**Assignment: Introduction to Data Science & Python Libraries (NumPy & Pandas)**

**Section 1: Introduction to Data Science**

1. Explain the **facets of data** in data science. How do volume, variety, velocity, and veracity impact real-world data analysis?
2. Describe the **Data Science Process** and its key steps. How does it differ from traditional data analysis approaches?
3. Provide an example of how data science is used in healthcare or business analytics. What role does **machine learning** play in this field?

**Section 2: NumPy - Numerical Computing**

1. What is **NumPy**, and why is it widely used in data science? Compare it with Python lists in terms of performance and functionality.
2. Write a Python program to **create a NumPy array** of shape (3,4) containing random integers between 10 and 50.
3. Explain **NumPy array attributes** such as shape, dtype, size, and ndim with suitable examples.
4. How do you **join, split, search, and sort** arrays in NumPy? Write Python code to demonstrate these operations.
5. Demonstrate **indexing, slicing, and iterating** through a NumPy array. Provide examples where these techniques can be applied.
6. Explain the **difference between deep copy and shallow copy** in NumPy arrays. Give a code example to illustrate the concept.
7. What is an **Identity matrix**, and how is it created using the **eye() function** in NumPy? Provide an example.

**Section 3: Pandas - Data Manipulation**

1. What are **Pandas Series** and **Pandas DataFrames**? Explain their differences with appropriate examples.
2. Write a Python program to **create a Pandas Series** using a Python list and a dictionary.
3. How do you **re-index** a Pandas DataFrame? Provide a code example.
4. Explain the drop() function in Pandas. How is it used to **remove entries** from a DataFrame?
5. Write Python code to **select specific entries** from a DataFrame using label-based (loc) and position-based (iloc) indexing.
6. How does **data alignment** work in Pandas when performing arithmetic operations on Series or DataFrames? Provide an example.
7. Explain the **rank and sort** functions in Pandas with a real-world data example.
8. How do you calculate **summary statistics** (mean, median, standard deviation) for a Pandas DataFrame? Write a Python script to demonstrate.
9. What is **Index Hierarchy** in Pandas? How can it be useful for multi-level data analysis?

**Section 4: Data Acquisition & Web Scraping**

1. What are different sources for **data acquisition**? Compare **Web APIs, Open Data Sources, and Web Scraping** in terms of accessibility and reliability.
2. Write a Python script to fetch data from an **Open Data Source** (e.g., COVID-19 statistics, weather data) using the requests library.
3. Explain the process of **accessing Web APIs** to retrieve structured data. Write a Python script to call a REST API and extract JSON data.
4. What are some ethical and legal considerations when performing **Web Scraping**? How can you ensure compliance with a website’s robots.txt file?
5. Write a Python script using **BeautifulSoup** or **Scrapy** to extract data (e.g., headlines, prices, or weather information) from a webpage.