OJT Assignment (25 Marks.)

Q1. Data Visualization and Statistical Measures:

For this question, you are required to analyse the iris dataset (iris.csv) using Python. Perform all possible data visualization techniques (histograms, scatter plots, box plots, etc.) on all numerical columns of the dataset. Additionally, calculate all possible statistical measures (mean, median, mode, standard deviation, etc.) for each numerical column.

Q2. Row Echelon Form:

Create a 5x5 matrix, A, with entries randomly chosen integers between 0 and 9. To generate the random matrix, set the random seed as the last two digits of your roll number. Reduce matrix A to its Row Echelon Form by performing elementary row operations.

Q3. Singular Value Decomposition (SVD):

Perform Singular Value Decomposition on the matrix A obtained in Question 2. Separate and print matrices U, Σ, and V^T. Verify that A equals the product of U, Σ, and V^T. Additionally, find the rank 2 and rank 3 approximations of matrix A.

Q4. Polynomial Plotting with Annotations:

Randomly select the coefficients of a 5th degree polynomial. Set the random seed as the last two digits of your roll number. Plot the polynomial for $-5 \leq x \leq 5$. Annotate the plot to identify the maxima and minima of the polynomial.

Q5. Article Writing with ChatGPT:

Write an article of approximately 100 words on any favourite topic from mathematics using ChatGPT. Provide proper prompts to generate insightful content. (You can use ChatGPT to choose the topic if required).

Submission Instructions:

1. Create a GitHub account if you haven't already.
2. Upload your completed .ipynb files for Questions 1-4 to your GitHub repository.
3. Upload .pdf file for Question 5 to your GitHub repository.
4. Provide the links to your GitHub repository for each of the question in the following Google form (https://forms.gle/T6k1MRJkxz3Yzm119)

Ensure clarity, correctness, and completeness in your solutions.

Deadline for submission: [27/04/2024].