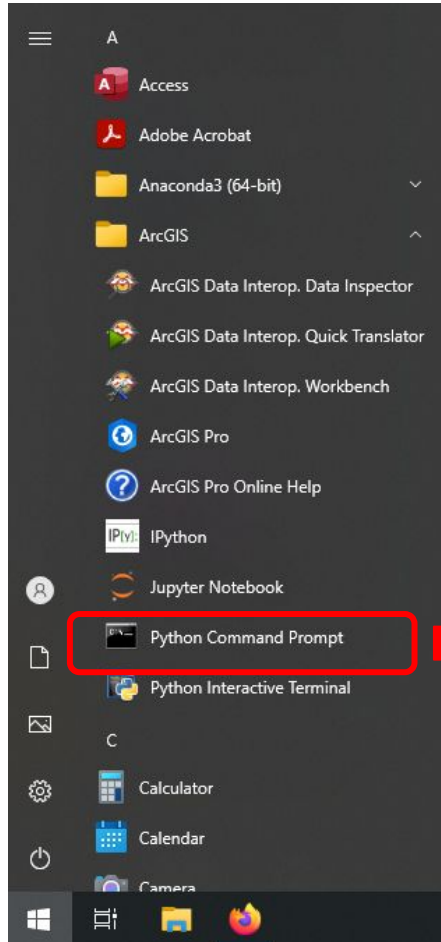


Running Python: Command Prompt

- Command Line Interface (CLI)
- Interactive terminal/shell/console or REPL (Read, Evaluate, Print Loop)
- Type python to enter
- Good for few lines of code
- Exit with quit(), exit(), Ctrl-Z then Enter, or Ctrl-Break

A screenshot of a Windows Command Prompt window titled 'Python Command Prompt - "C:\Program Files\ArcGIS\Pro\bin\Python\Scripts\proenv.bat"'. The window has a black background with white text. The text inside the window shows the following sequence of commands and output:

```
(arcgispro-py3) C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3>python
Python 3.9.11 [MSC v.1931 64 bit (AMD64)] :: Anaconda, Inc. on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> print("Hello World")
Hello World
>>> quit()

(arcgispro-py3) C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3>
```

Running Python: Command Prompt

```
Python Command Prompt - "C:\Program Files\ArcGIS\Pro\bin\Python\Scripts\proenv.bat"
(arcgispro-py3) C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3>cd C:\users\Stephen\GIS\GISC2435
(arcgispro-py3) C:\Users\Stephen\GIS\GISC2435>dir
Volume in drive C has no label.
Volume Serial Number is 8403-69DF

Directory of C:\Users\Stephen\GIS\GISC2435

12/18/2022  10:35 PM    <DIR>        .
12/18/2022  10:35 PM    <DIR>        ..
12/01/2022  11:59 AM    <DIR>        Design
12/18/2022  10:36 PM    <DIR>        Example
             0 File(s)                0 bytes
             4 Dir(s)  234,999,115,776 bytes free

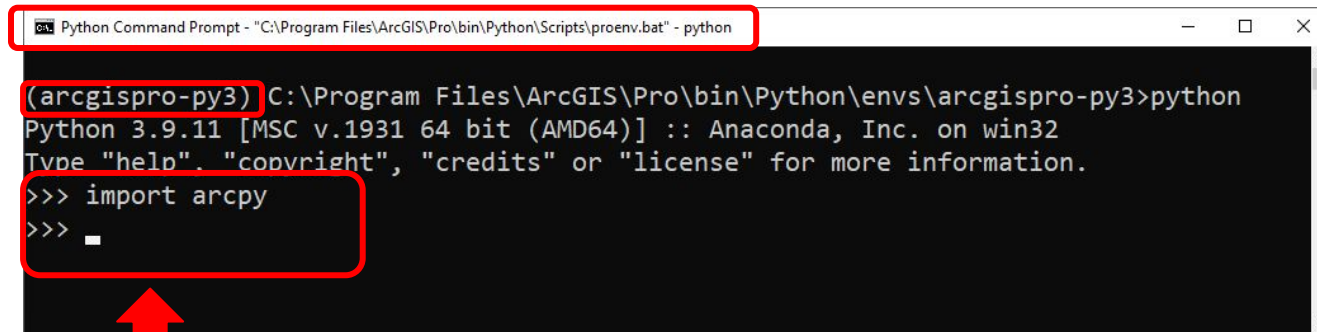
(arcgispro-py3) C:\Users\Stephen\GIS\GISC2435>cd Example
(arcgispro-py3) C:\Users\Stephen\GIS\GISC2435\Example>python example.py
Hello World

(arcgispro-py3) C:\Users\Stephen\GIS\GISC2435\Example>cd ..
(arcgispro-py3) C:\Users\Stephen\GIS\GISC2435>
```

- Navigating the command prompt
 - cd = change directory
 - cd .. = move up one level in directory
 - dir = display files in current directory level
- To run script, navigate to .py file location and type python {file name} or python {full file path + file name} from anywhere

Command Prompt vs Command Prompt

- ArcGIS Pro Python Command Prompt is different than the standard system Command Prompt

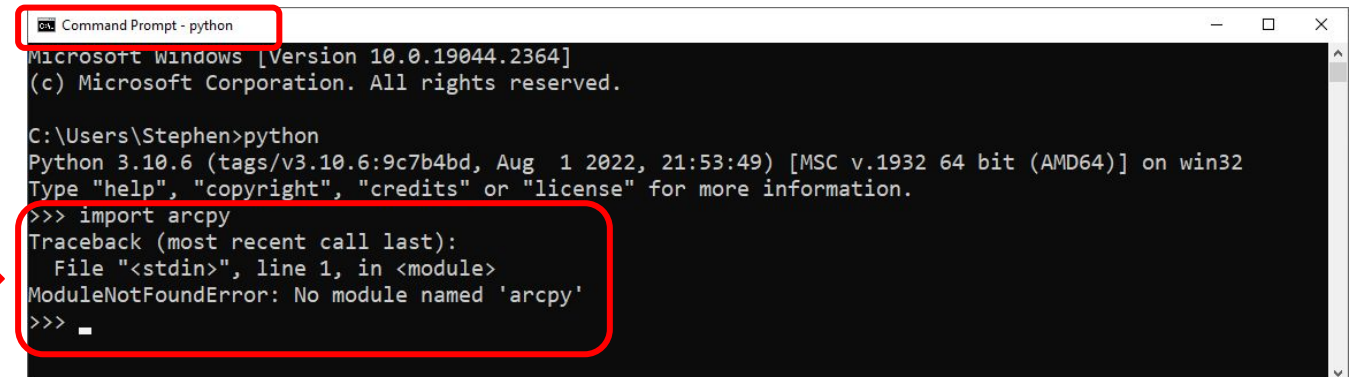
A screenshot of a Windows Command Prompt window titled "Python Command Prompt - \"C:\\Program Files\\ArcGIS\\Pro\\bin\\Python\\Scripts\\proenv.bat\" - python". The prompt shows the user is in the environment (arcgispro-py3) and has run 'python', displaying version 3.9.11. The user then enters 'import arcpy' and a cursor is shown on the next line. Red boxes highlight the title bar, the environment name, and the command input area. A red arrow points from the text 'ArcGIS Pro Python' below to the command input area.

```
Python Command Prompt - "C:\Program Files\ArcGIS\Pro\bin\Python\Scripts\proenv.bat" - python

(arcgispro-py3) C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3>python
Python 3.9.11 [MSC v.1931 64 bit (AMD64)] :: Anaconda, Inc. on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> import arcpy
>>> _
```

