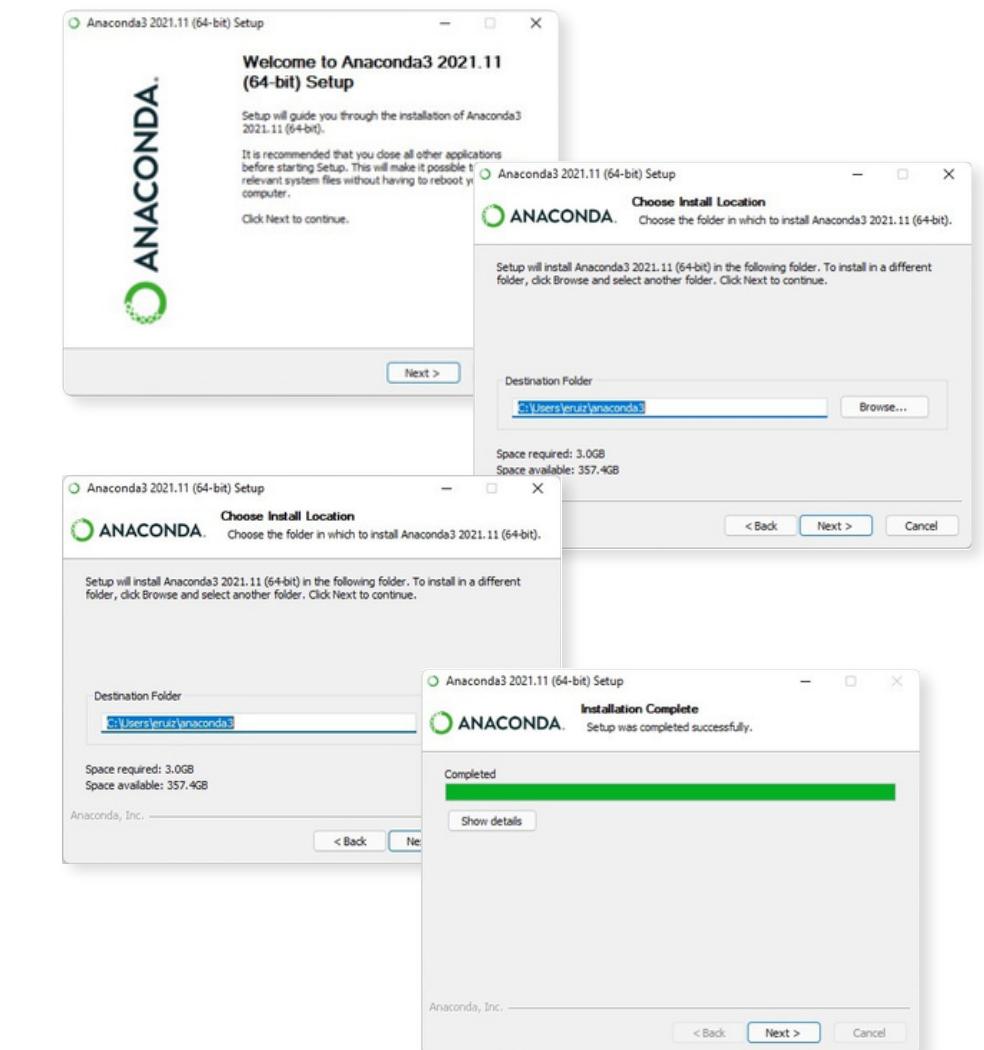
- 2) Click **X** on the Anaconda Nucleus pop-up
(no need to launch)



- 3) Launch the downloaded Anaconda **exe** file



- 4) Follow the **installation steps**
(default settings are OK)



LAUNCHING JUPYTER

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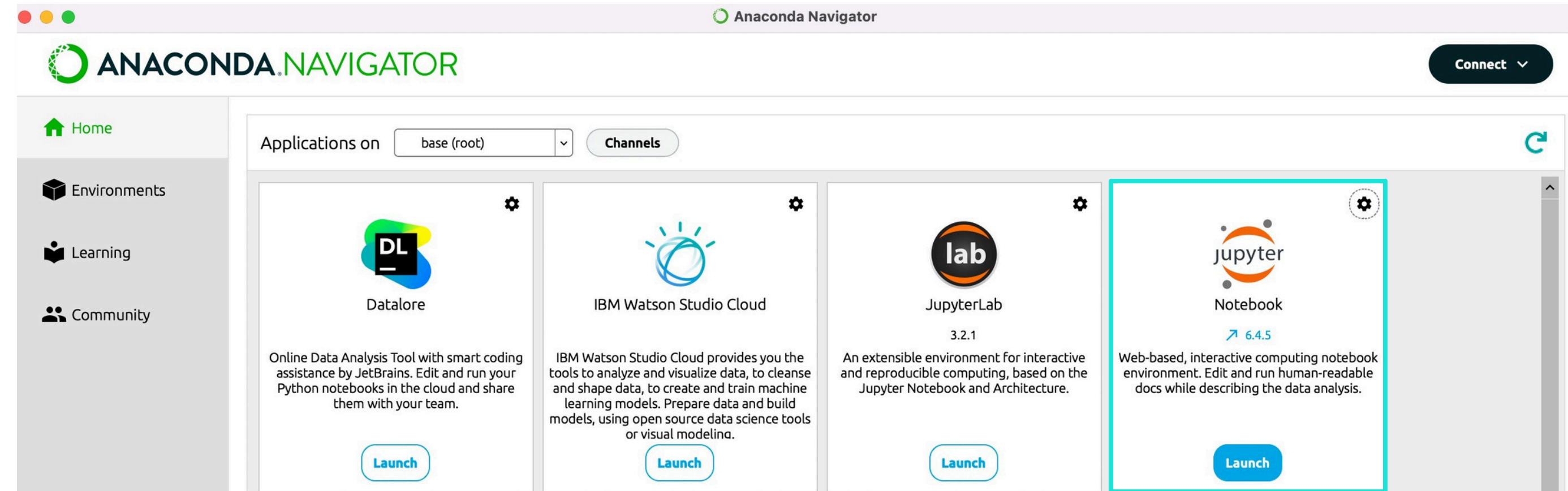
Google Colab

