

COP 3035

# Intro Programming in Python

Spring 2024

# Lecture 1 – part 1

## Introduction

# What is Python ?

## **High-level Programming Language:**

Focuses on readability and simplicity.

## **Interpreted Language:**

Executes directly without a need for compilation.

Facilitates quick prototyping and iteration.

## **General-purpose & Versatile:**

Web, data analysis, AI, game development, and more.

## **Community-driven:**

Huge global community that contributes to its growth.

Thousands of third-party libraries and tools.



<https://www.python.org/>

<https://docs.python.org/3/library/functions.html>

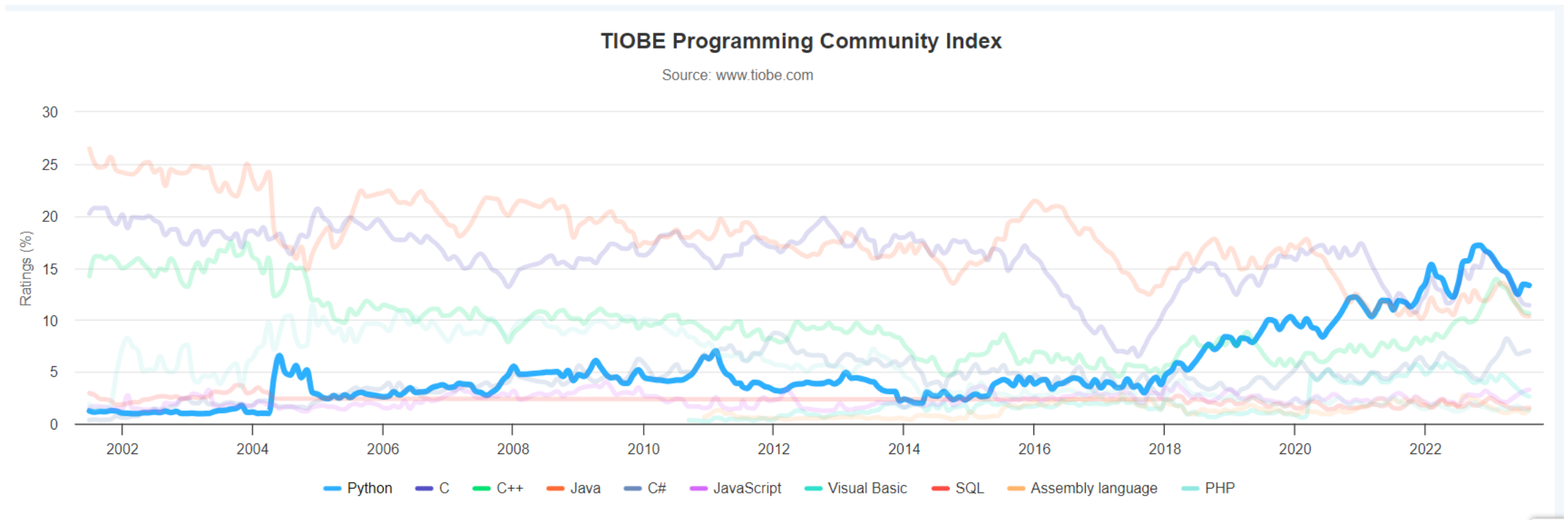


[https://www.reddit.com/r/ProgrammerHumor/comments/w31kx8/python\\_talking\\_to\\_c/](https://www.reddit.com/r/ProgrammerHumor/comments/w31kx8/python_talking_to_c/)

# How popular is Python ?

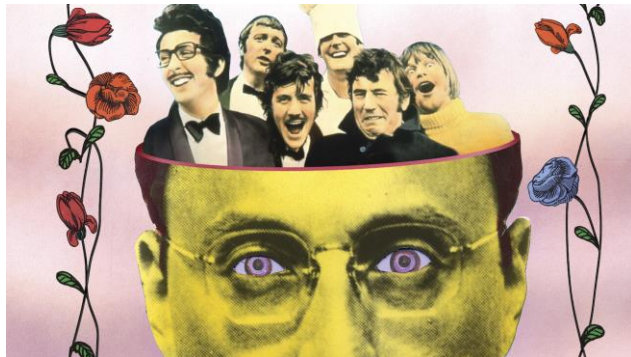
<https://www.tiobe.com/tiobe-index/>

The ratings are based on the number of skilled engineers world-wide, courses and third-party vendors. Popular search engines such as Google, Bing, Yahoo!, Wikipedia, Amazon, YouTube and Baidu are used to calculate the ratings.



# History of Python

- Python was created by **Guido van Rossum**, and first released on February 20, 1991.
- The name comes from an old BBC television comedy sketch series called **Monty Python's Flying Circus**.