**ArcGIS Pro
Python**

**System
Python**

A screenshot of a standard Windows Command Prompt window titled "Command Prompt - python". It shows the user running 'python' in a standard Windows environment, displaying version 3.10.6. When the user enters 'import arcpy', a 'ModuleNotFoundError: No module named 'arcpy'' is displayed. Red boxes highlight the title bar and the error message. A red arrow points from the text 'System Python' to the error message.

```
Command Prompt - python

Microsoft Windows [Version 10.0.19044.2364]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Stephen>python
Python 3.10.6 (tags/v3.10.6:9c7b4bd, Aug 1 2022, 21:53:49) [MSC v.1932 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> import arcpy
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
ModuleNotFoundError: No module named 'arcpy'
>>> _
```

Making It Work Anyway

- The following options will let you run ArcGIS Python from the standard Command Prompt:
- “%PROGRAMFILES%\ArcGIS\Pro\bin\Python\Scripts\propy” will bring up the ArcGIS Pro Python REPL (*yes you need to include the quotes*)
- “%PROGRAMFILES%\ArcGIS\Pro\bin\Python\Scripts\propy”
example.py will run example.py as long as you’re in the proper folder
- “%PROGRAMFILES%\ArcGIS\Pro\bin\Python\Scripts\proenv” or
“%PROGRAMFILES%\ArcGIS\Pro\bin\Python\scripts\propy.bat” will launch the ArcGIS Pro Python conda environment

Making It Work Continued

- %PROGRAMFILES% = C:\Program Files
- So “**C:\Program Files\ArcGIS\Pro\bin\Python\Scripts\propy**” will also work
- The quotes are required because spaces are read as breaks between parameters in this specific context in the Command Prompt
- Alternately, **C:\Progra~1\ArcGIS\Pro\bin\Python\scripts\propy** (no quotes) will work
- You can even add C:\Program Files\ArcGIS\Pro\bin\Python\Scripts to your Windows path settings, which will allow you to run ArcGIS Pro Python by simply typing **propy** or **propy.bat**

A Few Caveats

- To use the ArcGIS Pro Python installation outside of ArcGIS Pro, one of the following must be true:
 - Sign me in automatically is checked when signing in to ArcGIS Pro
 - ArcGIS Pro is currently open
 - ArcGIS Pro has been authorized to work offline

```
(arcgispro-py3) C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3>python
Python 3.7.11 [MSC v.1927 64 bit (AMD64)] :: Anaconda, Inc. on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> import arcpy
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
  File "C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\__init__.py", line 88, in <module>
    from arcpy.geoprocessing import gp
  File "C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\geoprocessing\__init__.py", line 14, in <module>
    from ._base import *
  File "C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\geoprocessing\_base.py", line 14, in <module>
    import arcgisscripting
  File "C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3\lib\site-packages\arcgisscripting\__init__.py", line 1
28, in <module>
    from . arcgisscripting import *
RuntimeError: The Product License has not been initialized.
```

Other Command Prompt-ish Things

- Python Interactive Terminal
 - Same as Command Prompt but starts with Python REPL activated
- IPython
 - Similar to Command Prompt but file navigation and Python REPL are available at the same time

```
IP IPython: C:\GIS2435\Example
Python 3.9.11 [MSC v.1931 64 bit (AMD64)]
Type 'copyright', 'credits' or 'license' for more information
IPython 7.21.0 -- An enhanced Interactive Python. Type '?' for help.

In [1]: cd
C:\Users\Stephen

In [2]: cd GIS
C:\Users\Stephen\GIS

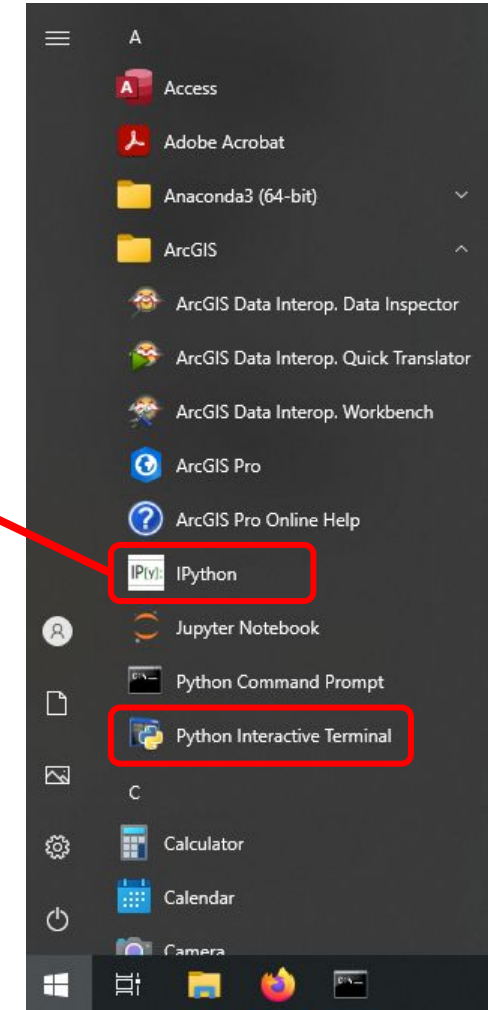
In [3]: import os

In [4]: os.listdir()
Out[4]: ['Admin', 'GIS2250', 'GIS2435']

In [5]: cd GIS2435\Example
C:\Users\Stephen\GIS\GIS2435\Example

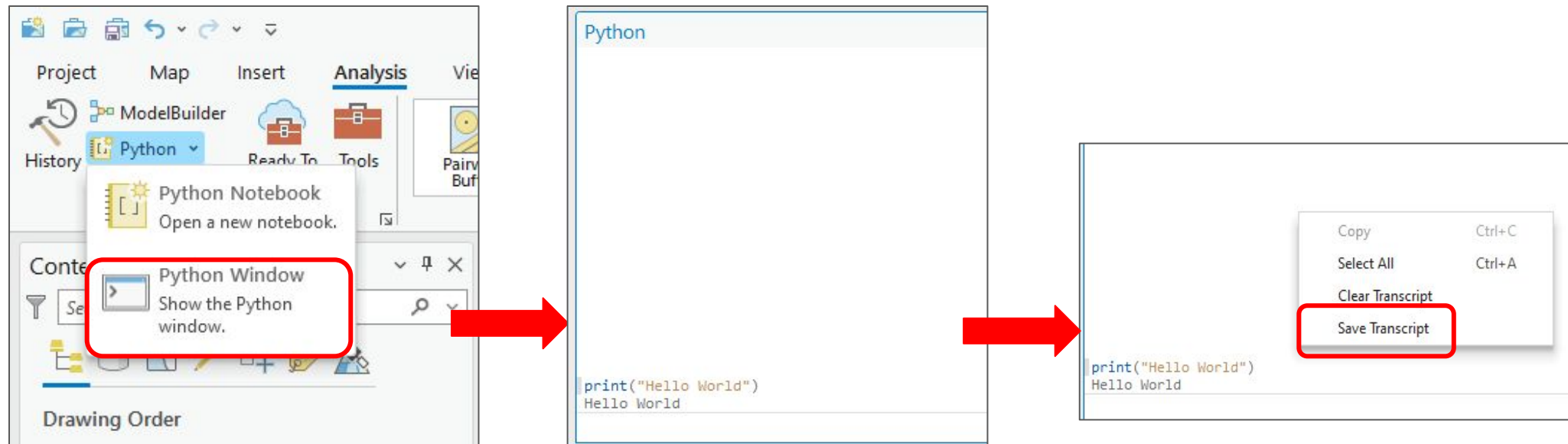
In [6]: run example.py
Hello World

In [7]:
```