Helpful
Resources

1)Launch **Anaconda Navigator**

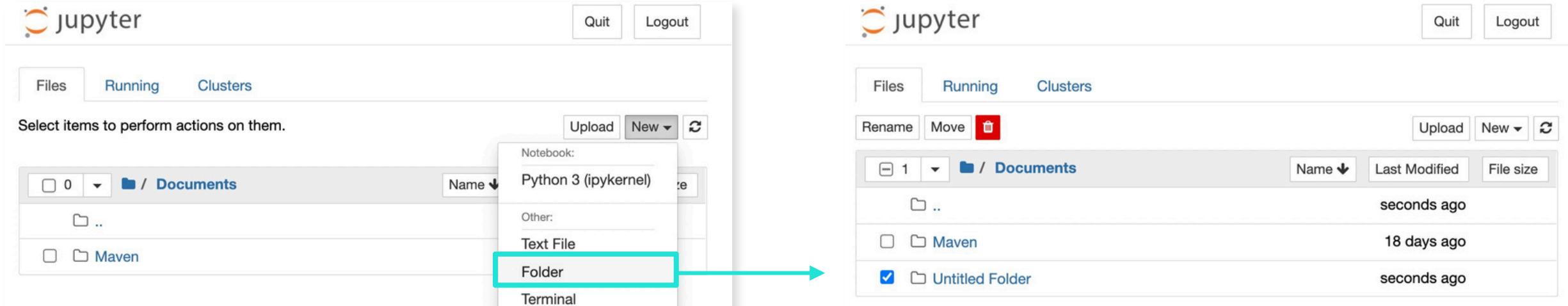
2)Find **Jupyter Notebook**and click

Launch



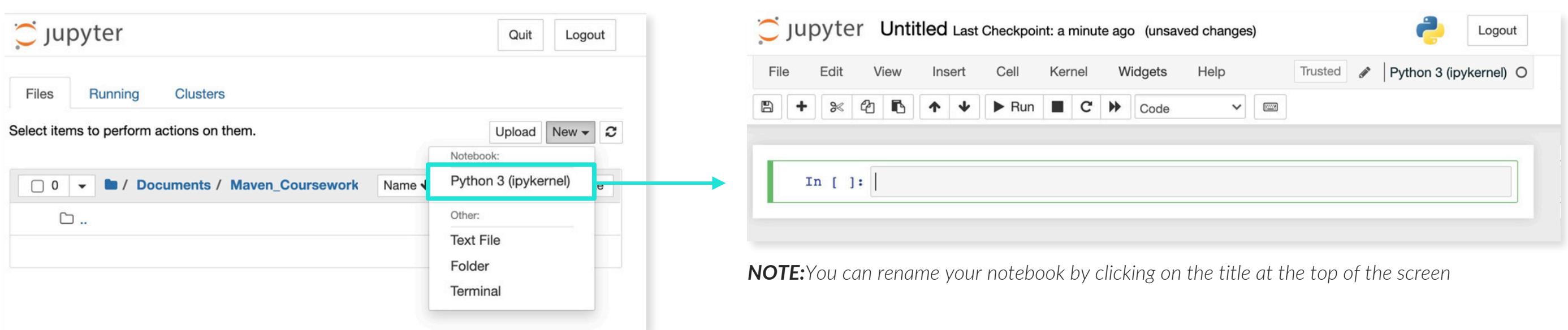
YOUR FIRST JUPYTER NOTEBOOK

1) Once inside the Jupyter interface, **create a folder** to store your notebooks for the course



NOTE: You can rename your folder by clicking "Rename" in the top left corner

2) Open your new coursework folder and **launch your first Jupyter notebook!**



NOTE: You can rename your notebook by clicking on the title at the top of the screen

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THE NOTEBOOK SERVER

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```
python
Last login: Tue Jan 25 14:04:12 on ttys002
(base) chrisb@Chriss-MBP ~ % jupyter notebook
[I 2022-01-26 08:45:53.886 LabApp] JupyterLab extension loaded from /Users/chrisb/opt/anaconda3/lib/python3.9/site-packages/jupyterlab
[I 2022-01-26 08:45:53.886 LabApp] JupyterLab application directory is /Users/chrisb/opt/anaconda3/share/jupyter/lab
[I 08:45:53.890 NotebookApp] Serving notebooks from local directory: /Users/chrisb
[I 08:45:53.890 NotebookApp] Jupyter Notebook 6.4.5 is running at:
[I 08:45:53.890 NotebookApp] http://localhost:8888/?token=3159cf032d9e6841d04910e257db2b24b6df6dfc878d6d5f
[I 08:45:53.890 NotebookApp] or http://127.0.0.1:8888/?token=3159cf032d9e6841d04910e257db2b24b6df6dfc878d6d5f
[I 08:45:53.890 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 08:45:53.893 NotebookApp]

