

01 — Variables and Data Types

Lesson 01: Variables and Data Types

Chapter 01: Python Fundamentals

Python for Artificial Intelligence

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Learning Objectives

After completing this lesson, you will be able to:

- Understand what variables are.
- Learn Python's built-in data types.
- Assign values to variables.
- Follow Python variable naming conventions.
- Check the data type of any variable.
- Convert between data types.
- Apply variables in AI and Data Science projects.

What is a Variable?

A variable is a named memory location used to store data.

Think of a variable as a labeled container that holds information.

Example:

Age → 25

Name → Sohail

Salary → 50000

Python creates the variable automatically when a value is assigned.

```
name = "Muhammad Sohail"
```

```
age = 31
```

```
cgpa = 3.10
```

```
is_teacher = True
```

```
print(name)
```

```
print(age)
```

```
print(cgpa)
```

```
print(is_teacher)
```

```
Muhammad Sohail
```

```
31
```

```
3.1
```

```
True
```

Built-in Data Types

Python provides several built-in data types.

The most commonly used are:

- int

- float

- str

- bool

- complex

- list

- tuple

- set

- dictionary

```
integer_number = 10

float_number = 3.14

student_name = "Sohail"

is_passed = True

complex_number = 4 + 3j

print(type(integer_number))
print(type(float_number))
print(type(student_name))
print(type(is_passed))
print(type(complex_number))
<class 'int'>
<class 'float'>
<class 'str'>
<class 'bool'>
<class 'complex'>
```

Variable Naming Rules

✓ Can contain letters

✓ Numbers (not at the beginning)

✓ Underscore ()

✗ No spaces

✗ No special symbols

Python is Case Sensitive.

```
student_name = "Ali"

student_age = 22

marks2026 = 95

# Invalid Examples

# 2student = "Ali"

# student-name = "Ali"

# student name = "Ali"
```

Type Casting

Type casting converts one data type into another.

Functions:

int()

float()

str()

bool()

```
num = "100"

print(type(num))

num = int(num)

print(type(num))

price = float(num)

print(price)

text = str(price)

print(text)
```

```
<class 'str'>  
<class 'int'>  
100.0  
100.0
```

Variables in Artificial Intelligence

Variables are everywhere in AI.

Examples include:

learning_rate

epochs

batch_size

model_name

accuracy

loss

dataset_name

These variables store the parameters used while training machine learning models.

```
model_name = "Random Forest"  
  
learning_rate = 0.01  
  
epochs = 100  
  
accuracy = 96.75  
  
print(model_name)
```

```
print(learning_rate)
print(epochs)
print(accuracy)

Random Forest
0.01
100
96.75
```

Best Practices

- Use meaningful variable names.
- Follow snake_case naming.
- Avoid single-letter variable names except in loops.
- Keep names descriptive.

Practice Exercises

1. Create variables for your name, age, university, and CGPA.
2. Print their data types.
3. Convert your age into float.
4. Convert CGPA into string.
5. Create five AI-related variables.

Interview Questions

- Q1. What is a variable?
- Q2. Explain dynamic typing in Python.
- Q3. Difference between int and float?

Q4. What does type() do?

Q5. What is type casting?

Mini Challenge

Create a student profile.

Store:

Name

Age

Department

CGPA

University

Email

Then print all the information.

Summary

Today you learned:

✓ Variables

✓ Data Types

✓ Type Checking

✓ Type Casting

✓ Variable Naming Rules

✓ AI Applications of Variables