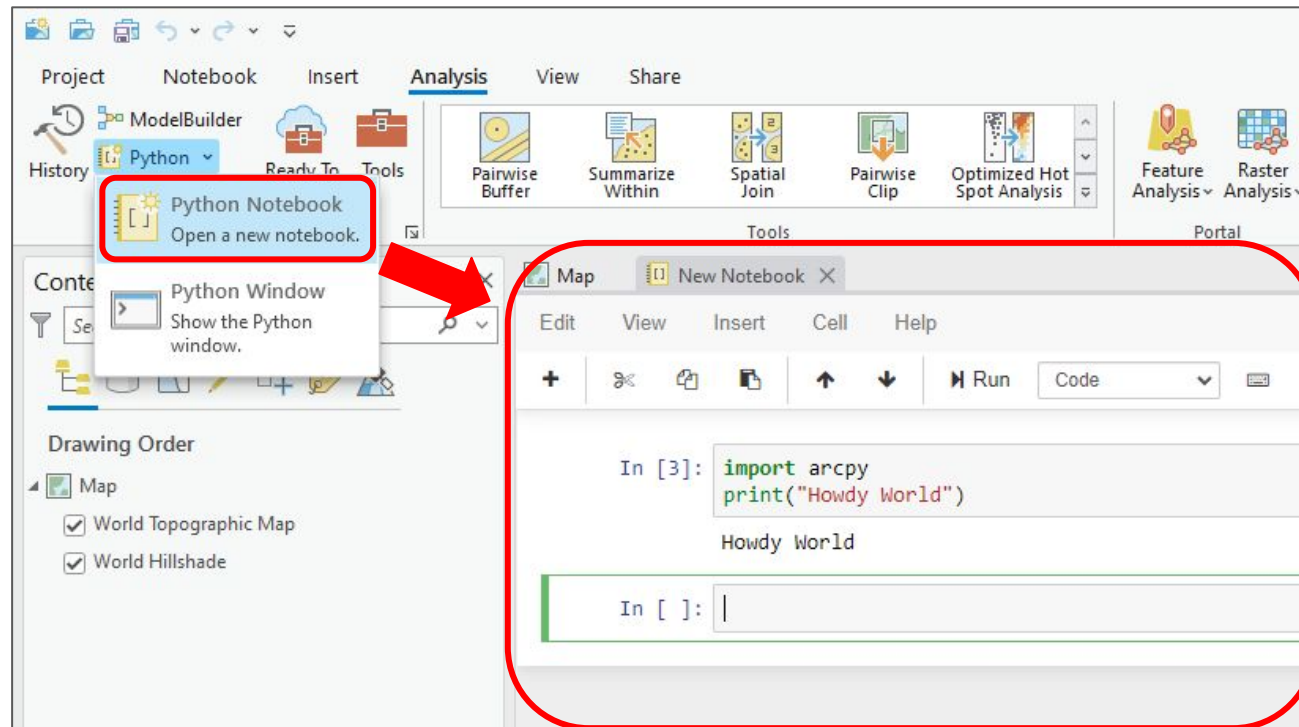
Running Python: Inside ArcGIS Pro

- Python Window
 - Python REPL inside ArcGIS Pro
 - Can be exported to .py file



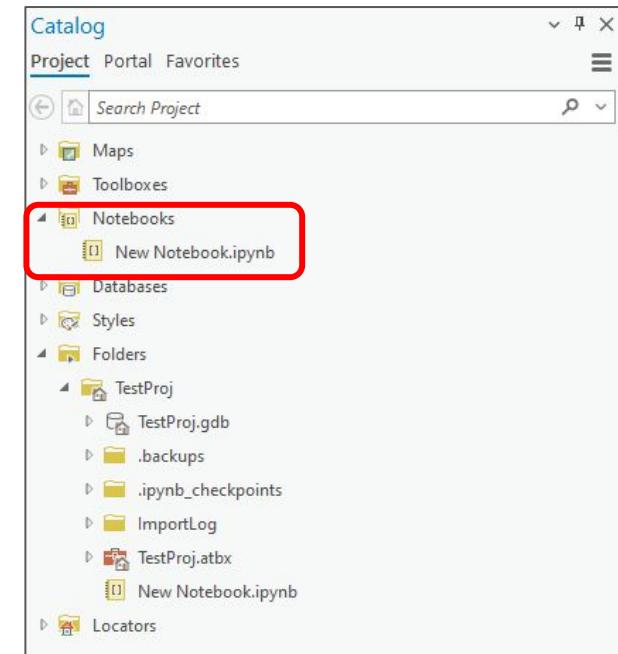
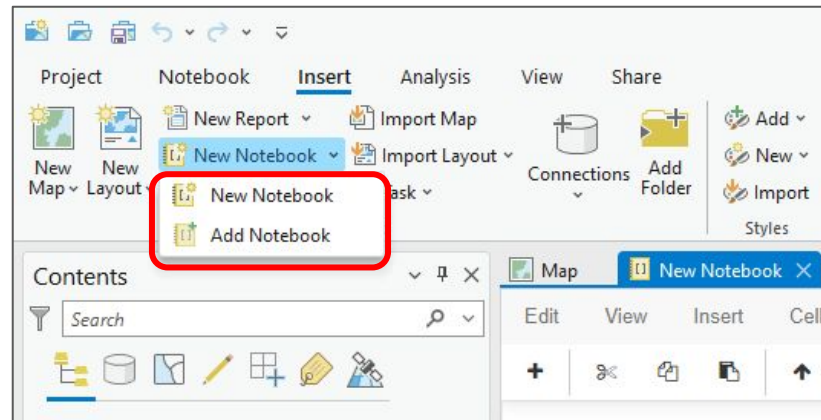
Running Python: Inside ArcGIS Pro

- ArcGIS Notebooks = Jupyter Notebook inside ArcGIS Pro
- Can add through Analysis tab