To access the notebook, open this file in a browser:
file:///Users/chrisb/Library/Jupyter/runtime/nbserver-27175-open.html
Or copy and paste one of these URLs:
http://localhost:8888/?token=3159cf032d9e6841d04910e257db2b24b6df6dfc878d6d5f
or http://127.0.0.1:8888/?token=3159cf032d9e6841d04910e257db2b24b6df6dfc878d6d5f
[W 08:46:05.829 NotebookApp] Notebook Documents/Maven_Coursework/Python_Intro.ipynb
```



If you close the server window,
your notebooks will not run!

Depending on your OS, and method of launching Jupyter, one may not open. As long as you can run your notebooks, don't worry!

THE NOTEBOOK INTERFACE

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Menu Bar

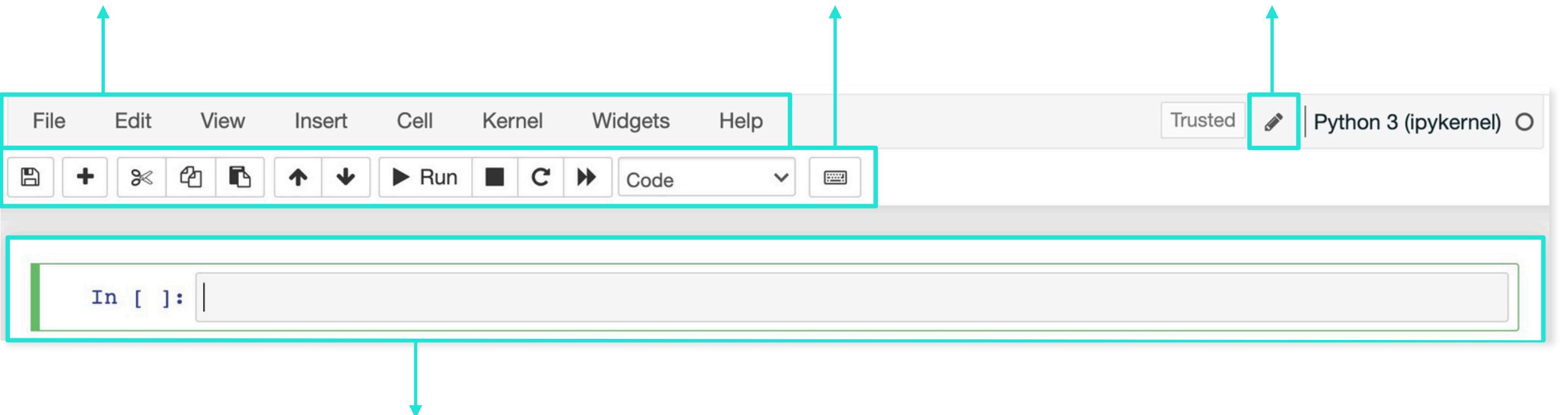
Options to manipulate the way
the notebook functions

Toolbar

Buttons for the most-used
actions within the notebook

Mode Indicator

Displays whether you are in **Edit**
Mode or **Command** Mode



Code Cell

Input field where you will write and
edit new code to be executed

MENU OPTIONS

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Resources

Save or revert, make a copy, open a notebook, download, etc.

- File Browser
- Show Header
- Toggle Zen Mode
- Table of Contents ⌘ K
- Show Notifications
- Show Line Numbers ⇧ L
- Match Brackets
- Wrap Words
- Open in JupyterLab
- Collapse Selected Code
- Collapse Selected Outputs
- Collapse All Code
- Collapse All Outputs
- Expand Selected Code
- Expand Selected Outputs
- Expand All Code
- Expand All Outputs
- Render Side-by-Side ⌘ R

Edit cells within your notebook (while in command mode)

- | Edit | View | Run | Kernel | Settings | Help |
|---------------------------------------|------|-----|--------|----------|------|
| Undo ⌘ Z | | | | | |
| Redo ⇧ ⌘ Z | | | | | |
| Undo Cell Operation Z | | | | | |
| Redo Cell Operation ⇧ Z | | | | | |
| Cut Cell X | | | | | |
| Copy Cell C | | | | | |
| Paste Cell Below V | | | | | |
| Paste Cell Above | | | | | |
| Paste Cell and Replace | | | | | |
| Delete Cell D, D | | | | | |
| Select All Cells ⌘ A | | | | | |
| Deselect All Cells | | | | | |
| Move Cell Up ⌃ ⌄ ↑ | | | | | |
