

BASICS

Sunday, December 7, 2025 12:41 PM

1. what is SYNTAX in python?

Syntax = Rules of writing code (structure)

It defines how python code must be written.

If you break syntax rules → **X SYNTAX ERROR**

2. What is SEMANTICS in python?

Semantics = Meaning / Logic of the code

Even if the syntax is correct, if the meaning is

wrong → **X logical Error / Runtime Error.**

3. What is a VARIABLE?

A variable is a name that stores a value in memory.

Python decides the data type automatically (**Dynamic Typing**).

4. What is a DATA TYPE?

A data type defines:

- What kind of value a variable stores.
- How much memory it uses.
- What operations can be performed on it.

Main Categories of Data Types.

A. Numeric Types

Type	Example
int	10, -5, -100
float	3.14, -2.5
Complex	5+3j

B. Text Type

Type	Example
str	"Hello", "DSA"

Indexing in strings

$s = "DATA"$
`print(s[0]) #D`
`print(s[-1]) #A`

Strings are immutable (can't be changed).

C. Boolean Type

Type	Example
bool	True/False

D. Sequence Types

Type	ordered	changeable	Example
list	✓	✓	[1, 2, 3]
tuple	✓	✗	(1, 2, 3)
range	✓	✗	range(5)

E. Set Type

Type	ordered?	Example
set	X	{1, 2, 3}

Properties: Used in:

- No duplicates
- Removing duplicates

- Unordered
- fast lookup

F. Mapping Type

Type	Example
dict	{name: "Saketh", age: 22}

Mutable vs Immutable

Mutable	Immutable
Can change	Cannot change
list, set, dict	int, float, str, tuple.

Type Conversion (Type Casting)

Used in:

- Input processing

- Algorithm problems

- Mathematical operations

5. What is an OPERATOR?

An operator is a symbol that performs an operation on one or more operands (values/variables).

$$x = 10 + 5$$

'+' is the operator ; 10 and 5 are operands

Types of Operators in Python

1. Arithmetic Operators

Operator	Meaning	Example
Addition	$5 + 2$	7
Subtraction	$5 - 2$	3
Multiplication	$5 * 2$	10
Division	$5 / 2$	2.5
Floor Division	$5 // 2$	2
Modulus	$5 \% 2$	1
Power	$2 ** 3$	8

2. Comparison (Relational) Operator

Operator	Meaning
$=$	Equal to
\neq	Not equal to
$<$	Less than

Returns Boolean Type

3. Logical Operators

Operator	Meaning
and	Both true
or	Any true
not	Reverse

4. Assignment Operators

Operator	Example
$=$	$x = 10$
$+=$	$x += 1$
$-=$	$x -= 1$
$*=$	$x *= 2$

5. Bitwise Operators → works in binary.

Operator	Name	Example
$\&$	AND	$5 \& 3$
$ $	OR	$5 3$
\wedge	XOR	$5 \wedge 3$
\sim	NOT	~ 5
\ll	left shift	$5 \ll 2$

$$\begin{array}{l} 5 \& 3 \\ \hline 101 \& 011 \\ \hline 101 \end{array} \quad \textcircled{1}$$
$$\begin{array}{l} 5 | 3 \\ \hline 101 | 011 \\ \hline 111 \end{array} \quad \textcircled{2}$$
$$\begin{array}{l} 5 \wedge 3 \\ \hline 101 \wedge 011 \\ \hline 110 \end{array} \quad \textcircled{3}$$
$$\begin{array}{l} \sim 5 \\ \hline 11010100 \\ \hline 11010100 \end{array} \quad \textcircled{4}$$
$$\begin{array}{l} 5 \ll 2 \\ \hline 1010 \\ \hline 1010 \end{array} \quad \textcircled{5}$$

6. Membership Operators → used in searching in arrays, strings.

Operator	Example
\in	'a' in 'cat'
\notin	'a' not in [1, 2, 3]

7. Identity Operator

Operator	Example
is	a is b
$is not$	a is not b

6. What is a CONDITIONAL STATEMENT?

A conditional statement lets your program take a decision based on a condition.

If answers:

"If this is true → do this, otherwise → do something else."

- if

- if-else

- if-elif-else

- nested if (if inside if) / used in, graph, trees, games, AI logic

7. What is a LOOP?

A loop is used to repeat a block of code multiple times until a condition is met.

Python has two main loops:

- 1. for loop

- 2. while loop

Loop Control Statements

- a) break - Stops the loop

- b) continue - Skips current iteration

Nested Loops → A loop inside another loop.