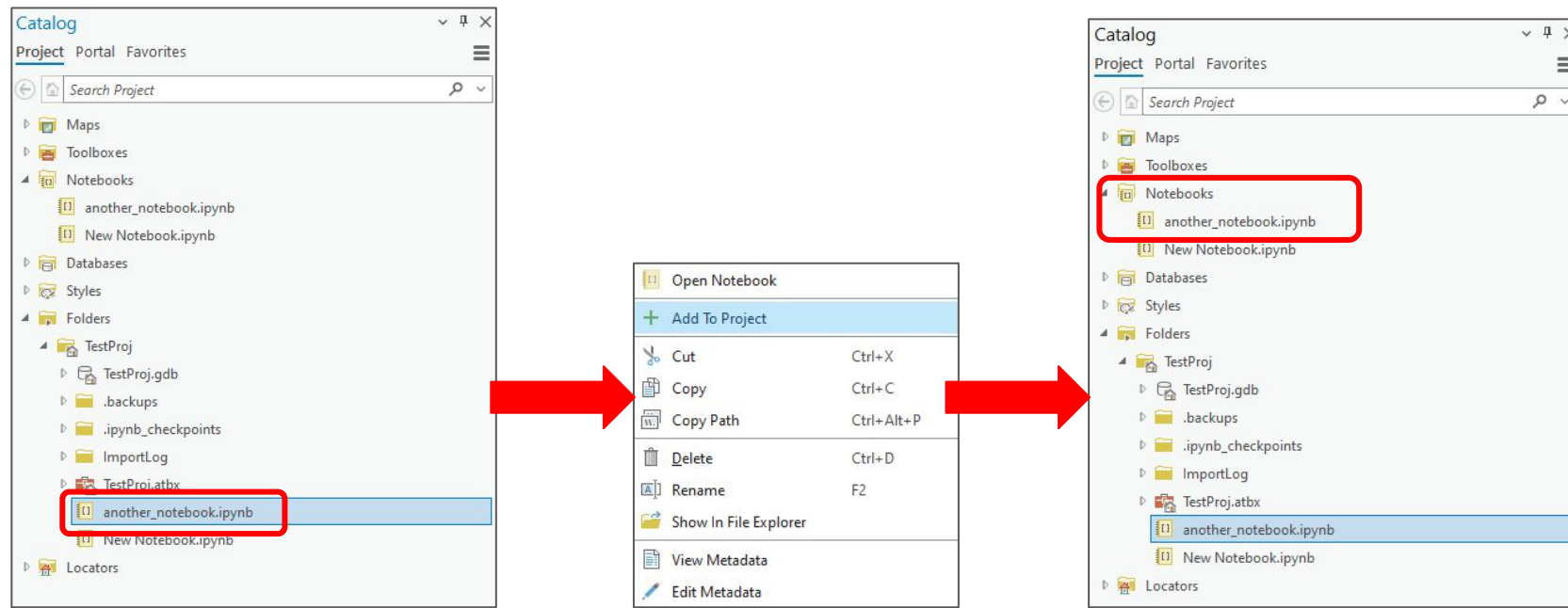
Running Python: Inside ArcGIS Pro

- Can also be added through Insert tab
 - New Notebook adds new notebook to project
 - Add Notebook adds reference to notebook file (.ipynb) to project
- Notebooks are shown in Catalog pane



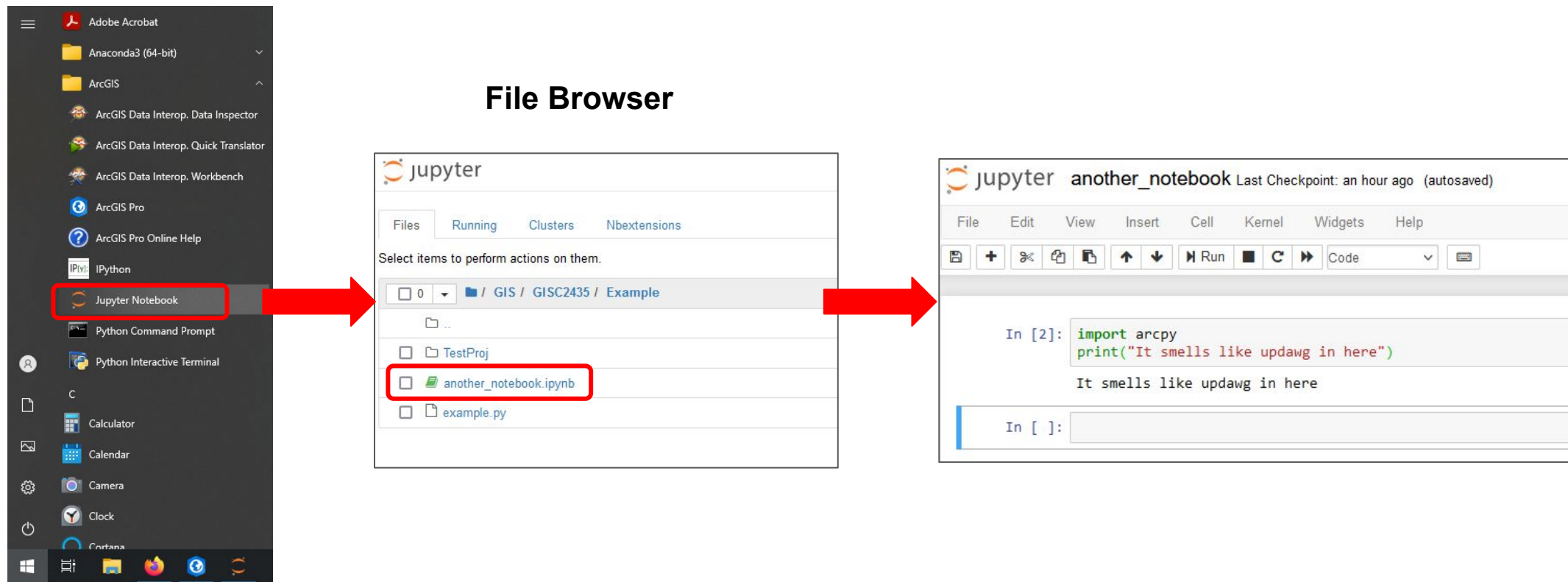
Running Python: Inside ArcGIS Pro

- You can also copy a notebook file (.ipynb) to your project folder and add it to your project from the Catalog pane by right clicking and selecting “Add To Project”



Jupyter Notebooks

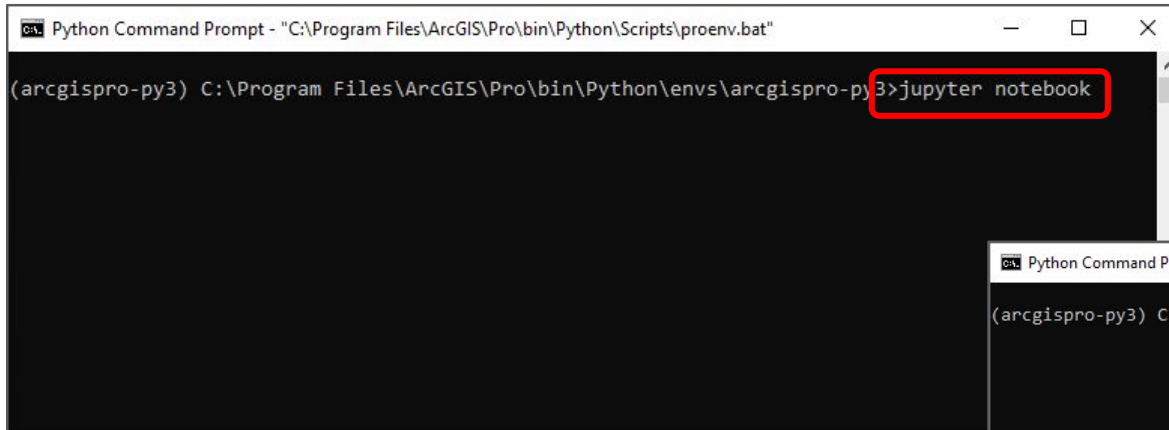
- The same as ArcGIS Notebooks but outside ArcGIS
- Runs in your browser