| Move Cell Down ⌃ ⌄ ↓ | | | | | |
| Split Cell ⌃ ⌄ - | | | | | |
| Merge Selected Cells ⌃ M | | | | | |
| Merge Cell Above ⌃ ⌄ ⌈ | | | | | |
| Merge Cell Below ⌃ ⌄ ⌉ | | | | | |
| Clear Cell Output | | | | | |
| Clear Outputs of All Cells | | | | | |
| Find... ⌘ F | | | | | |
| Find Next ⌘ G | | | | | |
| Find Previous ⇧ ⌄ G | | | | | |

Edit cosmetic options for your notebook.

- | View | Run | Kernel | Settings | Help |
|---|-----|--------|----------|------|
| Activate Command Palette ⇧ ⌄ C | | | | |
| Open JupyterLab | | | | |
| File Browser | | | | |
| Show Header | | | | |
| Toggle Zen Mode | | | | |
| Table of Contents ⌘ K | | | | |
| Show Notifications | | | | |
| Show Line Numbers ⇧ L | | | | |
| Match Brackets | | | | |
| Wrap Words | | | | |
| Open in JupyterLab | | | | |
| Collapse Selected Code | | | | |
| Collapse Selected Outputs | | | | |
| Collapse All Code | | | | |
| Collapse All Outputs | | | | |
| Expand Selected Code | | | | |
| Expand Selected Outputs | | | | |
| Expand All Code | | | | |
| Expand All Outputs | | | | |
| Render Side-by-Side ⌘ R | | | | |
| Text Editor Syntax Highlighting | | | | |
| Preview Notebook with Panel | | | | |
| Open with Panel in New Browser Tab | | | | |

MENU OPTIONS

Installation &
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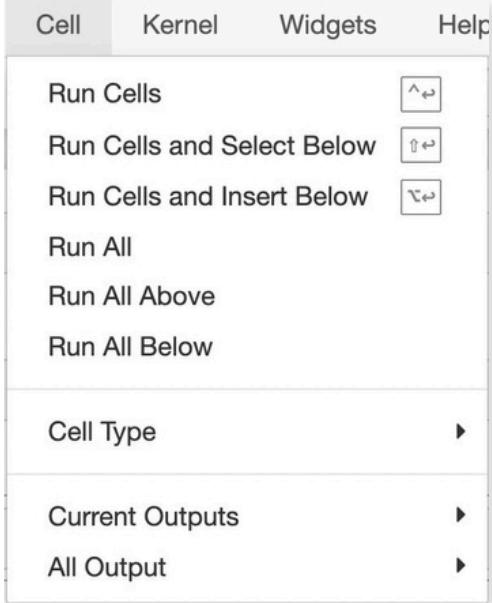
The Print
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Google Colab

Helpful
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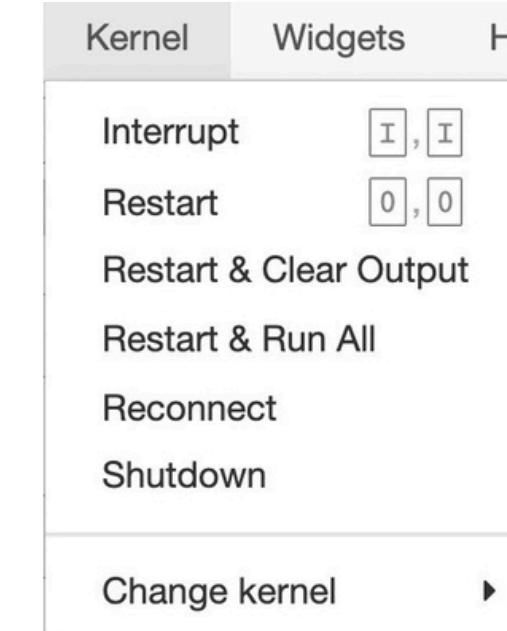
Cell

Access options for
running the cells in your
not ebook



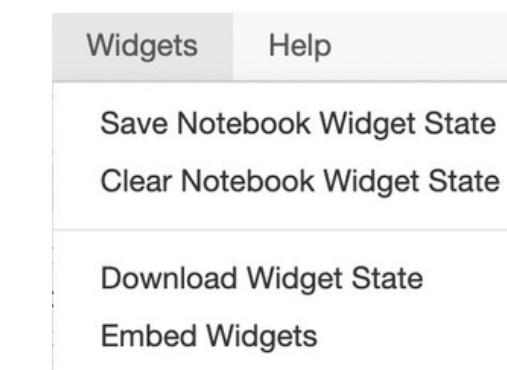
Kernel

Interact with the
instance of Python that
runs your code



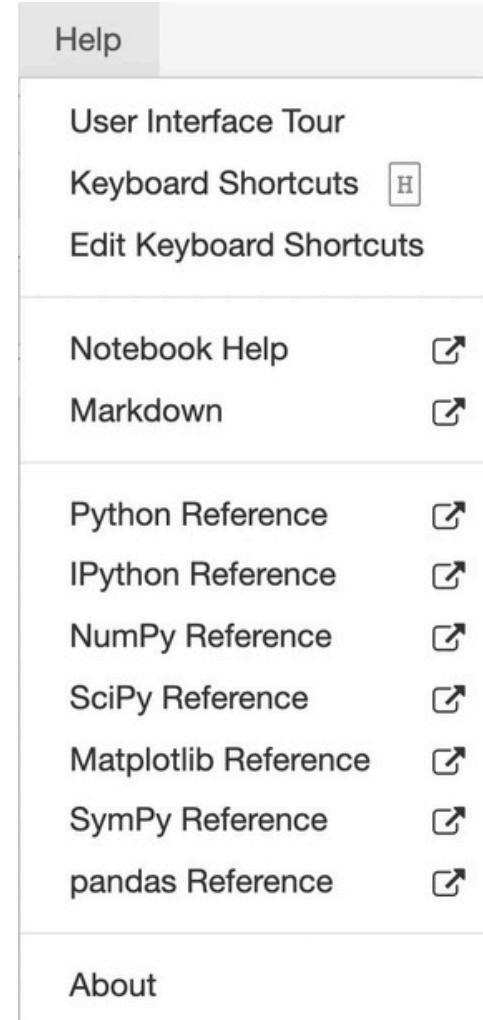
Widgets

Manage interactive
elements, or 'widgets' in
your notebook



Help

View or edit keyboard
shortcuts and access
Python reference
pages



THE TOOLBAR

Installation &
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Markdown

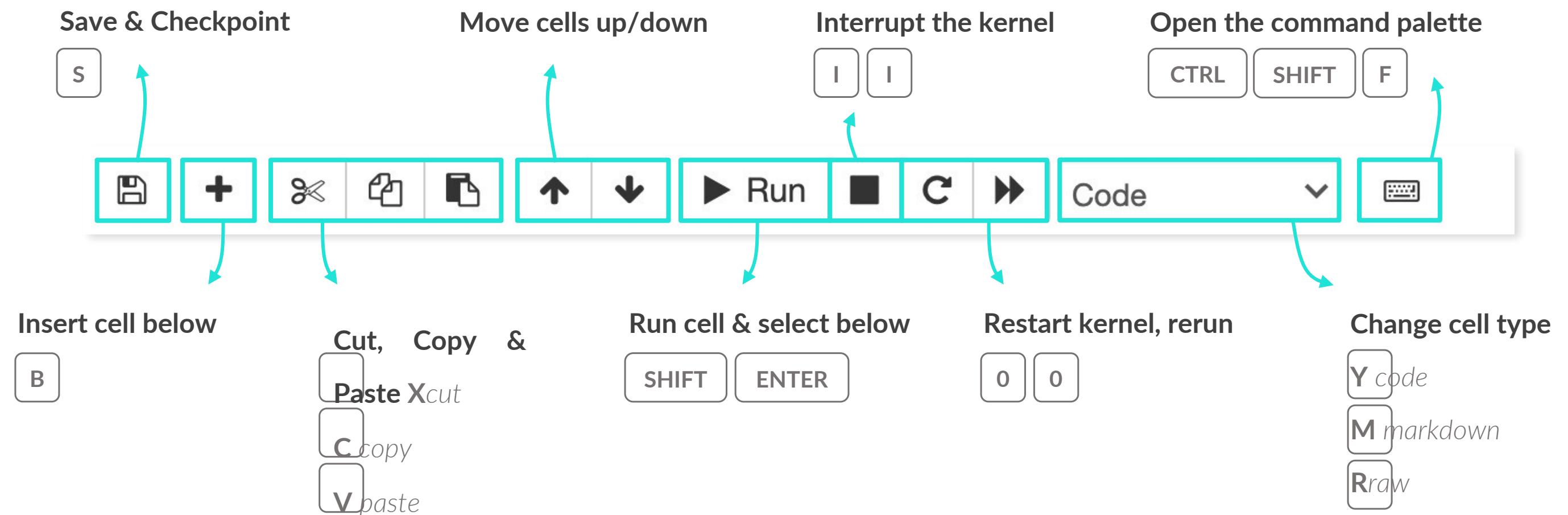
The Print
Function

Google Colab

Helpful
Resources

The **toolbar** provides easy access to the most-used notebook actions

