🔠Detailed Notes on Python Data Types

# 📌 What are Data Types?

In Python, data types define the kind of value a variable holds. Python is dynamically typed, so you don’t need to declare the type explicitly — Python detects it at runtime.

Example:

x = 5 # int  
name = "Bob" # str  
pi = 3.14 # float

# 🧱 Python's Built-in Data Types (Grouped)

Python’s standard data types are grouped into the following categories:

|  |  |
| --- | --- |
| Category | Types Included |
| Text Type | str |
| Numeric Types | int, float, complex |
| Sequence Types | list, tuple, range |
| Set Types | set, frozenset |
| Mapping Type | dict |
| Boolean Type | bool |
| Binary Types | bytes, bytearray, memoryview |
| None Type | NoneType |

# 🔢 1. Numeric Types

a) int – Integer: Whole numbers, positive or negative, no decimal. Arbitrary length in Python 3.

b) float – Floating Point Number: Numbers with decimal points.

c) complex – Complex Number: Numbers with real and imaginary parts.

# 🧵 2. Text Type

str – String: Sequence of Unicode characters. Defined using single or double quotes.

# 🧬 3. Sequence Types

a) list – Ordered, Mutable.  
b) tuple – Ordered, Immutable.  
c) range – Immutable sequence of numbers.

# 🧮 4. Set Types

a) set – Unordered, Unique.  
b) frozenset – Immutable set.

# 🗺️ 5. Mapping Type

dict – Key-value pairs. Mutable and ordered from Python 3.7+.

# 🔘 6. Boolean Type

bool – Only two values: True and False. Often the result of comparisons.

# 🧩 7. Binary Types

a) bytes – Immutable binary data.  
b) bytearray – Mutable binary data.  
c) memoryview – View on byte data.

# 🚫 8. None Type

NoneType – Represents the absence of a value.

# 🧪 Type Checking & Conversion

To check a variable's type, use the type() function. Type casting can convert between types using functions like int(), float(), str(), etc.

# ✅ Summary Table

|  |  |  |
| --- | --- | --- |
| Type | Description | Example |
| int | Integer | 5 |
| float | Decimal | 3.14 |
| complex | Real + Imaginary | 3 + 4j |
| str | Text | "Python" |
| bool | Boolean | True, False |
| list | Ordered, Mutable | [1, 2, 3] |
| tuple | Ordered, Immutable | (1, 2, 3) |
| dict | Key-value pairs | {"name": "Alice"} |
| set | Unordered, Unique | {1, 2, 3} |
| range | Sequence of numbers | range(0, 10) |
| NoneType | Absence of value | None |
| bytes | Binary, immutable | b"abc" |
| bytearray | Binary, mutable | bytearray(5) |