QUESTION 1

```
amei-302@amei302-HP-EliteBook-840-G3:~$ poetry --version
Poetry (version 1.8.3)
```

```
amei-302@amei302-HP-EliteBook-840-G3: ~/my_poetry_project
amei-302@amei302-HP-EliteBook-840-G3:~$ poetry --version
Poetry (version 1.8.3)
amei-302@amei302-HP-EliteBook-840-G3:~$ mkdir my_poetry_project
amei-302@amei302-HP-EliteBook-840-G3:~$ poetry new my_poetry_project
Created package my_poetry_project in my_poetry_project
amei-302@amei302-HP-EliteBook-840-G3:~$ cd my_poetry_project/
amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$
```

Adding Dependencies

```
amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$ poetry add requests@^2.2.0

Updating dependencies
Resolving dependencies... (0.8s)

Package operations: 0 installs, 1 update, 0 removals

  - Updating urllib3 (1.26.20 -> 2.2.3)

Writing lock file
amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$ poetry add urllib3@^2.0

Updating dependencies
Resolving dependencies... (0.1s)

No dependencies to install or update

Writing lock file
amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$
```

```
amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$ poetry show --tree
requests 2.32.3 Python HTTP for Humans.
├── certifi >=2017.4.17
├── charset-normalizer >=2,<4
├── idna >=2.5,<4
└── urllib3 >=1.21.1,<3
urllib3 2.2.3 HTTP library with thread-safe connection pooling, file post, and more.
amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$
```

hows the hierarchical relationship between your project's dependencies

```
amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$ poetry add urllib3@1.26.20

Updating dependencies
Resolving dependencies... (0.1s)

Package operations: 0 installs, 1 update, 0 removals

  - Downgrading urllib3 (2.2.3 -> 1.26.20)

Writing lock file
amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$
```

Activate the Virtual Environment

```
amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$ poetry shell
Spawning shell within /home/amei-302/.cache/pypoetry/virtualenvs/my-poetry-project-OhFhb0a6-py3.10
amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$ . /home/amei-302/.cache/pypoetry/virtualen
(my-poetry-project-py3.10) amei-302@amei302-HP-EliteBook-840-G3:~/my_poetry_project$
```

Commands used:

For project setup, adding dependencies, checking the tree, handling conflicts, activating the virtual environment, and importing packages.

Conflict resolution by Poetry:
Poetry resolves conflicts by analyzing the dependency tree and checking version constraints. It may downgrade or adjust package versions to ensure compatibility. If it can't resolve a conflict, it will throw an error and prevent installation. The resolved dependencies are saved in the poetry.lock file. This ensures the project remains stable with compatible packages

---

QUESTION 2:

```
amei-302@amei302-HP-EliteBook-840-G3:~$ mkdir calculator_app
amei-302@amei302-HP-EliteBook-840-G3:~$ cd calculator_app/
amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$ poetry init

This command will guide you through creating your pyproject.toml config.

Package name [calculator_app]:  calculator
Version [0.1.0]:  0.1
Description []:  will add, subtract, multiply and divide
Author [None, n to skip]:  Ahmed_Ali
License []:
Compatible Python versions [^3.10]:

Would you like to define your main dependencies interactively? (yes/no) [yes]
You can specify a package in the following forms:
  - A single name (requests): this will search for matches on PyPI
  - A name and a constraint (requests@^2.23.0)
  - A git url (git+https://github.com/python-poetry/poetry.git)
  - A git url with a revision (git+https://github.com/python-poetry/poetry.git#develop)
  - A file path (../my-package/my-package.whl)
  - A directory (../my-package/)
  - A url (https://example.com/packages/my-package-0.1.0.tar.gz)

Package to add or search for (leave blank to skip):

Would you like to define your development dependencies interactively? (yes/no) [yes]
Package to add or search for (leave blank to skip):
```

```
Generated file

[tool.poetry]
name = "calculator"
version = "0.1"
description = "will add, subtract, multiply and divide"
authors = ["Ahmed_Ali"]
readme = "README.md"

[tool.poetry.dependencies]
python = "^3.10"


[build-system]
requires = ["poetry-core"]
build-backend = "poetry.core.masonry.api"


Do you confirm generation? (yes/no) [yes]
amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$
```

