Name: Kamilah Nada Maisa

ID: 20224010

Assignment: Data Science and Python venv

1) Data science is the process of transforming data into insights to make better decisions. It combines scientific methods, statistics, algorithms, and technology to extract meaningful information from structured or unstructured data. (Source: Nathan Carter (2021))

2) **What Are the Differences Between:**
   - **Data:** Raw facts or observations, such as numbers, text, or images, without context or meaning.
   - **Data Science:** The scientific discipline of processing, analyzing, and interpreting data to generate insights and knowledge.
   - **Data Scientist:** A professional who collects, processes, analyzes, and communicates data-driven insights using data science methodologies and tools.

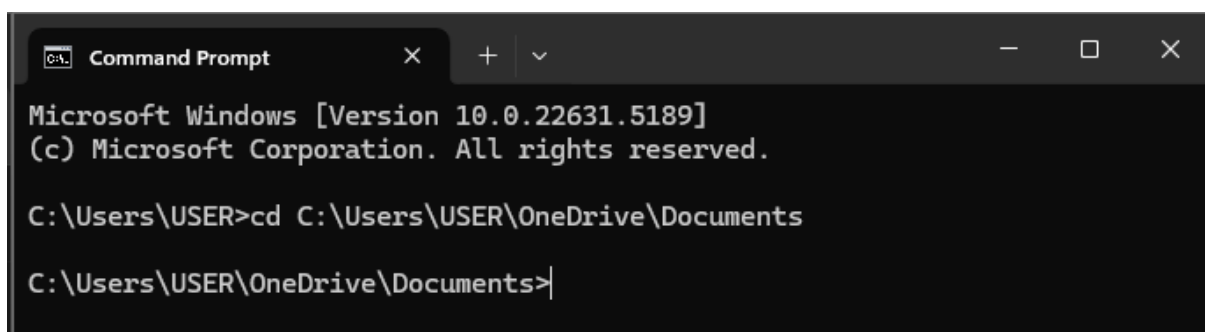3) **Four Foundational Aspects of Data Science**
   1. **Mathematics:** Involves functions, graphs, matrices, and statistics for understanding and analyzing data.
   2. **Technology:** Covers tools like Python, Jupyter Notebook, GitHub, and libraries for data processing.
   3. **Visualization:** Creation of static or interactive visual tools (graphs, plots, dashboards) to communicate findings.
   4. **Communication:** Writing clear documentation, notebooks, and reports for technical and non-technical audiences.

4) **PyPI Package Links**
   - **Jupyter Notebook (https://pypi.org/project/notebook/)**
   - **Matplotlib (https://pypi.org/project/matplotlib/)**
   - **NumPy (https://pypi.org/project/numpy/)**

5) **Python Virtual Environment Tasks**

Step 1: Open the Command Prompt

Step 2: Navigate to Your Working Folder

```
C:\Users\USER\OneDrive\Documents>python -m venv env1
```