- These actions can also be performed using hotkeys (keyboard shortcuts)



Shortcuts may differ depending on **which mode you are in**

EDIT & COMMAND MODES

Installation &
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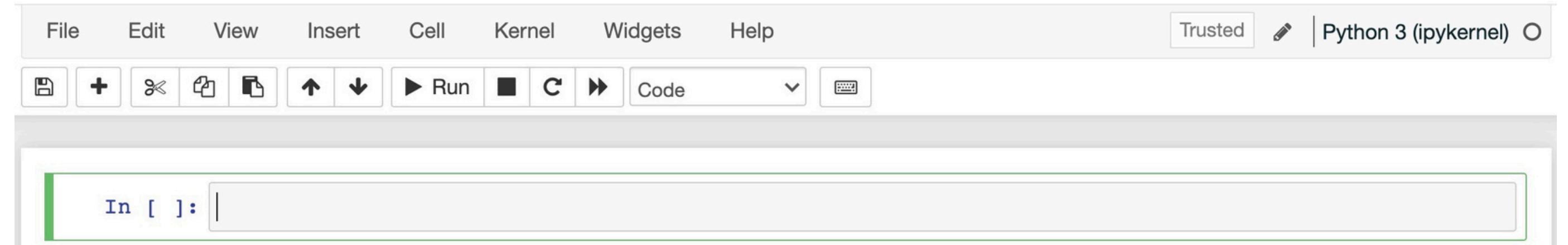
Comments &
Markdown

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Function

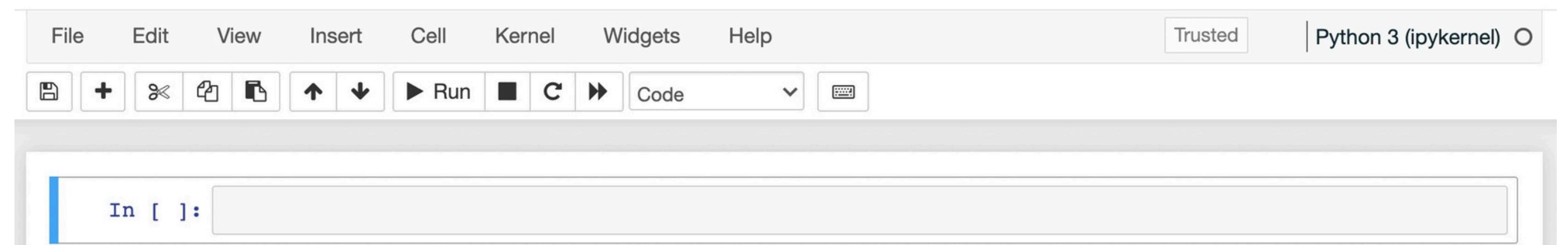
Google Colab

Helpful
Resources

EDIT MODE is for editing **content within cells**, and is indicated by **green** highlights and a  icon



COMMAND MODE is for editing **the notebook**, and is indicated by **blue** highlights and no icon



THE CODE CELL

Installation &
Setup

Notebook
Interface

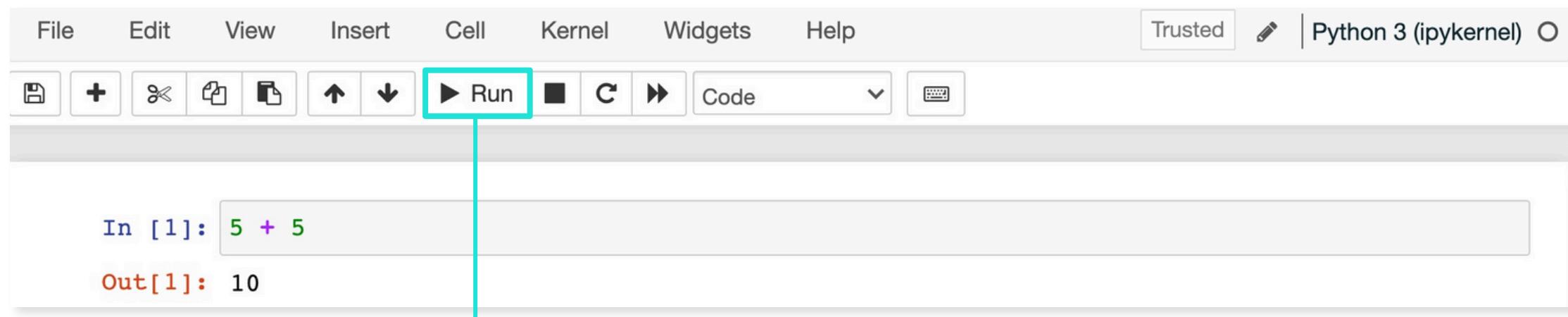
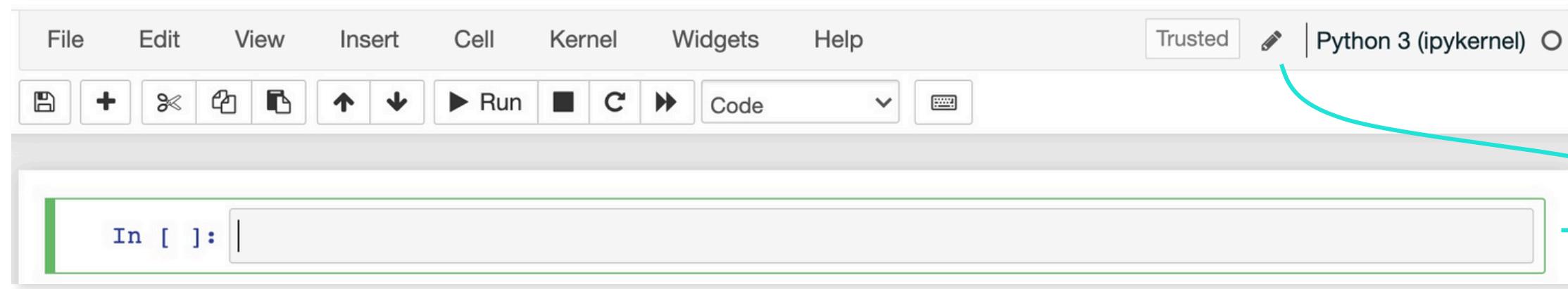
Comments &
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Helpful
Resources

The **code cell** is where you'll write and execute Python code



Type some code, and click **Run** to execute

In[]: Our code (*input*)

*Note: not all code has an output!

Out[]: What our code produced (*output*)*



Congratulations, you just became
a Python programmer!

THE CODE CELL

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The **code cell** is where you'll write and execute Python code

In [1]: $5 + 5$

Out[1]: 10

In [2]: $5 + 5$

Out[2]: 10

Note that our output hasn't changed, but the number in the brackets increased from **1** to **2**.

This is a **cell execution counter**, which indicates how many cells you've run in the current session. If the cell is still processing, you'll see

In[*]

Click back into the cell (or use the up arrow) and press **SHIFT + ENTER** to rerun the code

In [2]: $5 + 5$

Out[2]: 10

In [3]: $5 - 5$

Out[3]: 0

The cell counter will continue to increment as you run additional cells

COMMENTING CODE

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Comments are lines of code that start with '#' and do not run

- They are great for explaining portions of code for others who may use or review it
- They can also serve as reminders for yourself when you revisit your code in the future