Add Dependencies

```
amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$ poetry add click
Creating virtualenv calculator-KIEeP77X-py3.10 in /home/amei-302/.cache/pypoetry/virtualenvs
Using version ^8.1.7 for click

Updating dependencies
Resolving dependencies... (4.0s)

Package operations: 1 install, 0 updates, 0 removals

  - Installing click (8.1.7)

Writing lock file
amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$
```

Creating a Script

Open calculator.py and write the following script

Open | calculator.py ~/calculator_app | Save

```python
import click

@click.command()
@click.argument('operation', type=click.Choice(['add', 'subtract', 'multiply', 'divide'], case_sensitive=False))
@click.argument('num1', type=float)
@click.argument('num2', type=float)
def calculate(operation, num1, num2):
    """Perform basic arithmetic operations."""
    if operation == 'add':
        result = num1 + num2
    elif operation == 'subtract':
        result = num1 - num2
    elif operation == 'multiply':
        result = num1 * num2
    elif operation == 'divide':
        if num2 == 0:
            click.echo("Error: Division by zero is not allowed.")
            return
        result = num1 / num2

    click.echo(f"The result of {operation}ing {num1} and {num2} is: {result}")

if __name__ == '__main__':
    calculate()
```

Run Application

Activate the Poetry virtual environment:

```
amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$ poetry shell
Spawning shell within /home/amei-302/.cache/pypoetry/virtualenvs/calculator-KIEeP77X-py3.10
amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$ . /home/amei-302/.cache/pypoetry/virtualenvs/calculator
(calculator-py3.10) amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$ python calculator.py add 9 3
The result of adding 9.0 and 3.0 is: 12.0
(calculator-py3.10) amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$ python calculator.py add 9 3
The result of adding 9.0 and 3.0 is: 12.0
(calculator-py3.10) amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$ python calculator.py subtract 1 7
The result of subtracting 1.0 and 7.0 is: -6.0
(calculator-py3.10) amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$ python calculator.py multiply 7 7
The result of multiplying 7.0 and 7.0 is: 49.0
(calculator-py3.10) amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$ python calculator.py divide 4 2
The result of divideing 4.0 and 2.0 is: 2.0
(calculator-py3.10) amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$
```

Clean Up:

```
(calculator-py3.10) amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$ exit
exit
amei-302@amei302-HP-EliteBook-840-G3:~/calculator_app$
```

I learned how to use Poetry to set up a clean Python environment and manage dependencies. Setting up a new project and adding the **click** library with Poetry was easy and smooth. Using **click** made it simple to create a command-line interface for the calculator app. This helped me get hands-on practice with virtual environments, handling external libraries, and building basic command-line tools. Overall, working with Poetry was straightforward, and it gave me a better understanding of how to manage dependencies in Python projects.

QUESTION 03

Set Up a New Conda Environment

1. **Open your terminal** or **command prompt** (on Windows).
2. **Creating Conda environment** with Python 3.10:
   conda create --name data_analysis_env python=3.10 This command wll create an environment named as data_analysis.

```
(base) amei-302@amei302-HP-EliteBook-840-G3:~$ conda create --name data_analysis_env python=3.10
/home/amei-302/anaconda3/lib/python3.12/site-packages/conda/base/context.py:982: FutureWarning: Ac
be removed in 25.3.

To remove this warning, please choose a default channel explicitly via 'conda config --add channel
  deprecated.topic(
Channels:
 - defaults
Platform: linux-64
Collecting package metadata (repodata.json): done
Solving environment: done

## Package Plan ##

  environment location: /home/amei-302/anaconda3/envs/data_analysis_env

  added / updated specs:
    - python=3.10


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    pip-24.2                   |  py310h06a4308_0         2.3 MB
    python-3.10.15             |       he870216_1        26.8 MB
    setuptools-75.1.0          |  py310h06a4308_0         1.7 MB
    wheel-0.44.0               |  py310h06a4308_0         109 KB
    ------------------------------------------------------------
                                           Total:        30.9 MB

The following NEW packages will be INSTALLED:

  _libgcc_mutex      pkgs/main/linux-64::_libgcc_mutex-0.1-main
  _openmp_mutex      pkgs/main/linux-64::_openmp_mutex-5.1-1_gnu
  bzip2              pkgs/main/linux-64::bzip2-1.0.8-h5eee18b_6
  ca-certificates    pkgs/main/linux-64::ca-certificates-2024.9.24-h06a4308_0
  ld_impl_linux-64   pkgs/main/linux-64::ld_impl_linux-64-2.40-h12ee557_0
  libffi             pkgs/main/linux-64::libffi-3.4.4-h6a678d5_1
  libgcc-ng          pkgs/main/linux-64::libgcc-ng-11.2.0-h1234567_1
  libgomp            pkgs/main/linux-64::libgomp-11.2.0-h1234567_1
  libstdcxx-ng       pkgs/main/linux-64::libstdcxx-ng-11.2.0-h1234567_1
  libuuid            pkgs/main/linux-64::libuuid-1.41.5-h5eee18b_0
```