Step 3: Create the First Virtual Environment and Activate

```
Command Prompt                    ×    +   ∨                          —    □    ×

Microsoft Windows [Version 10.0.22631.5189]
(c) Microsoft Corporation. All rights reserved.

C:\Users\USER>cd C:\Users\USER\OneDrive\Documents

C:\Users\USER\OneDrive\Documents>python -m venv env1

C:\Users\USER\OneDrive\Documents>.\env1\Scripts\activate

(env1) C:\Users\USER\OneDrive\Documents>
```
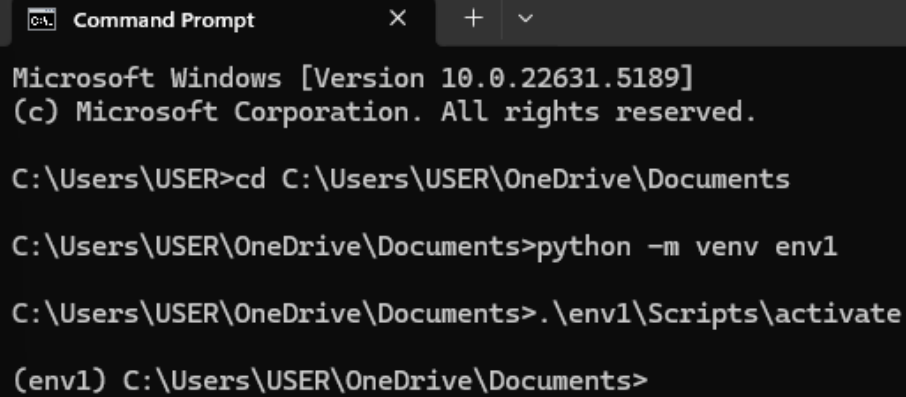
Step 4: Install Python Packages (Jupyter, Numpy, Matplotlib)

```
(env1) C:\Users\USER\OneDrive\Documents>pip install jupyter matplotlib numpy
Collecting jupyter
  Using cached jupyter-1.1.1-py2.py3-none-any.whl.metadata (2.0 kB)
Collecting matplotlib
  Downloading matplotlib-3.10.3-cp312-cp312-win_amd64.whl.metadata (11 kB)
Collecting numpy
  Using cached numpy-2.2.5-cp312-cp312-win_amd64.whl.metadata (60 kB)
Collecting notebook (from jupyter)
  Downloading notebook-7.4.2-py3-none-any.whl.metadata (10 kB)
Collecting jupyter-console (from jupyter)
  Using cached jupyter_console-6.6.3-py3-none-any.whl.metadata (5.8 kB)
Collecting nbconvert (from jupyter)
  Using cached nbconvert-7.16.6-py3-none-any.whl.metadata (8.5 kB)
Collecting ipykernel (from jupyter)
  Using cached ipykernel-6.29.5-py3-none-any.whl.metadata (6.3 kB)
Collecting ipywidgets (from jupyter)
  Downloading ipywidgets-8.1.7-py3-none-any.whl.metadata (2.4 kB)
Collecting jupyterlab (from jupyter)
  Downloading jupyterlab-4.4.2-py3-none-any.whl.metadata (16 kB)
Collecting contourpy>=1.0.1 (from matplotlib)
  Using cached contourpy-1.3.2-cp312-cp312-win_amd64.whl.metadata (5.5 kB)
Collecting cycler>=0.10 (from matplotlib)
  Using cached cycler-0.12.1-py3-none-any.whl.metadata (3.8 kB)
Collecting fonttools>=4.22.0 (from matplotlib)
  Downloading fonttools-4.58.0-cp312-cp312-win_amd64.whl.metadata (106 kB)
Collecting kiwisolver>=1.3.1 (from matplotlib)
  Using cached kiwisolver-1.4.8-cp312-cp312-win_amd64.whl.metadata (6.3 kB)
Collecting packaging>=20.0 (from matplotlib)
  Using cached packaging-25.0-py3-none-any.whl.metadata (3.3 kB)
```

Step 5: Save the Package List to requirements.txt


```
(env1) C:\Users\USER\OneDrive\Documents>pip freeze > requirements.txt
```

Step 6: Create a Second Virtual Environment


```
(env1) C:\Users\USER\OneDrive\Documents>python -m venv env2

(env1) C:\Users\USER\OneDrive\Documents>.\env2\Scripts\activate

(env2) C:\Users\USER\OneDrive\Documents>
```

Step 7: Activate env2

```
(env1) C:\Users\USER\OneDrive\Documents>.\env2\Scripts\activate

(env2) C:\Users\USER\OneDrive\Documents>pip install -r requirements.txt
Collecting anyio==4.9.0 (from -r requirements.txt (line 1))
  Using cached anyio-4.9.0-py3-none-any.whl.metadata (4.7 kB)
Collecting argon2-cffi==23.1.0 (from -r requirements.txt (line 2))
  Using cached argon2_cffi-23.1.0-py3-none-any.whl.metadata (5.2 kB)
Collecting argon2-cffi-bindings==21.2.0 (from -r requirements.txt (line
3))
  Using cached argon2_cffi_bindings-21.2.0-cp36-abi3-win_amd64.whl.metad
ata (6.7 kB)
Collecting arrow==1.3.0 (from -r requirements.txt (line 4))
  Using cached arrow-1.3.0-py3-none-any.whl.metadata (7.5 kB)
Collecting asttokens==3.0.0 (from -r requirements.txt (line 5))
  Using cached asttokens-3.0.0-py3-none-any.whl.metadata (4.7 kB)
Collecting async-lru==2.0.5 (from -r requirements.txt (line 6))
  Using cached async_lru-2.0.5-py3-none-any.whl.metadata (4.5 kB)
Collecting attrs==25.3.0 (from -r requirements.txt (line 7))
  Using cached attrs-25.3.0-py3-none-any.whl.metadata (10 kB)
Collecting babel==2.17.0 (from -r requirements.txt (line 8))
  Using cached babel-2.17.0-py3-none-any.whl.metadata (2.0 kB)
Collecting beautifulsoup4==4.13.4 (from -r requirements.txt (line 9))
  Using cached beautifulsoup4-4.13.4-py3-none-any.whl.metadata (3.8 kB)
Collecting bleach==6.2.0 (from -r requirements.txt (line 10))
  Using cached bleach-6.2.0-py3-none-any.whl.metadata (30 kB)
Collecting certifi==2025.4.26 (from -r requirements.txt (line 11))
  Using cached certifi-2025.4.26-py3-none-any.whl.metadata (2.5 kB)
Collecting cffi==1.17.1 (from -r requirements.txt (line 12))
  Using cached cffi-1.17.1-cp312-cp312-win_amd64.whl.metadata (1.6 kB)
Collecting charset-normalizer==3.4.2 (from -r requirements.txt (line 13)
)
  Using cached charset_normalizer-3.4.2-cp312-cp312-win_amd64.whl.metada
```

