Introduction to Data Science

Assignment 2

1. Array Manipulation:

Create a 5x5 array filled with numbers from 1 to 25 in a spiral pattern (clockwise).

- Extract a 3x3 subarray from the center of the original array.
- Reverse the rows of the original array.
- Find the indices of all elements greater than 15 in the original array.
- Reshape the original array into a 1D array without changing the order of elements.

2. Data Analysis Challenge:

- Load the "iris.csv" dataset (included as a separate file) into a NumPy array.
- Calculate the mean, standard deviation, minimum, and maximum values for each of the four features (sepal length, sepal width, petal length, petal width).
- Find the correlation coefficients between each pair of features.
- Select only the rows where the petal length is greater than 5.0.
- Visualize the distribution of sepal length using a histogram.

3. Problem-Solving Scenario:

- Create a 10x10 array representing a game board, where each element indicates a player's move (1 for player 1, 2 for player 2, 0 for empty).
- Write a NumPy function to check if there's a winning row, column, or diagonal for either player.
- If there's a winner, return the winning player's number. If it's a tie, return 0. If the game is still in progress, return -1.

Requirements:

- Use clear and concise code comments to explain your logic.
- Use appropriate NumPy functions and methods efficiently.
- Handle errors or unexpected inputs gracefully.
- Test your code thoroughly to ensure correctness.

Submission:

- Submit a well-organized Notebook containing your code and results.
- Include clear explanations and visualizations where appropriate.