after this press y and enter this will install some new packages

(SEE BELOW)

```
The following NEW packages will be INSTALLED:

  _libgcc_mutex      pkgs/main/linux-64::_libgcc_mutex-0.1-main
  _openmp_mutex      pkgs/main/linux-64::_openmp_mutex-5.1-1_gnu
  bzip2              pkgs/main/linux-64::bzip2-1.0.8-h5eee18b_6
  ca-certificates    pkgs/main/linux-64::ca-certificates-2024.9.24-h06a4308_0
  ld_impl_linux-64   pkgs/main/linux-64::ld_impl_linux-64-2.40-h12ee557_0
  libffi             pkgs/main/linux-64::libffi-3.4.4-h6a678d5_1
  libgcc-ng          pkgs/main/linux-64::libgcc-ng-11.2.0-h1234567_1
  libgomp            pkgs/main/linux-64::libgomp-11.2.0-h1234567_1
  libstdcxx-ng       pkgs/main/linux-64::libstdcxx-ng-11.2.0-h1234567_1
  libuuid            pkgs/main/linux-64::libuuid-1.41.5-h5eee18b_0
  ncurses            pkgs/main/linux-64::ncurses-6.4-h6a678d5_0
  openssl            pkgs/main/linux-64::openssl-3.0.15-h5eee18b_0
  pip                pkgs/main/linux-64::pip-24.2-py310h06a4308_0
  python             pkgs/main/linux-64::python-3.10.15-he870216_1
  readline           pkgs/main/linux-64::readline-8.2-h5eee18b_0
  setuptools         pkgs/main/linux-64::setuptools-75.1.0-py310h06a4308_0
  sqlite             pkgs/main/linux-64::sqlite-3.45.3-h5eee18b_0
  tk                 pkgs/main/linux-64::tk-8.6.14-h39e8969_0
  tzdata             pkgs/main/noarch::tzdata-2024b-h04d1e81_0
  wheel              pkgs/main/linux-64::wheel-0.44.0-py310h06a4308_0
  xz                 pkgs/main/linux-64::xz-5.4.6-h5eee18b_1
  zlib               pkgs/main/linux-64::zlib-1.2.13-h5eee18b_1


Proceed ([y]/n)? y


Downloading and Extracting Packages:

Preparing transaction: done
Verifying transaction: done
Executing transaction: done
#
# To activate this environment, use
#
```

Activate the environment:

```
#
# To activate this environment, use
#
#     $ conda activate data_analysis_env
#
# To deactivate an active environment, use
#
#     $ conda deactivate

(base) amei-302@amei302-HP-EliteBook-840-G3:~$
```

Enter command **conda activate data_analysis_env**

```
(base) amei-302@amei302-HP-EliteBook-840-G3:~$ conda activate data_analysis_env
(data_analysis_env) amei-302@amei302-HP-EliteBook-840-G3:~$
```

Install Required Libraries now

to install the necessary libraries (NumPy, Pandas, Matplotlib, Seaborn):

