Python Assignment

Project Overview

This assignment aims to provide a comprehensive understanding of Python programming fundamentals. You will create code examples to demonstrate your proficiency in various Python concepts.

Task

1. **Create a Jupyter Notebook** to document your code and explanations.
2. **Write at least five code examples** for each of the following concepts:
    - Python Functions
    - Lambda Functions
    - NumPy
    - Pandas
    - If Statements
    - Loops (for and while)
    - Lists, Tuples, Sets, Dictionaries
    - Operators (arithmetic, comparison, logical, etc.)
    - Reading CSV files
    - Python String Methods

Concepts to Cover

Python Functions

- Create functions with different numbers of parameters and return types.
- Explore function scope and variable accessibility.
- Implement functions with default argument values.
- Write recursive functions.
- Demonstrate how to use docstrings to document functions.

Lambda Functions

- Create simple lambda functions for various operations.
- Use lambda functions with built-in functions like map, filter, and reduce.
- Compare lambda functions with regular functions in terms of syntax and use cases.

NumPy

- Create different types of NumPy arrays (1D, 2D, 3D).
- Perform basic arithmetic operations on arrays.
- Use indexing and slicing to access elements.
- Explore array manipulation functions (reshape, transpose, concatenate).
- Create and use NumPy random number generators.

Pandas

- Create Pandas Series and DataFrames.
- Load data from various file formats (CSV, Excel, etc.).
- Perform data cleaning and manipulation tasks.
- Explore data analysis and visualization using Pandas.
- Create pivot tables and group data for analysis.

If Statements

- Demonstrate conditional logic using if, else, and elif statements.
- Create complex conditional expressions.
- Implement nested if statements.

Loops

- Use for loops to iterate over sequences.
- Employ while loops for indefinite iteration.
- Implement nested loops.
- Utilize break and continue statements.

Lists, Tuples, Sets, Dictionaries

- Create and manipulate lists, tuples, sets, and dictionaries.
- Understand the differences between these data structures.
- Perform operations like indexing, slicing, adding, removing elements.
- Explore built-in methods for each data structure.

Operators

- Use arithmetic, comparison, logical, and assignment operators.
- Understand operator precedence.
- Apply operators in expressions and calculations.

Reading CSV files

- Read CSV files into Pandas DataFrames.
- Explore different CSV reading options and parameters.
- Handle missing values and data cleaning.

Python String Methods

- Manipulate strings using various built-in methods.
- Perform operations like concatenation, slicing, finding substrings.
- Convert strings to uppercase, lowercase, and title case.
- Remove whitespace and split strings.

Submission

- Save your Jupyter Notebook as a PDF.
- Submit the PDF by Monday.

Additional Tips

- Use clear and concise code comments to explain your code.
- Experiment with different approaches and libraries to enhance your learning.
- Refer to online resources and documentation for further exploration.