<https://www.imdb.com/title/tt0063929/>



Guido Van Rossum

<https://gvanrossum.github.io/pics.html>

Founder and the original BDFL  
(Benevolent Dictator For Life) of Python  
(up to 2018).

# The Zen of Python

```
Anaconda Prompt (Anaconda3) - python
(base) C:\Users\jyepes>python
Python 3.7.6 (default, Jan  8 2020, 20:23:39) [MSC v.1916 64 bit (AMD64)] :: Anaconda, Inc. on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> import this
The Zen of Python, by Tim Peters

Beautiful is better than ugly.
Explicit is better than implicit.
Simple is better than complex.
Complex is better than complicated.
Flat is better than nested.
Sparse is better than dense.
Readability counts.
Special cases aren't special enough to break the rules.
Although practicality beats purity.
Errors should never pass silently.
Unless explicitly silenced.
In the face of ambiguity, refuse the temptation to guess.
There should be one-- and preferably only one --obvious way to do it.
Although that way may not be obvious at first unless you're Dutch.
Now is better than never.
Although never is often better than *right* now.
If the implementation is hard to explain, it's a bad idea.
If the implementation is easy to explain, it may be a good idea.
Namespaces are one honking great idea -- let's do more of those!
>>>
```

# Lecture 1 – part 2

## Syllabus

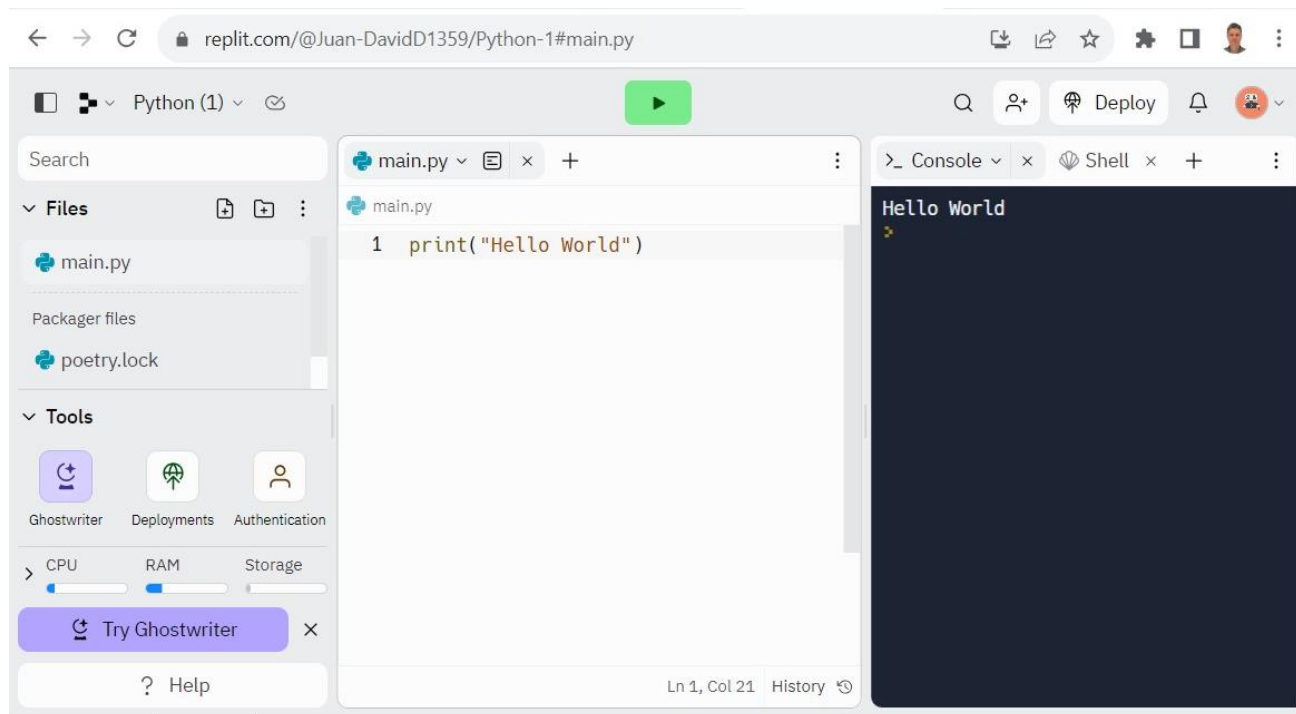


# Lecture 1 – part 3

## Running Python code

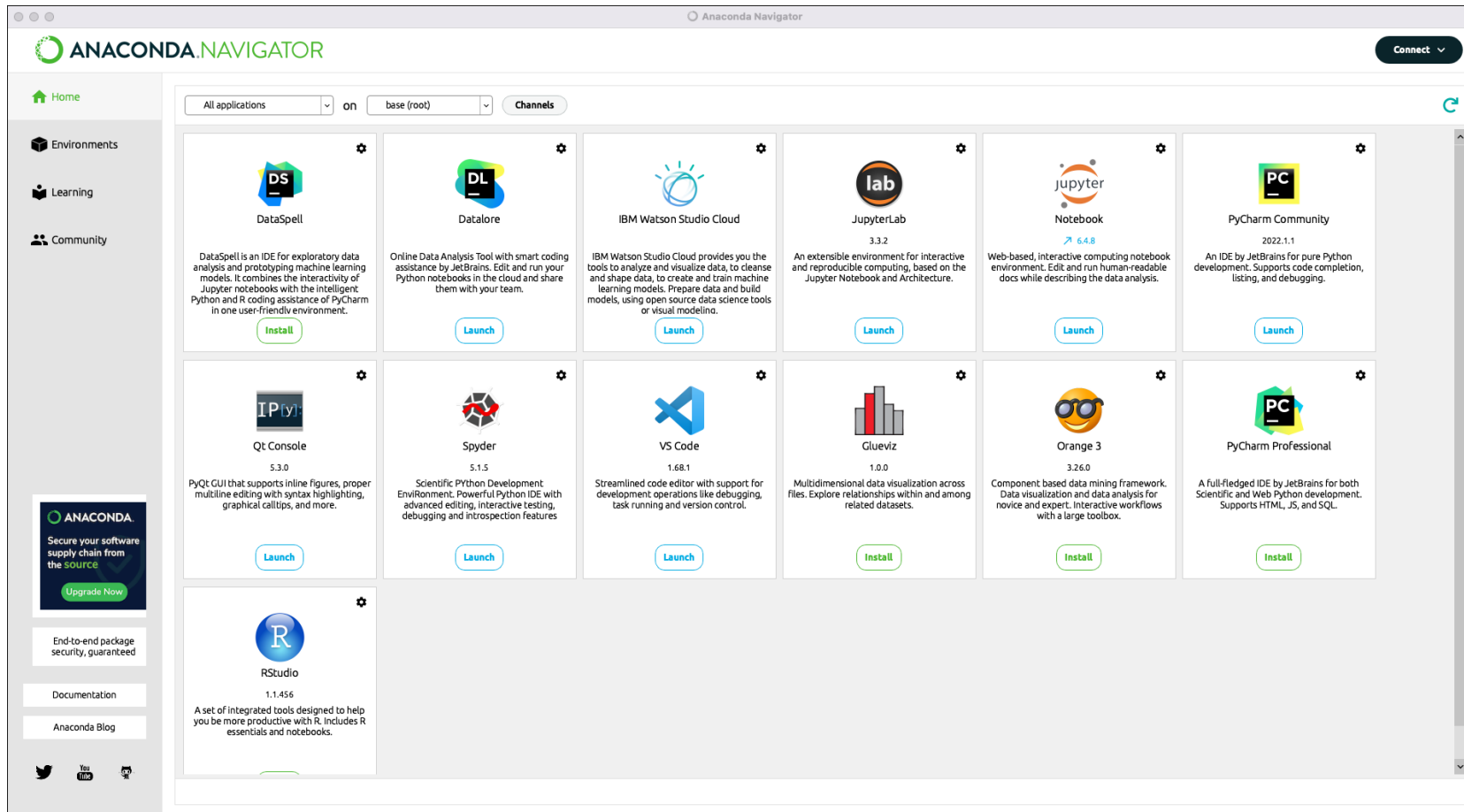
# Online – No installation options

- <https://jupyter.org/try-jupyter/retro/notebooks/?path=notebooks/Intro.ipynb>
- <https://colab.google/>
- <https://replit.com/languages/python3>