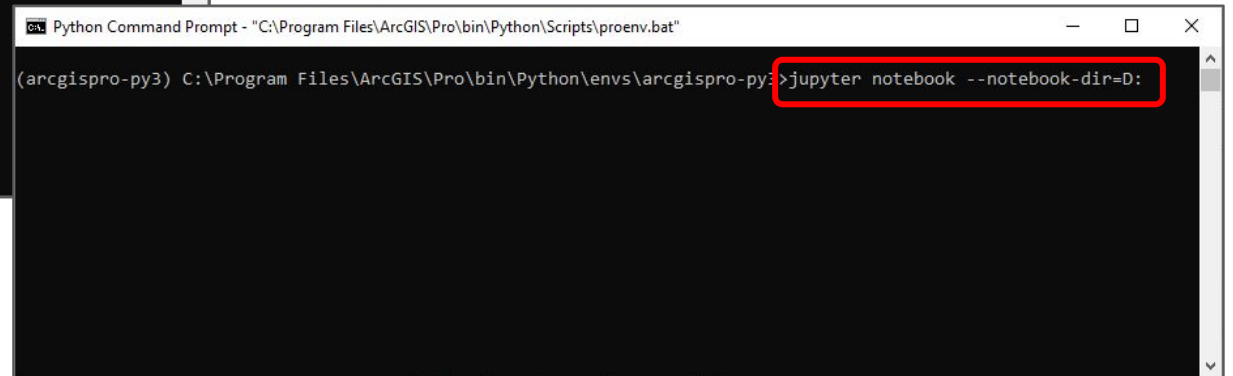
Jupyter Notebooks

- Can also be run from Python Command Prompt
- Runs from C drive. Specify if you need to run elsewhere

“jupyter notebook”

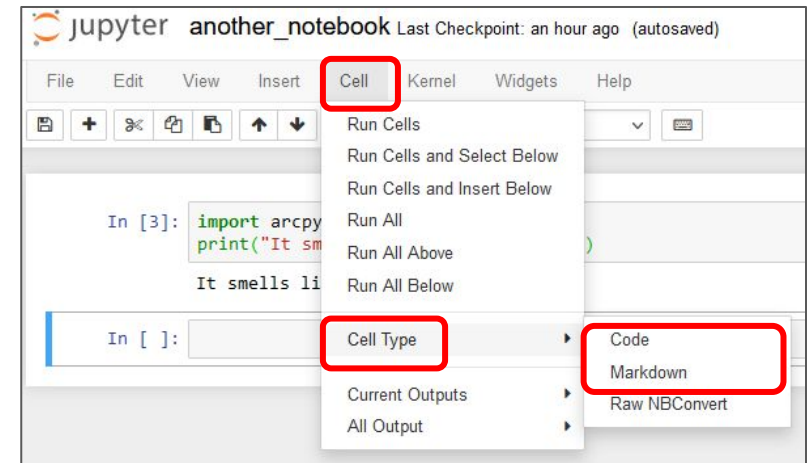
A screenshot of a Python Command Prompt window. The title bar reads "Python Command Prompt - \"C:\\Program Files\\ArcGIS\\Pro\\bin\\Python\\Scripts\\proenv.bat\"". The command prompt shows the path "(arcgispro-py3) C:\\Program Files\\ArcGIS\\Pro\\bin\\Python\\envs\\arcgispro-py3>" followed by the command "jupyter notebook", which is highlighted with a red rectangular box.

“jupyter notebook -- notebook-dir=D:”

A screenshot of a Python Command Prompt window. The title bar reads "Python Command Prompt - \"C:\\Program Files\\ArcGIS\\Pro\\bin\\Python\\Scripts\\proenv.bat\"". The command prompt shows the path "(arcgispro-py3) C:\\Program Files\\ArcGIS\\Pro\\bin\\Python\\envs\\arcgispro-py3>" followed by the command "jupyter notebook --notebook-dir=D:", which is highlighted with a red rectangular box.

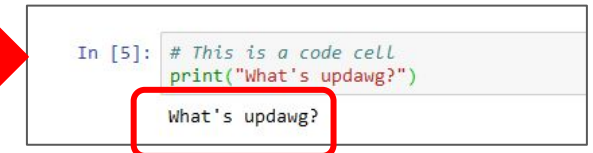
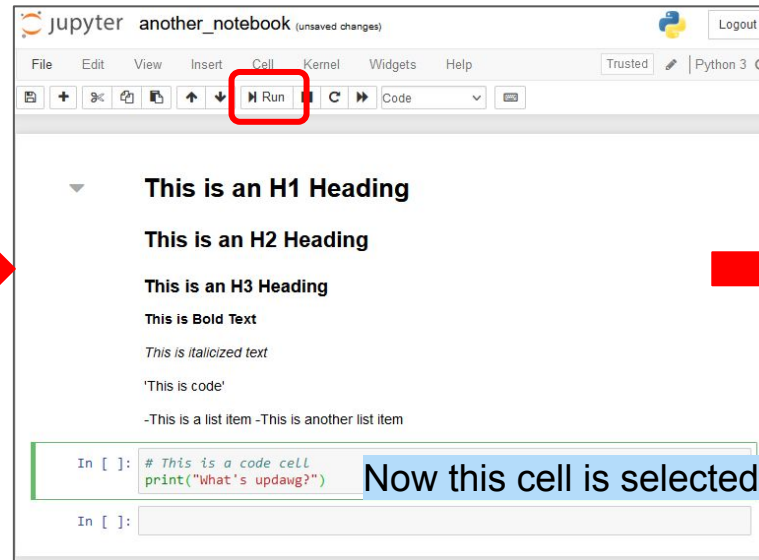
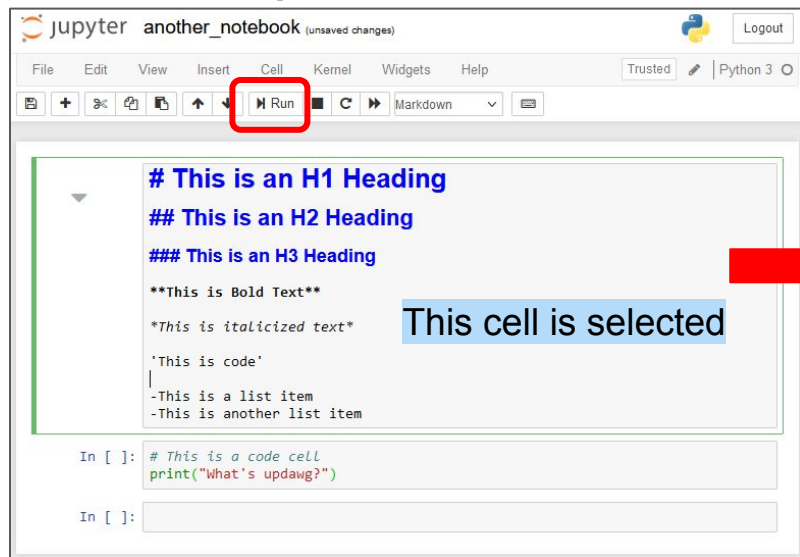
Using Jupyter / ArcGIS Notebooks

- Notebooks consist of cells, which can contain:
 - **Markdown** = “Lightweight markup language” (text with simple syntax for formatting)
 - Code
- To change cell type:
 - Click inside cell or Esc + arrows to navigate to it
 - Esc + m to change to Markdown
 - Esc + y to change to code
 - Or use menu: Cell | Cell Type
- In general:
 - Esc to enter “Command Mode”
 - Enter for “Edit mode”



