Variables and Data Types in Python

1. Introduction to Variables:

Variables are used to store information in a program. They act as containers for data values. In Python, you do not need to declare the type of a variable beforehand. The type is inferred at runtime.

Example:

name = "Alice"

age = 25

height = 5.6

2. Rules for Naming Variables:

- Must begin with a letter or underscore (_)
- Cannot start with a number
- Can contain letters, numbers, and underscores
- Case-sensitive (e.g., age and Age are different)

3. Assigning Values:

Variables are assigned using the = operator.

Example:

x = 10

y = "Python"

z = 3.14

Multiple assignments:

a, b, c = 1, 2, 3

4. Data Types in Python:

Python has various built-in data types:

- int: Integer numbers
  e.g., x = 5
- float: Decimal numbers

  e.g., pi = 3.14

- str: Strings or text

  e.g., name = "Alice"

- bool: Boolean values (True or False)

  e.g., is_valid = True

- list: Ordered and changeable collection

- tuple: Ordered and unchangeable collection

- dict: Key-value pairs

- set: Unordered collection of unique items

5. Type Checking:

Use the type() function to check the data type of a variable.

Example:

```
x = 5
print(type(x))  # Output: <class 'int'>
```

6. Type Casting:

You can convert data types using casting functions:

int(), float(), str(), bool()

Example:

```
x = "10"
y = int(x)       # y is now 10 (int)
```

7. Dynamic Typing:

Python allows you to reassign variables to values of different types:

```
x = 10
x = "Python"  # Valid
```

8. Best Practices:

- Use descriptive variable names (e.g., total_price, user_name)

- Avoid using Python reserved keywords as variable names

9. Practice Questions:

1. Assign your name and age to two variables and print them.

2. Convert the string "100" into an integer and add 50 to it.

3. Create a boolean variable that stores True.

4. Create a list of 3 favorite movies and print the second one.

10. Summary:

Variables are essential to store and manage data. Understanding data types helps in writing accurate and error-free programs. Pythons dynamic and flexible typing makes it beginner-friendly.