# Anaconda Navigator

<https://docs.anaconda.com/free/navigator/index.html>



## First challenge:

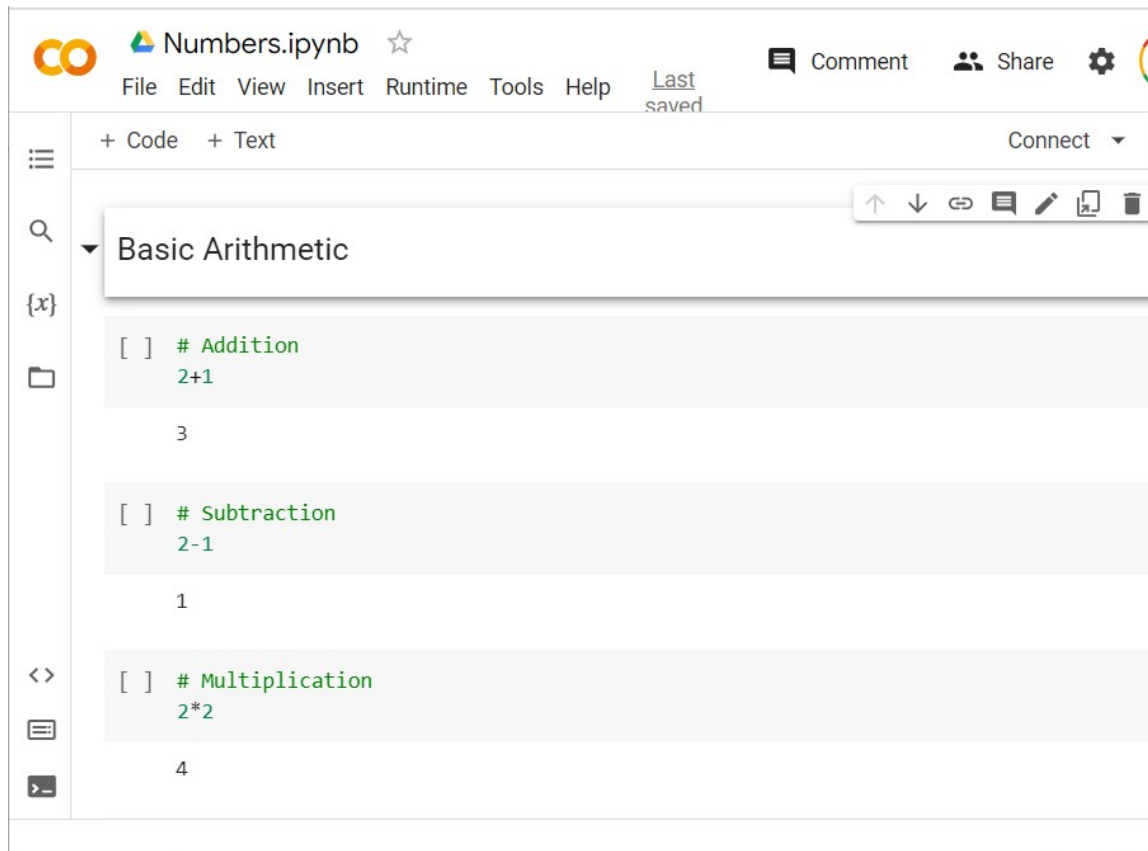
Install Anaconda Navigator in your computer, and create a python environment.

<https://docs.anaconda.com/free/navigator/install/>

<https://docs.anaconda.com/free/navigator/tutorials/create-python35-environment/>