Using Jupyter / ArcGIS Notebooks

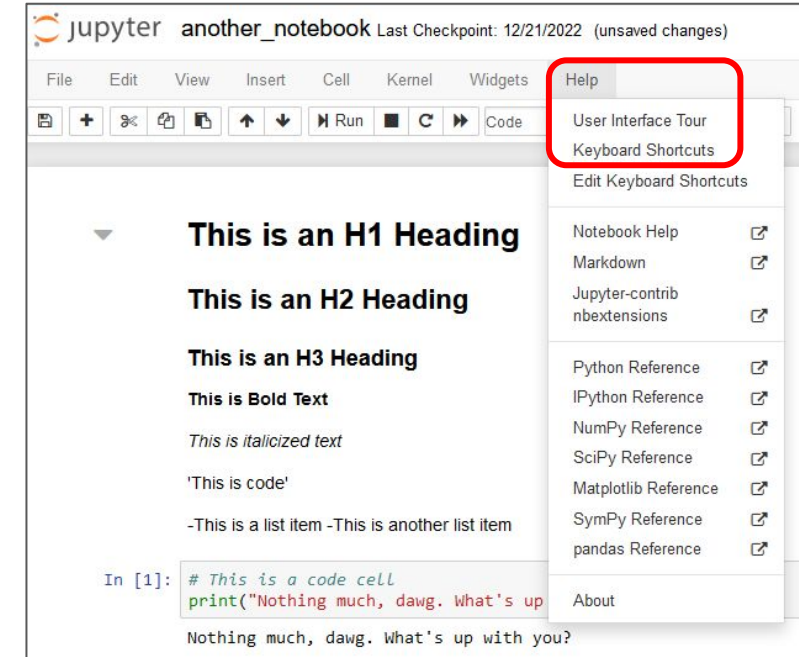
- Cells, either Markdown or code, are executed by clicking Run button, Ctrl + Enter, or Shift +Enter
- This works on one cell at a time
 - Option to run all cells at once is in Cell menu



Code output below cell

Using Jupyter / ArcGIS Notebooks

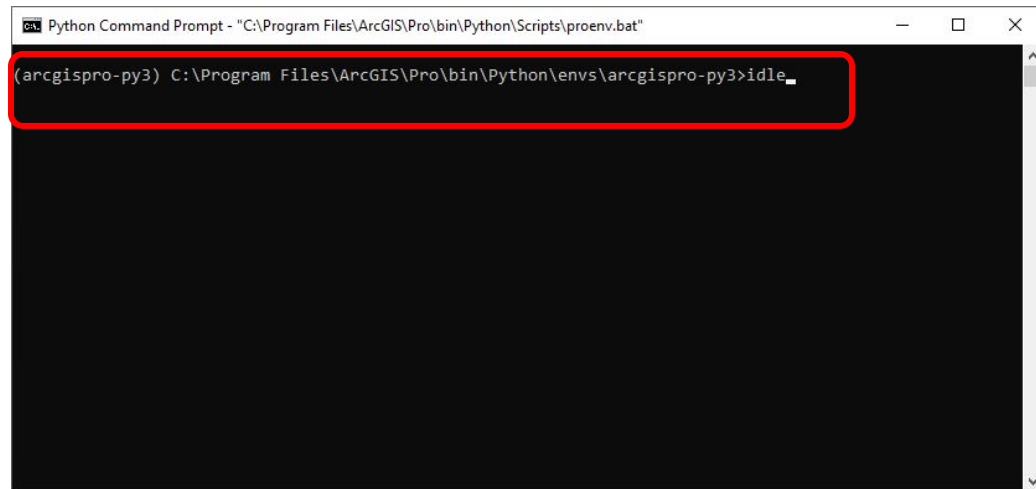
- Help menu contains a User Interface Tour and Keyboard Shortcuts
- Only run one ArcGIS Notebook at a time



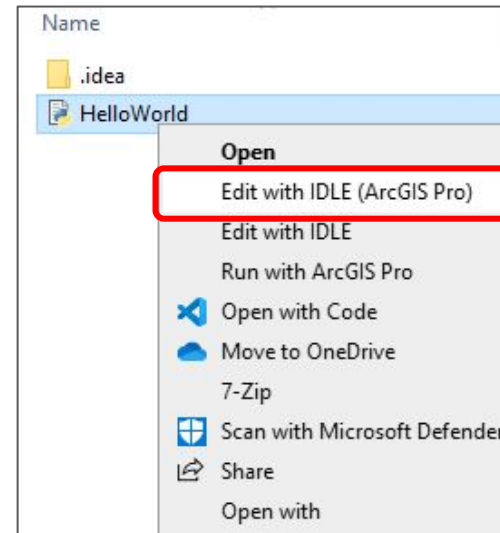
Running Python: IDLE

- IDLE (Integrated Development and Learning Environment) is a simple IDE typically bundled with Python installations
- Written entirely in Python (User interface done with Tkinter toolkit)

Open ArcGIS Pro Python Command Prompt and type “idle”



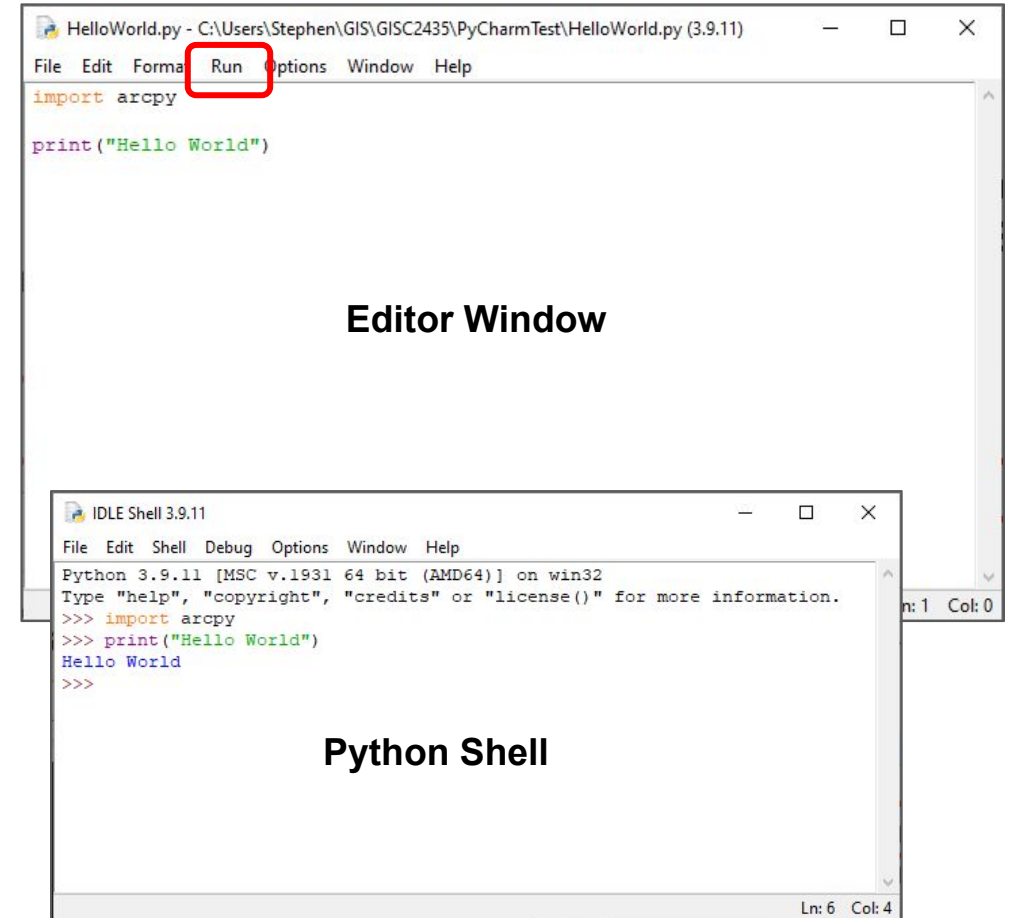
Right-click on .py file and Select Edit with IDLE (ArcGIS Pro)



