Assignment designed to assess prerequisite knowledge for the course. These questions cover foundational topics in programming, statistics, machine learning, and data visualization to determine if the students' skill level is sufficient.

Section 1: Python Programming Basics (8 questions)

1. **Python Basics**: Write a Python program that prints all the numbers divisible by 5 from 1 to 100.
2. **Data Structures**: What is the difference between a Python list, tuple, and dictionary? Provide examples.
3. **Loops**: Write a Python program to calculate the sum of a list of numbers using a for loop.
4. **File Handling**: Write a Python script to read data from a CSV file and display its first 5 rows.
5. **Libraries**: What are pandas and numpy used for in Python? Give two example usages for each.
6. **Functions**: Write a Python function that takes a list of numbers as input and returns their average.
7. **Error Handling**: Explain the purpose of try, except, and finally in Python with a code example.
8. **Debugging**: Given the code snippet below, identify and fix the error:

   ```
   my_list = [1, 2, 3]
   print(my_list(1))
   ```

Section 2: Data Manipulation and Visualization (6 questions)

1. **Data Manipulation**: How would you calculate the mean of a column in a pandas DataFrame?
2. **Data Cleaning**: Write a Python code snippet to handle missing values in a pandas DataFrame by replacing them with the column mean.
3. **Data Visualization**: Explain the difference between a line plot and a scatter plot. Provide an example use case for each.
4. **Visualization Tools**: Write Python code to plot using matplotlib and pandas.
5. **Plot Customization**: How can you add a title, axis labels, and a legend to a matplotlib plot? Provide a code example.

Section 3: Statistics and Probability (6 questions)

1. **Descriptive Statistics**: Define mean, median, and standard deviation with examples.
2. **Correlation**: Explain correlation and how it differs from causation. How is correlation measured?
3. **Statistical Tests**: What is the purpose of a hypothesis test? Explain with an example.

Section 4: Machine Learning Foundations (6 questions)

1. **Supervised vs. Unsupervised Learning**: What is the difference between these two paradigms? Provide examples.
2. **Regression and Classification**: Provide a brief explanation.
3. **Evaluation Metrics**: What are MSE and RMSE? How are they calculated?
4. **Overfitting**: Define overfitting in the context of machine learning models. How can it be mitigated?