Step 8: Install from requirements.txt

```
(env2) C:\Users\USER\OneDrive\Documents>pip install -r requirements.txt
Requirement already satisfied: anyio==4.9.0 in c:\users\user\onedrive\do
cuments\env2\lib\site-packages (from -r requirements.txt (line 1)) (4.9.
0)
```

```
(env2) C:\Users\USER\OneDrive\Documents>
```

```
Using cached terminado-0.18.1-py3-none-any.whl (14 kB)
Using cached tinycss2-1.4.0-py3-none-any.whl (26 kB)
Using cached tornado-6.4.2-cp38-abi3-win_amd64.whl (438 kB)
Using cached traitlets-5.14.3-py3-none-any.whl (85 kB)
Using cached types_python_dateutil-2.9.0.20241206-py3-none-any.whl (14 k
B)
Using cached typing_extensions-4.13.2-py3-none-any.whl (45 kB)
Using cached uri_template-1.3.0-py3-none-any.whl (11 kB)
Using cached urllib3-2.4.0-py3-none-any.whl (128 kB)
Using cached wcwidth-0.2.13-py2.py3-none-any.whl (34 kB)
Using cached webcolors-24.11.1-py3-none-any.whl (14 kB)
Using cached webencodings-0.5.1-py2.py3-none-any.whl (11 kB)
Using cached websocket_client-1.8.0-py3-none-any.whl (58 kB)
Using cached widgetsnbextension-4.0.14-py3-none-any.whl (2.2 MB)
Installing collected packages: webencodings, wcwidth, pywin32, pure_eval
, fastjsonschema, widgetsnbextension, websocket-client, webcolors, urlli
b3, uri-template, typing_extensions, types-python-dateutil, traitlets, t
ornado, tinycss2, soupsieve, sniffio, six, setuptools, Send2Trash, rpds-
py, rfc3986-validator, pyzmq, PyYAML, pywinpty, python-json-logger, pypa
rsing, Pygments, pycparser, psutil, prompt_toolkit, prometheus_client, p
latformdirs, pillow, parso, pandocfilters, packaging, overrides, numpy,
nest-asyncio, mistune, MarkupSafe, kiwisolver, jupyterlab_widgets, jupyt
erlab_pygments, jsonpointer, json5, idna, h11, fqdn, fonttools, executin
g, defusedxml, decorator, debugpy, cycler, colorama, charset-normalizer,
 certifi, bleach, babel, attrs, async-lru, asttokens, terminado, stack-d
ata, rfc3339-validator, requests, referencing, python-dateutil, matplotl
ib-inline, jupyter_core, Jinja2, jedi, ipython_pygments_lexers, httpcore
, contourpy, comm, cffi, beautifulsoup4, anyio, matplotlib, jupyter_serv
er_terminals, jupyter_client, jsonschema-specifications, ipython, httpx,
 arrow, argon2-cffi-bindings, jsonschema, isoduration, ipywidgets, ipyke
rnel, argon2-cffi, nbformat, jupyter-console, nbclient, jupyter-events,
nbconvert, jupyter_server, notebook_shim, jupyterlab_server, jupyter-lsp
, jupyterlab, notebook, jupyter
```