If this option isn't available, you may have to run IDLE from the Command Prompt first

Running Python: IDLE

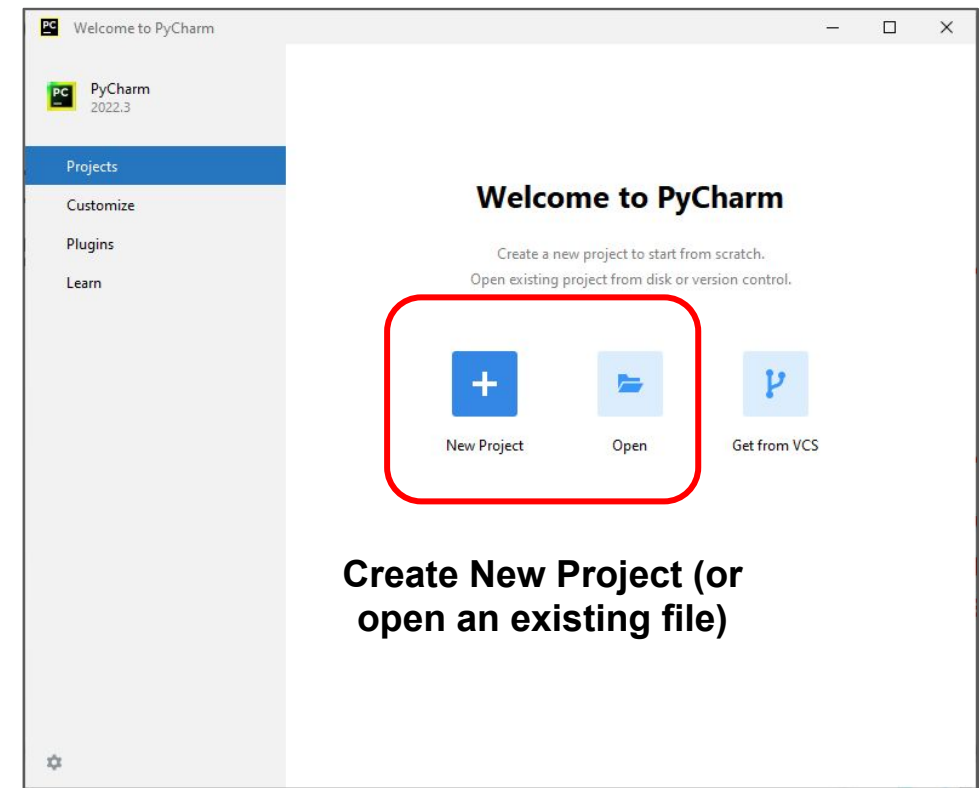
- Opens in Python Shell (typing idle from command prompt) or editor (right-click on .py file)
- Open a .py file or create a new one from File menu
- Run menu > Run Module or F5 to run current file
- Run menu > Python Shell to open the Python Shell



Running Python: PyCharm

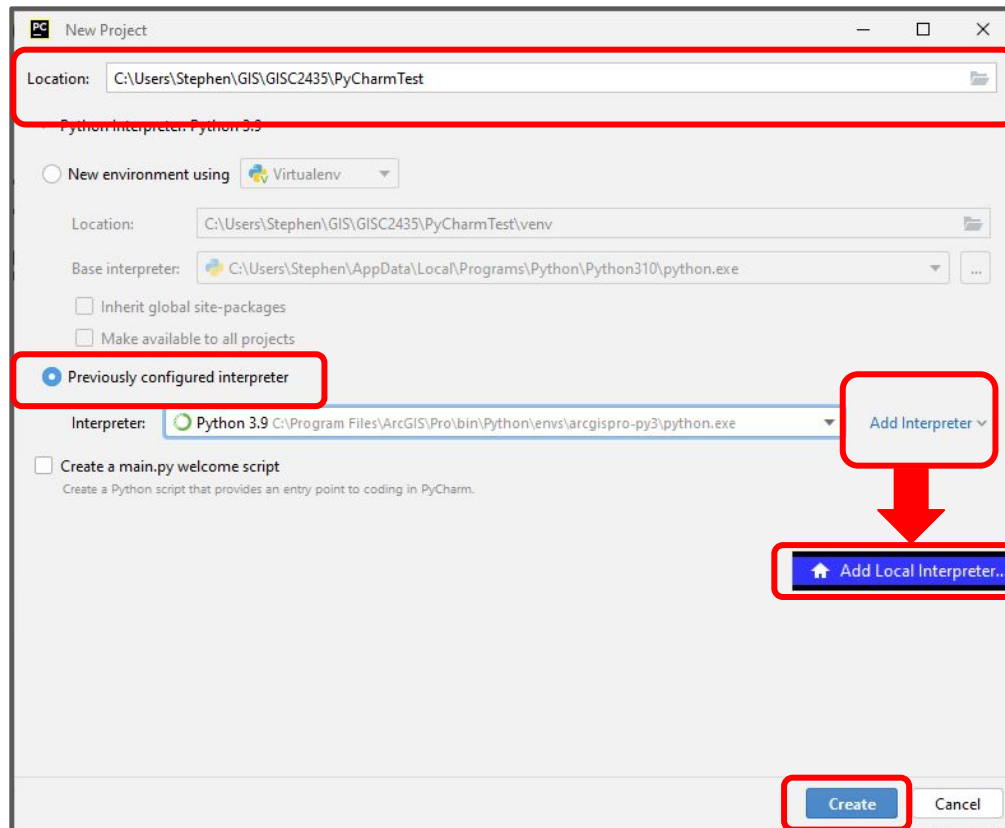
- Download free Community Edition
- Full-featured IDE for Python
- Free version intended for Python only
- Full version has support for web dev and lots of others features we won't be using
- Setup is similar for other IDEs like VSCode

This is what you'll see the first time you open PyCharm (possibly in a different color scheme)