```
In [4]: # I'm subtracting five from five. Add a space between your hash and comment.  
      5 - 5
```

```
Out[4]: 0
```

```
In [5]: 5 - 5 # change the second 5 to a 6 tomorrow
```

```
Out[5]: 0
```

```
# This notebook is about teaching the basics of Jupyter notebook.  
# Should i define what a jupyter notebook is here?  
# I'm subtracting five from five. Add a space between your hash and comment.  
5 - 5 # 5 is the fifth integer greater than zero. It is also the number of fingers on our hand  
# 5 is a very interesting number  
# so is 0, which is the output
```

```
0
```

Think about your audience when commenting your code (you may not need to explain basic arithmetic to an experienced Python programmer)

Be conscious of over-commenting, which can actually make your code even more difficult to read



Comments should explain **individual cells or lines of code**, NOT your entire workflow – we have better tools for that!

MARKDOWN CELLS

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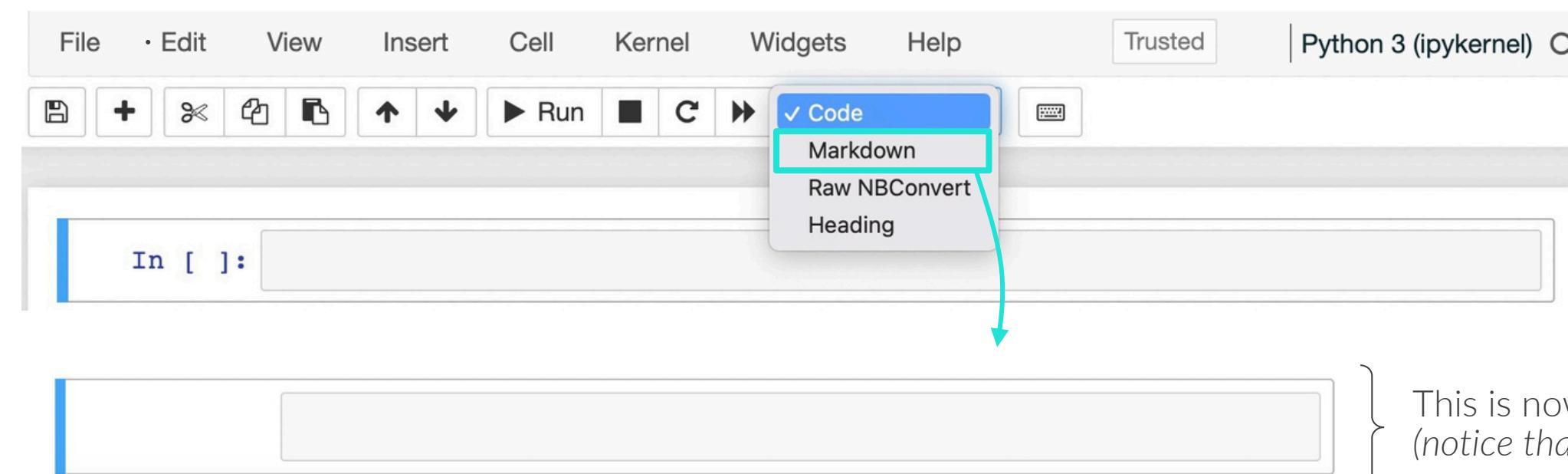
Google Colab

Helpful
Resources

Markdown cells let you write structured text passages to explain your workflow, provide additional context, and help users navigate the notebook

To create a markdown cell:

- 1 Create a new cell above the top cell (press **A** with the cell selected)
- . Select “**Markdown**” in the cell menu (or press **M**)
- 2



} This is now a markdown cell
(notice that the
In[]: disappeared)

MARKDOWN SYNTAX

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Markdown cells use a special **text formatting syntax**

Jupyter Notebook Intro

Section 1: Markdown Basics

This is body text. I can use this area to provide more in depth explanations of my:

- * Thought process
- * Overall workflow
- * etc

Anything that would be too much text for comments.

To create bulleted lists, begin a line with *.

Numbered lists can be created by beginning a line with 1., 2., and so on.

Markdown has a **lot** of capabilities, and could be a course on its own. You will learn more as you build more notebooks and look at the work of others.

The Essentials to get started are:

1. Create headers with # (one is biggest, six is the smallest header)
2. **Bold**, **italicize**, **Bold AND Italic**
3. Creating bulleted or numbered lists (begin a new line with * for bullets 1. for numbers).
4. Code highlighting e.g. `my_variable = 5`. Use the backtick, not apostrophe.