# Jupyter Notebooks

## Notebook

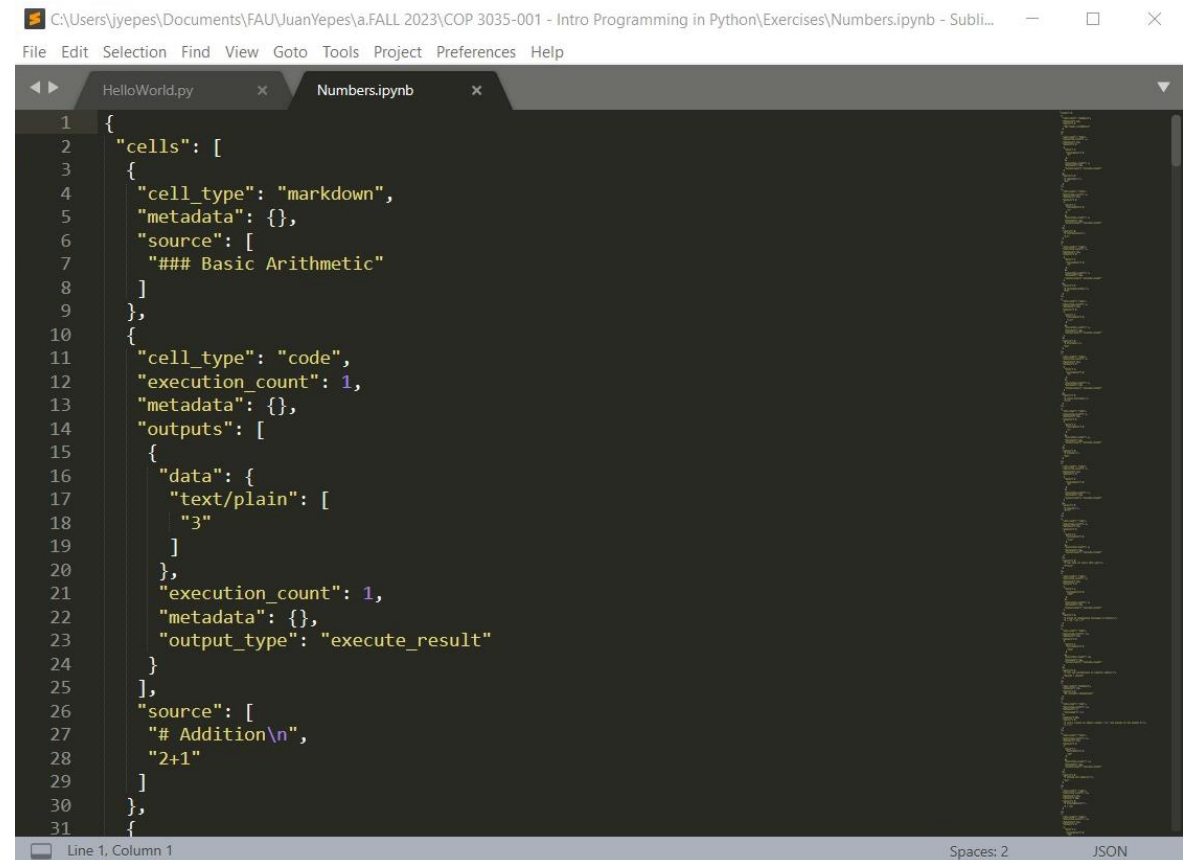


The screenshot shows the Jupyter Notebook interface. The top bar includes the Jupyter logo, the notebook title 'Numbers.ipynb', and a star icon. Below the title is a menu bar with 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', and 'Help'. A 'Last saved' status is visible. On the right side of the top bar are icons for 'Comment', 'Share', and 'Settings'. The left sidebar contains a file explorer showing a folder named 'Basic Arithmetic'. The main area displays three code cells:

- Cell 1: `# Addition`  
`2+1`  
Output: 3
- Cell 2: `# Subtraction`  
`2-1`  
Output: 1
- Cell 3: `# Multiplication`  
`2*2`  
Output: 4



## Numbers.ipynb



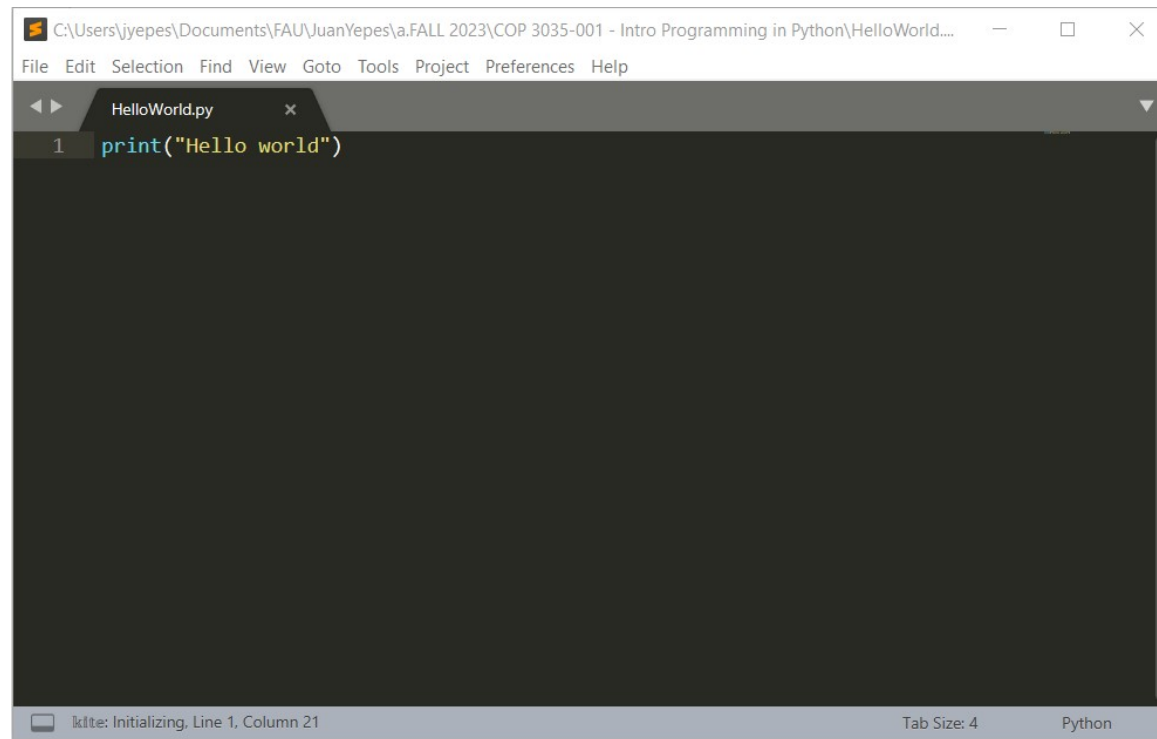
The screenshot shows the source code of the Jupyter Notebook, which is a JSON file. The code is displayed in a dark-themed editor with line numbers. The JSON structure represents the notebook's content:

```
1 {
2   "cells": [
3     {
4       "cell_type": "markdown",
5       "metadata": {},
6       "source": [
7         "### Basic Arithmetic"
8       ]
9     },
10    {
11      "cell_type": "code",
12      "execution_count": 1,
13      "metadata": {},
14      "outputs": [
15        {
16          "data": {
17            "text/plain": [
18              "3"
19            ]
20          },
21          "execution_count": 1,
22          "metadata": {},
23          "output_type": "execute_result"
24        }
25      ],
26      "source": [
27        "# Addition\n",
28        "2+1"
29      ]
30    },
31  ]
32 }
```

