🧮 Assignment: Variables in Python

🎯 Objective:

Enhance your proficiency with Python Variables by completing a series of tasks that cover creation, manipulation, and application of Variables in various scenarios.

🟢 Level 1: Beginner – Understanding the Basics

1. **Variable Creation and Assignment**

   - Create variables to store your name, age, and city.

   - Print each variable.

2. **Variable Reassignment**

   - Assign a new value to the `city` variable.

   - Print the updated value.

3. **Multiple Assignments**

   - Assign the values 10, 20, and 30 to variables `a`, `b`, and `c` in a single line.

   - Print all three variables.

4. **Swapping Variables**

   - Swap the values of `a` and `b` without using a temporary variable.

   - Print the swapped values.

5. **Variable Naming Conventions**

   - Identify which of the following are valid variable names:

     - `1st_name`

     - `_name`

     - `user-name`

     - `user_name`

     - `userName`

   - Explain why each is valid or invalid.

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🟡 Level 2: Intermediate – Exploring Variable Operations and Scope

6. **Arithmetic Operations**

   - Create two variables, `num1` and `num2`, and assign them integer values.

   - Perform addition, subtraction, multiplication, division, and modulus operations.

   - Print the results.

7. **String Concatenation**

   - Create variables `first_name` and `last_name`.

   - Concatenate them to form `full_name`.

   - Print `full_name`.

8. **Type Conversion**

   - Create a variable `age` with an integer value.

   - Convert `age` to a string and concatenate it with a message.

   - Print the message.

9. **Global vs. Local Variables**

   - Write a function that modifies a global variable.

   - Demonstrate the difference between local and global scope.

10. **Dynamic Typing**

    - Assign different data types to the same variable and print its type after each assignment.

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🔴 Level 3: Advanced – Real-world Applications

11. **User Input and Variables**

    ° Prompt the user to enter their name and age.

    ° Calculate the year they will turn 100 years old.

    ° Print a message with this information.

12. **Variable Scope in Functions**

    ° Create a function that takes a number as input and returns its square.

    ° Show how variable scope affects the function's behavior.

13. **Constants in Python**

    ° Define a constant for the value of Pi.

    ° Use it to calculate the area of a circle with a given radius.

14. **Variable Identity and Equality**

    ° Create two variables with the same value.

    ° Use `is` and == to compare them.

    ° Explain the difference between identity and equality.

15. **Memory Management**

    ° Create a large list and assign it to a variable.

    ° Delete the variable and observe the effect on memory usage.