Running Python: PyCharm

- Configure Location and Interpreter for new project

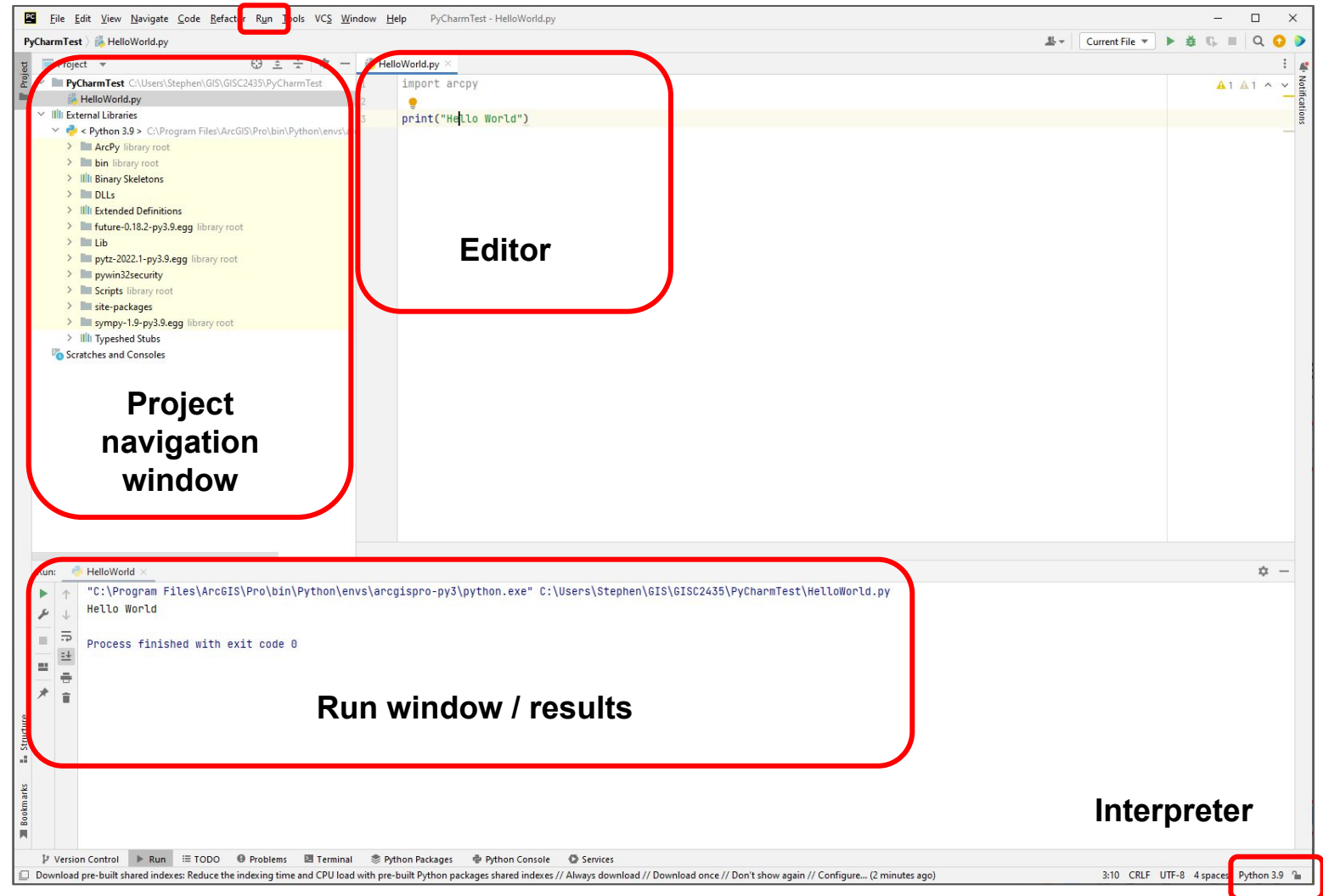


C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3\python.exe



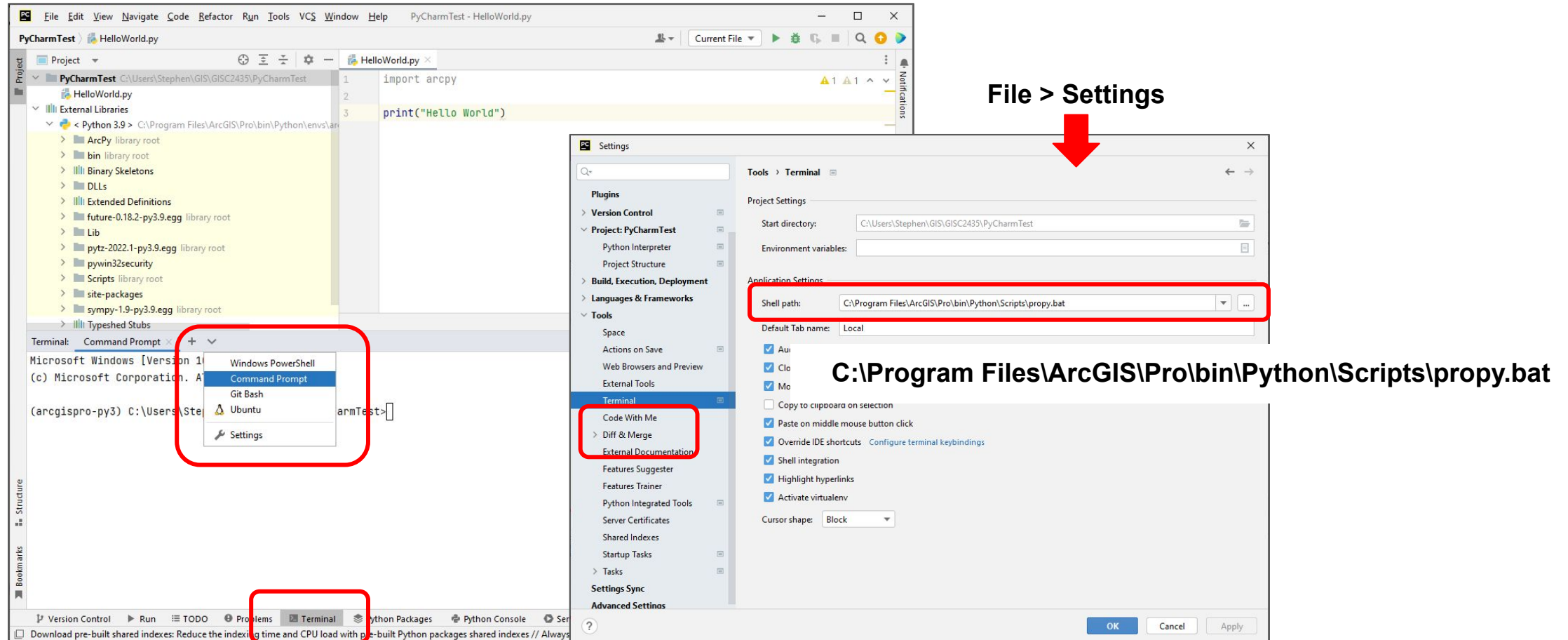
Running Python: PyCharm

- New .py file can be created through File menu, or right-clicking in project window
- Run a .py file from Run menu, Shift + F10, or Terminal



Running Python: PyCharm

- Terminal can be used like Command Prompt



Running Python: Summary

- REPL/Interactive Console/Terminal/Whatever
 - Allows direct interaction with the Python interpreter
 - Good to run a few quick lines of code and test things out
- Running .py scripts directly
 - Run much more complicated code with a single command
- ArcGIS Pro Script Tools
 - Similar to any other ArcGIS Geoprocessing Tool
 - Allows users to run Python code without directly interacting with it
- Jupyter Notebooks / ArcGIS Notebooks
 - Code execution cell by cell mixed with Markdown text
 - Think of this mostly as a code sketchbook or way to share analysis