The status bar at the bottom indicates 'Line 1, Column 1' and 'Spaces: 2 JSON'.

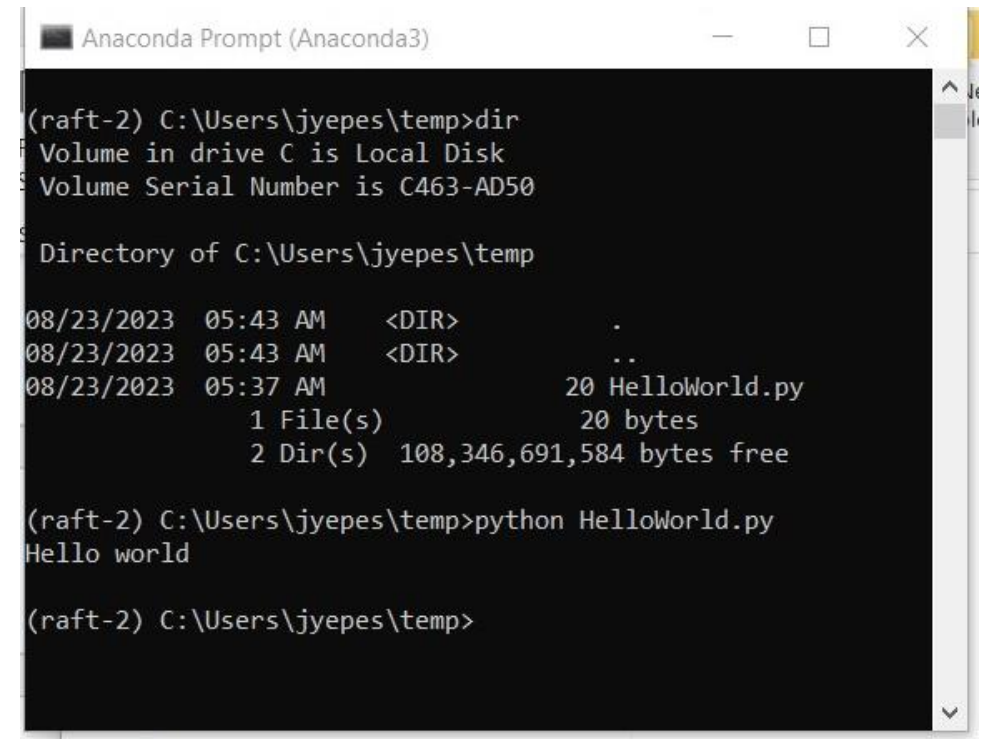
# Running from a Text File

[www.sublimetext.com](http://www.sublimetext.com)



A screenshot of the Sublime Text editor window. The title bar shows the file path: C:\Users\jyepes\Documents\FAU\JuanYepes\fa.FALL 2023\COP 3035-001 - Intro Programming in Python\HelloWorld.... The menu bar includes File, Edit, Selection, Find, View, Goto, Tools, Project, Preferences, and Help. The editor has a single tab open for HelloWorld.py. The code inside is a single line: `1 print("Hello world")`. The status bar at the bottom indicates "kllte: Initializing, Line 1, Column 21", "Tab Size: 4", and "Python".