To explore further, I highly recommend [\[this guide.\]](https://www.markdownguide.org/basic-syntax/)(<https://www.markdownguide.org/basic-syntax/>)

MARKDOWN SYNTAX

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Markdown cells use a special **text formatting syntax**

Jupyter Notebook Intro

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This is body text. I can use this area to provide more in depth explanations of my:

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3. Creating bulleted or numbered lists (begin a new line with * for bullets 1. for numbers).
4. Code highlighting e.g. `my_variable = 5`. Use the backtick, not apostrophe.

To explore further, I highly recommend [this guide](#).

In [4]: `5 + 5`

Out[4]: 10

THE PRINT FUNCTION

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The **print()** function will display a specified value

In [11]: `print('Hello World!')`

Hello World!

Simply specify the value you want to print inside the parenthesis

In [16]: `print(5, 5 + 5)`

5 10

You can print multiple values by separating them with **commas**

Note that this does not say different from the standard output returned by Python

Out[16]: as a printed output is



Besides `print()`, Python has **many built-in functions** along with tools for **creating our own custom functions** (*more on that later!*)



PRO TIP: Add a "?" after a function name to access documentation

In [18]: `print?`

Docstring:

`print(value, ..., sep=' ', end='\n', file=sys.stdout, flush=False)`

Prints the values to a stream, or
Optional keyword arguments:

file: a file-like object (stream)

sep: string inserted between values

end: string appended after the last value

flush: whether to forcibly flush the stream

Type: `builtin_function_or_method`

ALTERNATIVE: GOOGLE COLAB

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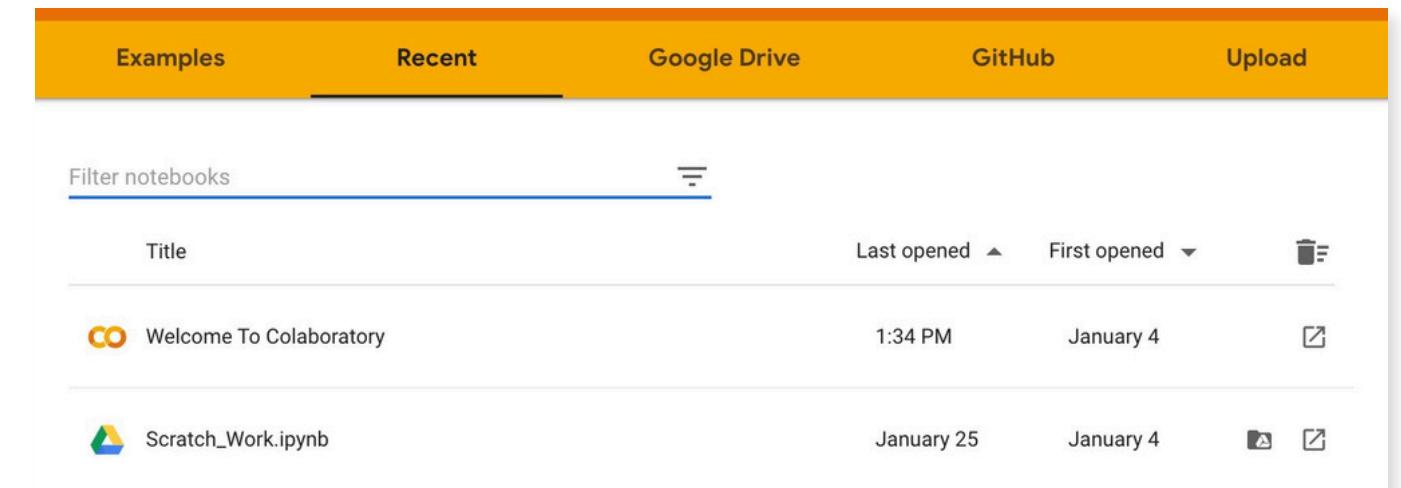
Google Colab is Google's cloud-based version of Jupyter Notebooks

To create a Colab notebook:

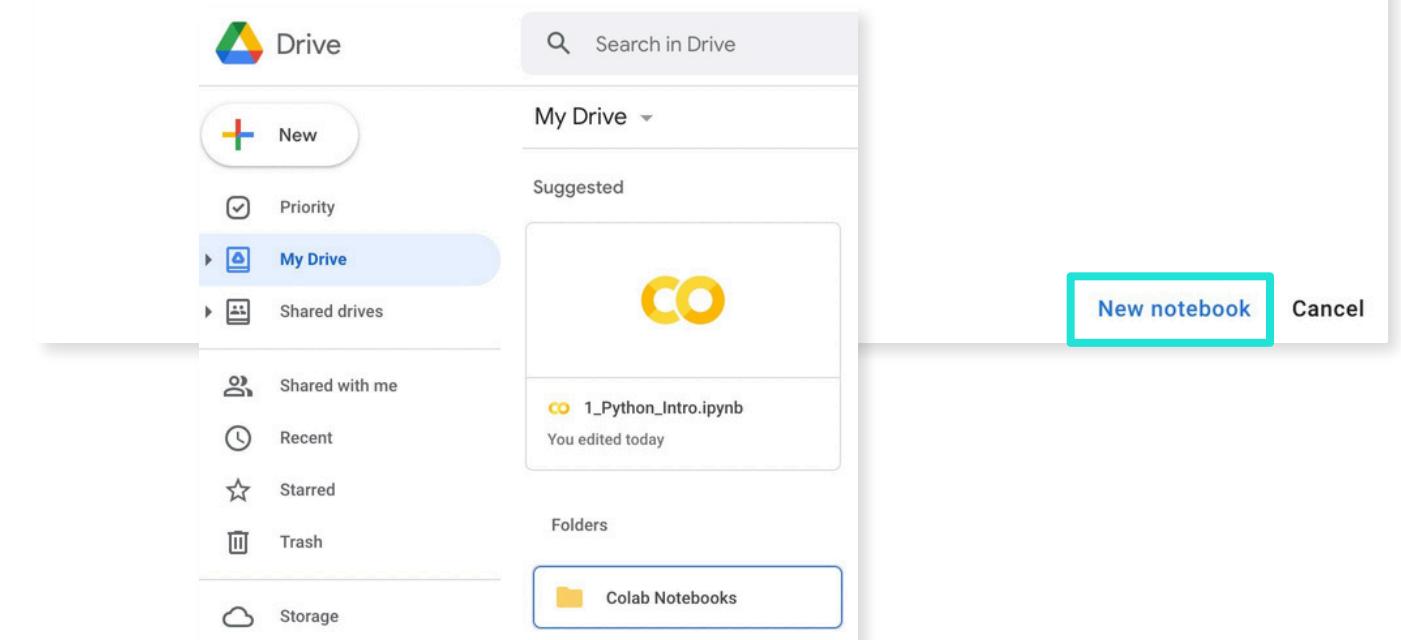
1. Log in to a Gmail account
2. Go to colab.research.google.com
3. Click "new notebook"



Colab is very similar to Jupyter Notebooks (*they even share the same file extension*); the main difference is that you are connecting to **Google Drive** rather than your machine, so files will be stored in Google's cloud