Type command conda install numpy pandas matplotlib seaborn

```
(data_analysis_env) amei-302@amei302-HP-EliteBook-840-G3:~$ conda install numpy pandas matplotlib seaborn
/home/amei-302/anaconda3/lib/python3.12/site-packages/conda/base/context.py:982: FutureWarning: Adding 'def
be removed in 25.3.

To remove this warning, please choose a default channel explicitly via 'conda config --add channels <name>'
  deprecated.topic(
Channels:
 - defaults
Platform: linux-64
Collecting package metadata (repodata.json): done
Solving environment: done

## Package Plan ##

  environment location: /home/amei-302/anaconda3/envs/data_analysis_env

  added / updated specs:
    - matplotlib
    - numpy
    - pandas
    - seaborn


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    bottleneck-1.3.7           |  py310ha9d4c09_0         125 KB
    contourpy-1.2.0            |  py310hdb19cb5_0         246 KB
    fontconfig-2.14.1          |       h55d465d_3         281 KB
    fonttools-4.51.0           |  py310h5eee18b_0         2.3 MB
    kiwisolver-1.4.4           |  py310h6a678d5_0          76 KB
    libxkbcommon-1.0.1         |       h097e994_2         590 KB
    libxml2-2.13.1             |       hfdd30dd_2         739 KB
    matplotlib-3.9.2           |  py310h06a4308_0           7 KB
    matplotlib-base-3.9.2      |  py310hbfdbfaf_0         7.0 MB
    mkl-service-2.4.0          |  py310h5eee18b_1          54 KB
    mkl_fft-1.3.10             |  py310h5eee18b_0         217 KB
    mkl_random-1.2.7           |  py310h1128e8f_0         352 KB
    numexpr-2.8.7              |  py310h85018f9_0         141 KB
    numpy-1.26.4               |  py310h5f9d8c6_0          11 KB
    numpy-base-1.26.4          |  py310hb5e798b_0         7.2 MB
    packaging-24.1             |  py310h06a4308_0         148 KB
```