## HelloWorld.py



A screenshot of the Anaconda Prompt (Anaconda3) terminal window. The prompt is (raft-2) C:\Users\jyepes\temp. The user has entered the command `dir`, and the output shows the directory contents of C:\Users\jyepes\temp. The output includes the date and time (08/23/2023 05:43 AM), the drive (C), the volume (Local Disk), the serial number (C463-AD50), and the directory listing. The directory listing shows a file named HelloWorld.py with a size of 20 bytes. The user has then entered the command `python HelloWorld.py`, and the output is "Hello world". The prompt is now (raft-2) C:\Users\jyepes\temp>.

```
(raft-2) C:\Users\jyepes\temp>dir
Volume in drive C is Local Disk
Volume Serial Number is C463-AD50

Directory of C:\Users\jyepes\temp

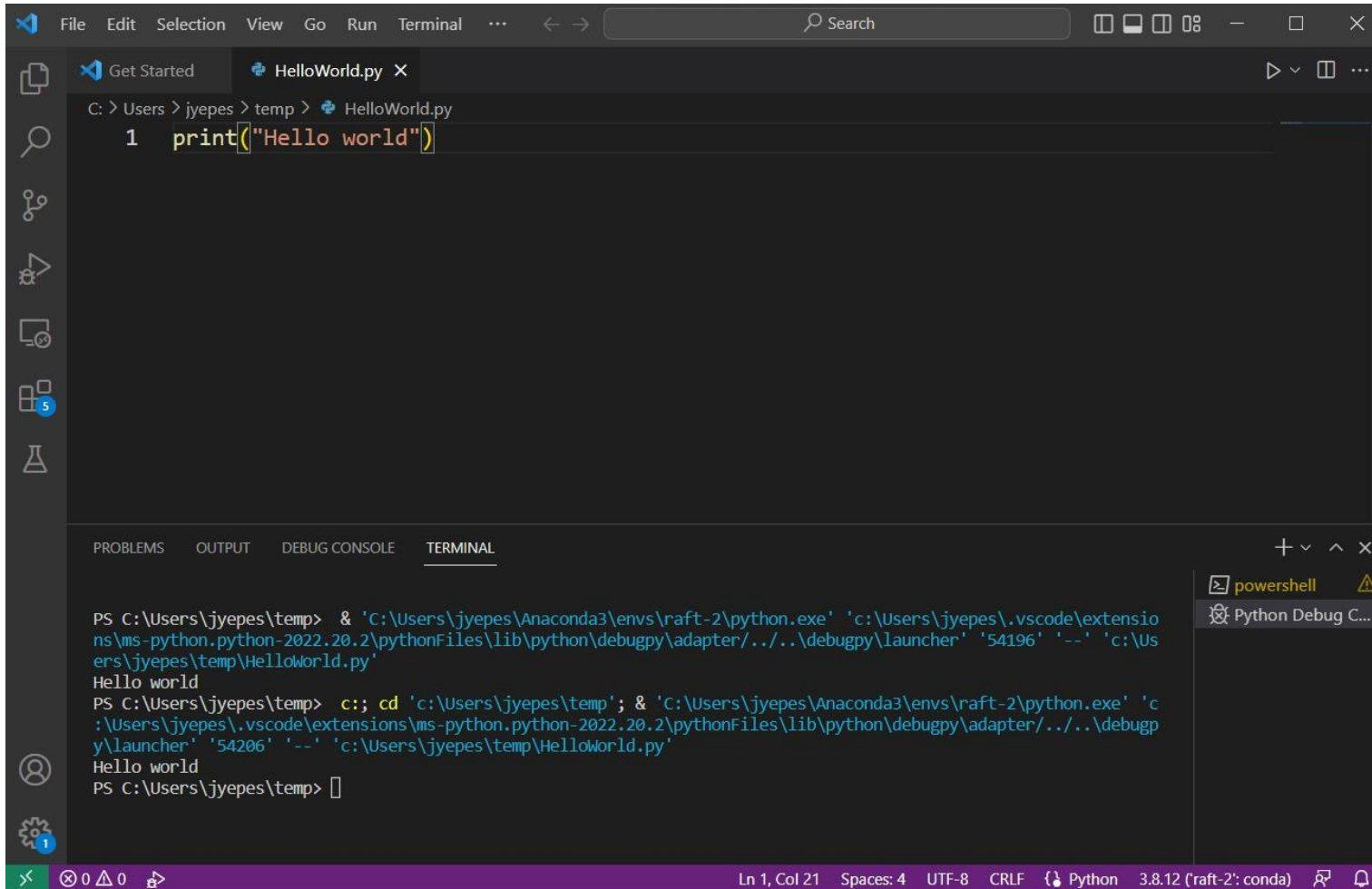
08/23/2023  05:43 AM    <DIR>          .
08/23/2023  05:43 AM    <DIR>          ..
08/23/2023  05:37 AM                20 HelloWorld.py
                1 File(s)                20 bytes
                2 Dir(s)  108,346,691,584 bytes free

(raft-2) C:\Users\jyepes\temp>python HelloWorld.py
Hello world

(raft-2) C:\Users\jyepes\temp>
```