The screenshot shows the 'Recent' tab of the Google Colab interface. At the top, there are tabs for 'Examples', 'Recent', 'Google Drive', 'GitHub', and 'Upload'. Below the tabs is a search bar labeled 'Filter notebooks'. Underneath the search bar, there are columns for 'Title', 'Last opened', and 'First opened'. Two notebooks are listed: 'Welcome To Colaboratory' (last opened 1:34 PM on January 4) and 'Scratch_Work.ipynb' (first opened January 25 on January 4).



The screenshot shows the Google Drive interface. On the left, there is a sidebar with options like 'New', 'Priority', 'My Drive' (which is selected), 'Shared drives', 'Shared with me', 'Recent', 'Starred', and 'Trash'. In the main area, there is a 'Suggested' section with a thumbnail for '1_Python_Intro.ipynb'. On the right, a modal dialog box is open with the title 'New notebook'. It contains a 'Cancel' button and a 'New notebook' button, which is highlighted with a blue border.

HELPFUL RESOURCES

Installation &
Setup

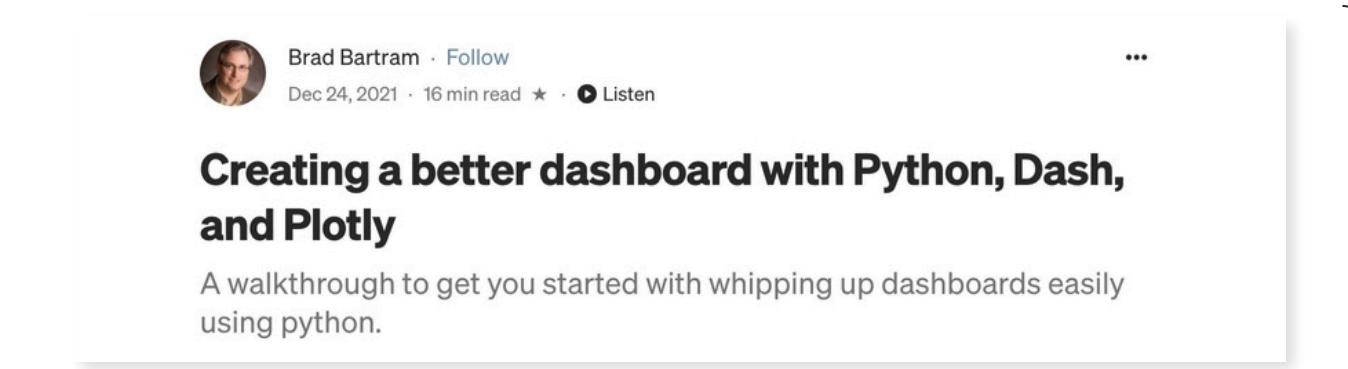
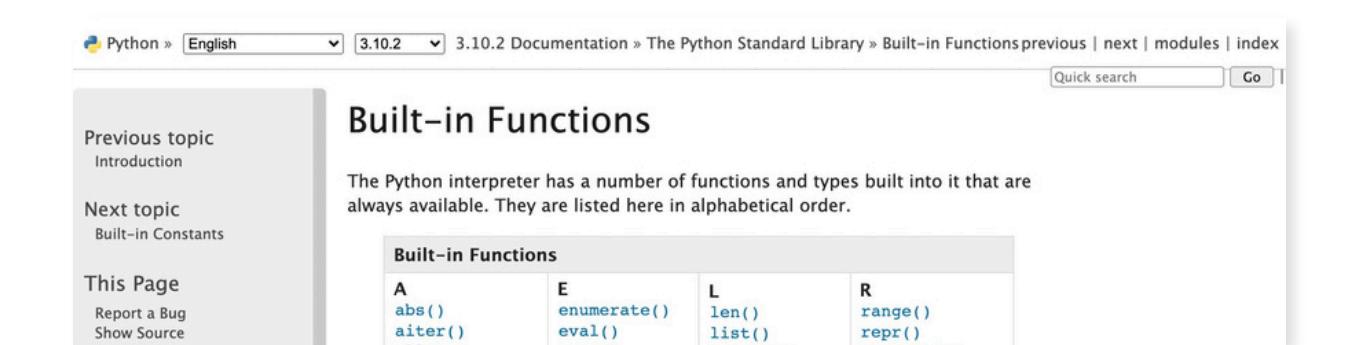
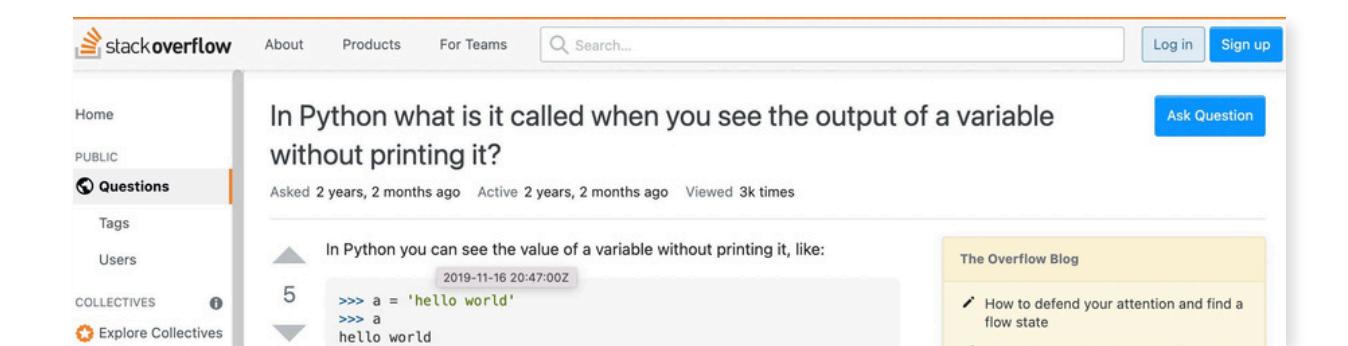
Notebook
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Resources



Google your questions – odds are someone else has asked the same thing and it has been answered (*include Python in the query!*)

Stack Overflow is a public coding forum that will most likely have the answers to most of the questions you'll search for on Google

<https://stackoverflow.com/>

The **Official Python Documentation** is a great “cheat sheet” for library and language references

<https://docs.python.org/3/>

There are many quality **Python & Analytics Blogs** on the web, and you can learn a lot by subscribing and reviewing the concepts and underlying code

<https://towardsdatascience.com/>

KEY TAKEAWAYS



JupyterNotebooks are user-friendly coding environments

- Jupyternotebooks are popular among analysts and data scientists, since they allow you to create and document entire analytical workflows and render outputs and visualizations on screen



Code cells are where you write and execute Python code

- Make sure that you know how to run, add, move, and remove cells, as well as how to restart your kernel or stop the code from executing



Use comments and markdown cells for documentation

- Comments should be used to explain specific portions of your code, and markdown should be used to document your broader workflow and help users navigate the notebook



Google Colab is a popular cloud-based alternative to JupyterNotebooks

- Colab and Jupyternotebooks are very similar and share the same file extension, but Colab files are stored in Google Drive instead of on your machine