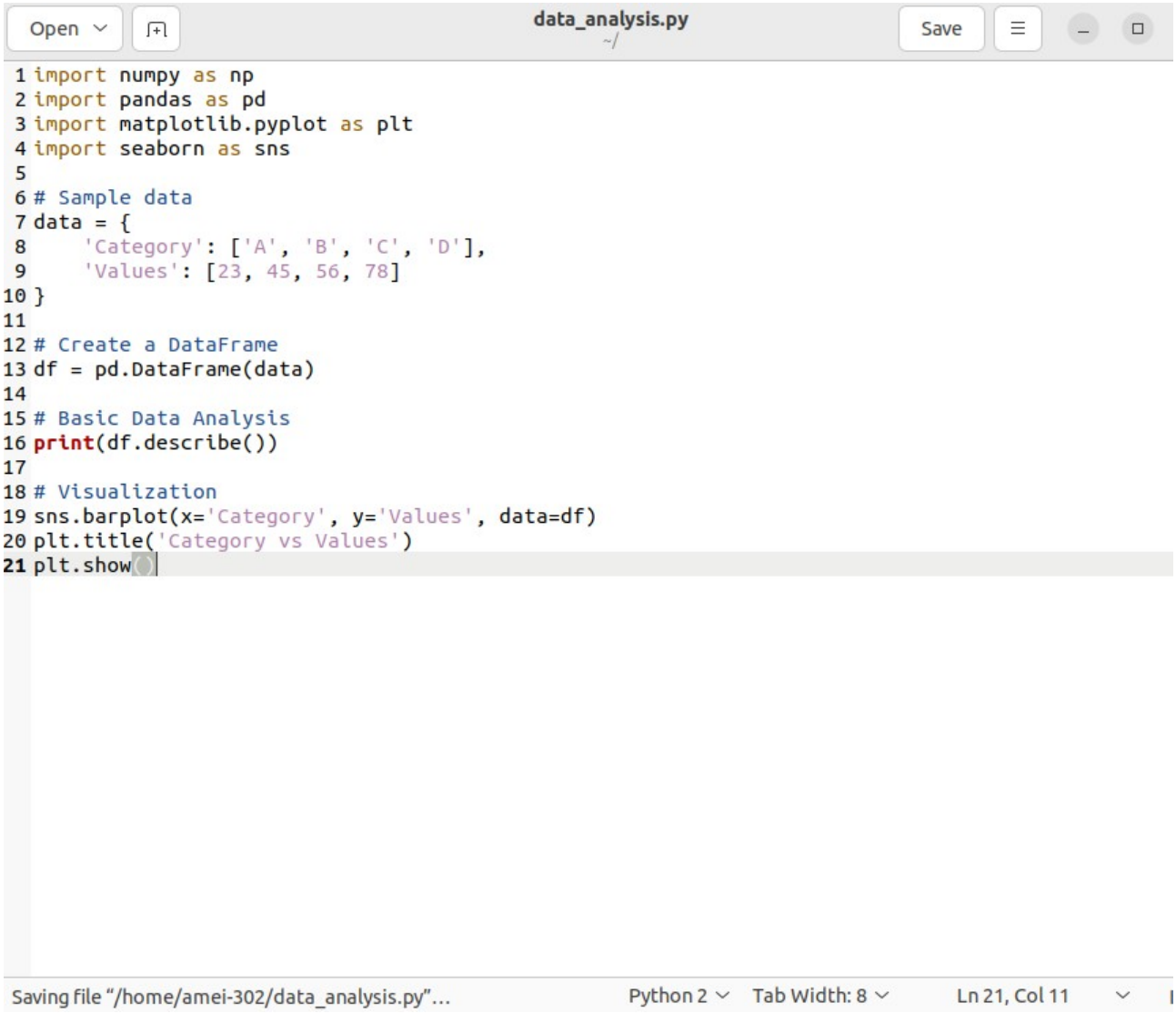
press y and hit enter for downlaoding and extracting packages

```
  pytz               pkgs/main/linux-64::pytz-2024.1-py310h06a4308_0
  qt-main            pkgs/main/linux-64::qt-main-5.15.2-h53bd1ea_10
  seaborn            pkgs/main/linux-64::seaborn-0.13.2-py310h06a4308_0
  sip                pkgs/main/linux-64::sip-6.7.12-py310h6a678d5_0
  six                pkgs/main/noarch::six-1.16.0-pyhd3eb1b0_1
  tbb                pkgs/main/linux-64::tbb-2021.8.0-hdb19cb5_0
  tomli              pkgs/main/linux-64::tomli-2.0.1-py310h06a4308_0
  tornado            pkgs/main/linux-64::tornado-6.4.1-py310h5eee18b_0
  unicodedata2       pkgs/main/linux-64::unicodedata2-15.1.0-py310h5eee18b_0
  zstd               pkgs/main/linux-64::zstd-1.5.5-hc292b87_2


Proceed ([y]/n)? y


Downloading and Extracting Packages:
pandas-2.2.2          | 13.0 MB   |
numpy-base-1.26.4     | 7.2 MB    |
matplotlib-base-3.9.  | 7.0 MB    |
pyqt-5.15.10          | 5.7 MB    |
libxml2-2.13.1        | 739 KB    |
tornado-6.4.1         | 654 KB    |
seaborn-0.13.2        | 606 KB    |
libxkbcommon-1.0.1    | 590 KB    |
unicodedata2-15.1.0   | 519 KB    |
sip-6.7.12            | 509 KB    |
pyparsing-3.1.2       | 401 KB    |
mkl_random-1.2.7      | 352 KB    |
fontconfig-2.14.1     | 281 KB    |
python-dateutil-2.9.  | 280 KB    |
contourpy-1.2.0       | 246 KB    |
mkl_fft-1.3.10        | 217 KB    |
pytz-2024.1           | 212 KB    |
packaging-24.1        | 148 KB    |
numexpr-2.8.7         | 141 KB    |
bottleneck-1.3.7      | 125 KB    |
pyqt5-sip-12.13.0     | 95 KB     |
ply-3.11              | 80 KB     |
kiwisolver-1.4.4      | 76 KB     |
mkl-service-2.4.0     | 54 KB     |
tomli-2.0.1           | 24 KB     |
numpy-1.26.4          | 11 KB     |
matplotlib-3.9.2      | 7 KB      |
```

Create a Python Script

1. **Navigate to your project directory** and create a file named data_analysis.py:

