Day-2 Exercise Homework

Internals of Python

Section 1: History of Python

1. **Short Answer Questions:**
    - Who created Python, and in which year was it first released?
    - Why is Python named "Python"?
    - Mention two major changes introduced in Python 2.0 and Python 3.0.
    - List the key organizations that support Python development and maintenance.
2. **Timeline Activity:**
    - Create a timeline of Python's development from 1991 to the present, highlighting key milestones.

Section 2: Features of Python

3. **Identify the Feature:**
    - Which Python feature allows variables to change their type during execution? Provide an example.
    - Explain why Python is considered cross-platform.
    - What does it mean that Python is interpreted, and how does this affect debugging?
4. **True or False:**
    - Python is only used for web development.
    - Python manages memory manually.
    - Python's syntax is more complex than other programming languages.
5. **Practical Task:**
    - Write a Python program demonstrating the following features:
        - Dynamic typing

- Use of a standard library module (e.g., math or random)

- Cross-platform compatibility by running it on different operating systems (if possible).

Section 3: Why Python Is Popular

6. **Application Research:**
   - Research one Python library for each of the following fields and write a brief description of its purpose:
     - Web Development
     - Data Science
     - Machine Learning
7. **Discussion Question:**
   - Why do you think Python has gained popularity across diverse fields like automation, data science, and web development? Write your thoughts in 150–200 words.

Section 4: Memory Management in Python

8. **Code Analysis:**
   - Write a Python program demonstrating reference counting. Use the sys.getrefcount() method to verify reference counts for a variable.
   - Create an example that produces a reference cycle and use the gc module to clear it.
9. **Explain Concepts:**
   - What is the purpose of Python's garbage collector, and how does it handle reference cycles?
   - Explain interning with an example.

10. **Research Task:**
    - Find a tool or library to monitor Python memory usage and write a brief report on how to use it.

Section 5: Setting Up Python Environment & Writing Programs

11. **Installation Task:**
    - Install Python on your machine and verify the installation. Take a screenshot of the terminal output showing the Python version.
12. **First Python Program:**
    - Write, save, and run your first Python program to print "Hello, World!" Include steps you followed and the output.
13. **Experiment with print():**
    - Use the print() function to achieve the following outputs:
        - Print values separated by a comma (,).
        - Print values on the same line with a space in between.
        - Customize the end character to a period (.).