# Using an IDE

<https://code.visualstudio.com/download>



The screenshot displays the Visual Studio Code IDE interface. The top menu bar includes File, Edit, Selection, View, Go, Run, and Terminal. The left sidebar contains icons for Explorer, Search, Source Control, Run and Debug, Extensions, and Testing. The main editor area shows a file named `HelloWorld.py` with the following code:

```
1 print("Hello world")
```

The bottom panel shows the TERMINAL tab with the following commands and output:

```
PS C:\Users\jyepes\temp> & 'C:\Users\jyepes\Anaconda3\envs\raft-2\python.exe' 'c:\Users\jyepes\.vscode\extensions\ms-python.python-2022.20.2\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '54196' '--' 'c:\Users\jyepes\temp\HelloWorld.py'
Hello world
PS C:\Users\jyepes\temp> c;; cd 'c:\Users\jyepes\temp'; & 'C:\Users\jyepes\Anaconda3\envs\raft-2\python.exe' 'c:\Users\jyepes\.vscode\extensions\ms-python.python-2022.20.2\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '54206' '--' 'c:\Users\jyepes\temp\HelloWorld.py'
Hello world
PS C:\Users\jyepes\temp> 
```

The status bar at the bottom indicates the current line and column (Ln 1, Col 21), the number of spaces (4), the encoding (UTF-8), the line ending (CRLF), the language (Python), and the version (3.8.12 (raft-2; conda)).

Lecture 1 – part 4

Basic Arithmetic

## Basic Arithmetic

```
In [1]: 1 # Addition  
        2 2+1
```

Out[1]: 3

```
In [2]: 1 # Subtraction  
        2 2-1
```

Out[2]: 1

```
In [3]: 1 # Multiplication  
        2 2*2
```

Out[3]: 4

```
In [4]: 1 # Division  
        2 3/2
```

Out[4]: 1.5

```
In [5]: 1 # Floor Division  
        2 7//4
```

Out[5]: 1



```
In [6]: 1 # Modulo  
        2 7%4
```

Out[6]: 3

```
In [7]: 1 # Powers  
        2 2**3
```

Out[7]: 8

```
In [8]: 1 # Can also do roots this way  
        2 4**0.5
```

Out[8]: 2.0

```
In [9]: 1 # Order of Operations followed in Python  
        2 2 + 10 * 10 + 3
```

Out[9]: 105

```
In [10]: 1 # Can use parentheses to specify orders  
         2 (2+10) * (10+3)
```

Out[10]: 156

Lecture 1 – part 4

Variable Assignments

# Variable Assignment

## Dynamic Typing

Python uses *dynamic typing*, meaning you can reassign variables to different data types.

```
In [1]: 1 my_dogs = 2
```

```
In [2]: 1 my_dogs
```

```
Out[2]: 2
```

```
In [3]: 1 my_dogs = ['Sammy', 'Frankie']
```

```
In [4]: 1 my_dogs
```

```
Out[4]: ['Sammy', 'Frankie']
```

```
In [5]: 1 a = 5
```

```
In [6]: 1 a
```

```
Out[6]: 5
```

```
In [7]: 1 a = 10
```

```
In [8]: 1 a
```

```
Out[8]: 10
```

```
In [9]: 1 a + a
```

```
Out[9]: 20
```

## Reassigning Variables

```
In [10]: 1 a = a + 10
```

```
In [11]: 1 a
```

```
Out[11]: 20
```

```
In [12]: 1 a += 10
```

```
In [13]: 1 a
```

```
Out[13]: 30
```

```
In [14]: 1 a *= 2
```

```
In [15]: 1 a
```

```
Out[15]: 60
```

## Determining variable type with `type()`

You can check what type of object is assigned to a variable using Python's built-in `type()` function. Common data types include:

- **int** (for integer)
- **float**
- **str** (for string)
- **list**
- **tuple**
- **dict** (for dictionary)
- **set**
- **bool** (for Boolean True/False)

```
In [16]: 1 type(a)
```

```
Out[16]: int
```

```
In [17]: 1 a = (1,2)
```

```
In [18]: 1 type(a)
```

```
Out[18]: tuple
```

## Simple Exercise

This shows how variables make calculations more readable and easier to follow.

In [19]:

```
1 my_income = 100
2 tax_rate = 0.1
3 my_taxes = my_income * tax_rate
```

In [20]:

```
1 my_taxes
```

Out[20]: 10.0