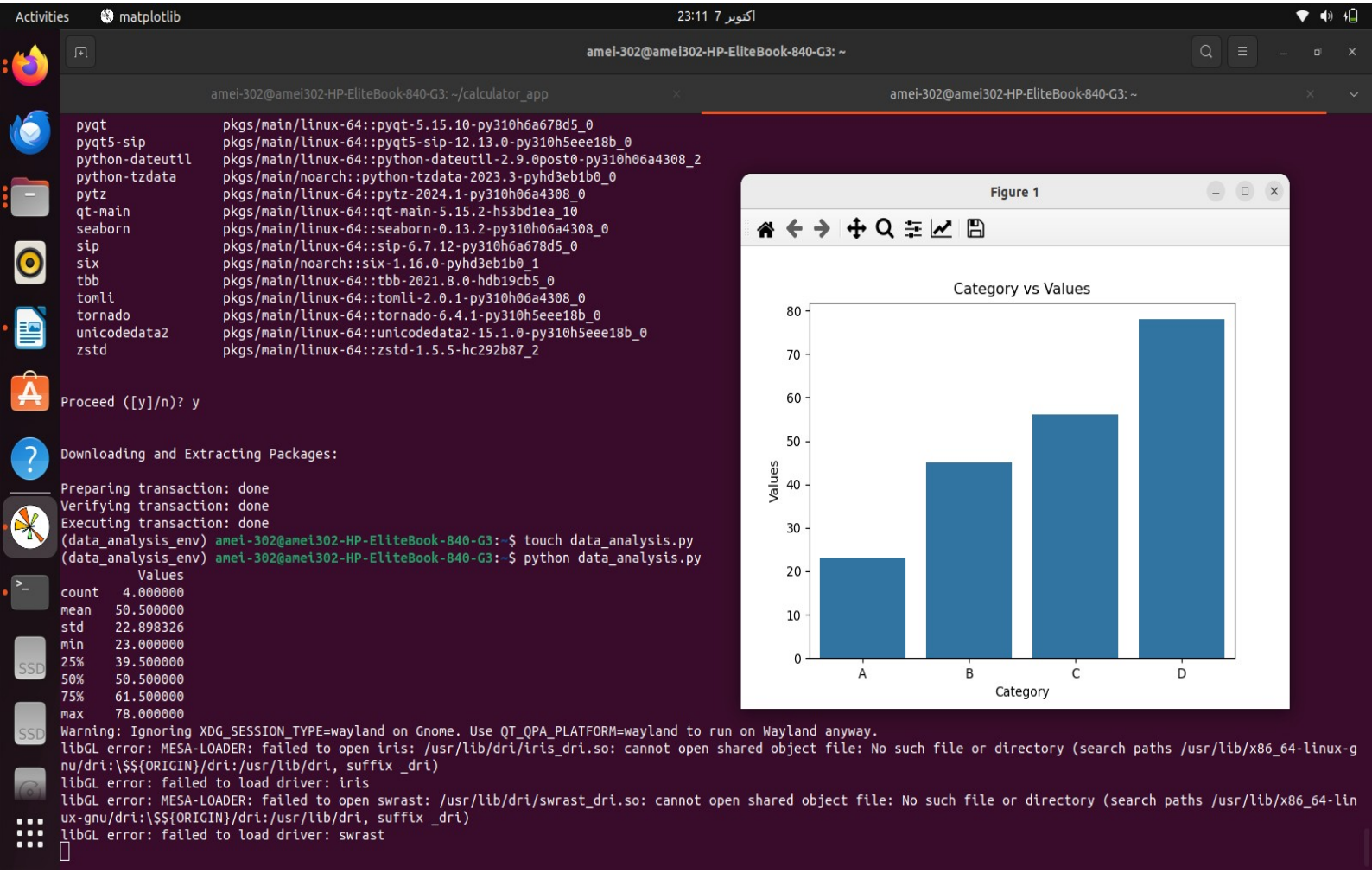
Write the following code into data_analysis.py:



Run Script

To execute the script inside your activated Conda environment, run **python data_analysis.py**

will see a basic summary of the data and a bar plot visualizing the categories against their values.



Clean Up:

type command conda deactivate

```
(data_analysis_env) amei-302@amei302-HP-EliteBook-840-G3:~$ conda deactivate
(base) amei-302@amei302-HP-EliteBook-840-G3:~$
```

Deliverables

1. Ensure that your Python script (data_analysis.py) works correctly.
2. Prepare a brief report summarizing your experience, such as:

   Summary: Through this task, I learned how to set up and manage Conda environments. I was able to install the necessary libraries (NumPy, Pandas, Matplotlib, and Seaborn) using Conda and use them in a Python project to perform basic data analysis. The process helped me understand how data is structured and visualized using Pandas and Seaborn. The bar plot visualization provided insight into the relationship between the categories and their values, enhancing my skills in basic data handling and plotting