Module 1j: Introduction to Problem Solving and Python Fundamentals

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August 1, 2025

What are Data Types in Python?

- A data type defines the kind of value a variable can store.
- Python is dynamically typed — no need to declare type explicitly.
- Data types help Python decide how to store, process, and represent data.

Categories of Data Types

- **Numeric** – int, float, complex
- **Sequence** – str, list, tuple, range
- **Set** – set, frozenset
- **Mapping** – dict
- **Boolean** – bool
- **Binary** – bytes, bytearray, memoryview
- **NoneType** – None

Numeric Data Types

- **int** – Integer numbers (e.g., 5, -20)
- **float** – Decimal numbers (e.g., 3.14, -0.5)
- **complex** – Numbers with real and imaginary parts (e.g., 2 + 3j)

Examples

```
a = 10          # int
b = 3.5         # float
z = 2 + 3j      # complex
```

Sequence Data Types

- **str** – Text data (e.g., "Hello")
- **list** – Mutable ordered collection
- **tuple** – Immutable ordered collection
- **range** – Generates a sequence of numbers

Examples

```
name = "Python"
colors = ['red', 'blue']
coords = (10, 20)
nums = range(1, 5)
```

Set Data Types

- **set** – Unordered, mutable, unique elements
- **frozenset** – Immutable version of a set

Examples

```
s = {1, 2, 3}
fs = frozenset([1, 2, 3])
```

Mapping Data Type

- **dict** – Stores data in key-value pairs

Example

```
student = {
    "name": "Premanand",
    "age": 38
}
```

Boolean Data Type

- **bool** – Two possible values: `True`, `False`
- Used in logical operations and conditions

Example

```
is_logged_in = True
print(5 > 2)    # Output: True
```

NoneType

- **None** is a special type indicating "no value"
- Used as a default return or uninitialized placeholder

Example

```
x = None
if x is None:
    print("No value assigned")
```

Assignment 1: Identify Data Types

- Create variables to store different kinds of data:
  - Age of a person
  - Temperature in Celsius
  - City name
  - Is a student enrolled (yes/no)
  - List of subject names
- Print each variable with its data type using `type()`.

Assignment 2: Type Conversion Practice

- Accept user input for:
  - Integer (age)
  - Float (marks)
  - String (name)
- Convert and print:
  - int to float
  - float to int
  - string to list of characters

Assignment 3: Real-World Data Modeling

- Design variables for a student management system.
- Include:
  - Student name, ID, grade, subjects enrolled
  - Fees paid (True/False), date of joining
- Choose appropriate data types and justify them.

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Don't just code — think, plan, and solve