Introduction to Python

Agenda

- Python Fundamentals Quiz
- Variables, Operators, and Data Structures
- Conditional Statements
- Looping Statements
- Functions

Let's begin the discussion by answering a few questions on the fundamentals of Python programming

Python Fundamentals Quiz

Which of the following is true regarding variables in Python?

A. Values assigned to variables can be modified

B. Variables can store data structures such as arrays and dictionaries

C. Variables can only store integer and floats

D. Variables can store integer, floats, strings and booleans

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Variables

Used to **store any type of data**

Single values (integer, float, string, boolean, etc.)

Data structures (arrays, lists, dictionaries, etc.)

Can be **created by assigning a value to it with the "=" operator** (assignment operator)

`num = 100` => creates a variable *num* and stores the value *100* in it

Can be **modified to store a different value**

`num = 3.14` => variable *num* gets modified, now stores *3.14* instead of *100*

Python Fundamentals Quiz

Which of the following combinations accurately matches mathematical symbols with their respective operations?

A. + for addition, - for subtraction

B. * for exponentiation, / for modulus

C. % for multiplication, ** for division

D. ** for multiplication, % for subtraction

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Operators

Symbol	Operation	Example	Output
+, -	Addition, Subtraction	1 + 7 9 - 4	8 5
*, /, %	Multiplication, Division, Modulus	3 * 4 6 / 2 6 % 2	12 3.0 0
**	Exponentiation	2 ** 4	16
==, !=, >, >=, <, <=	Comparison	5 <= 4	False
in, not in	Membership	5 in [1, 2, 3, 4, 5]	True
()	Grouping	(1+2) * (2+3)	3 * 5 = 15

Python Fundamentals Quiz

Which of the following data structures in Python are mutable (can be modified later after being created)?
List, Dictionary, Tuple

A. Only List

B. Tuple and Dictionary

C. List and Tuple

D. List and Dictionary

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Data Structures

List	Tuple	Dictionaries
A collection of items of any data type	A collection of items of any data type	A collection of key-value pairs
Mutable (can be modified)	Immutable (cannot be modified)	Mutable (can be modified)
Syntax: `mylist = ["Element 1", "Element 2", "Element 3"]`	Syntax: `mytuple = ("Element 1", "Element 2", "Element 3")`	Syntax: `mydict = {1: 'Element 1', 2: 'Element 2', 3: 'Elements 3'}`
Example: `X=["a", 2, True, "b"]`	Example: `X=("a", 2, True, "b")`	Example: `X={1:'Jan', 2:'Feb', 3:'Mar'}`

Python Fundamentals Quiz

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Which of the following will retrieve the two middle elements from the list?

```
my_list = [1, "two", 3.5, "four", 5, 6.0, "seven", 8.2]
```

A
```
my_list[3:5]
```

B
```
my_list[4:6]
```

C
```
my_list[-5:-3]
```

D
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my_list[-4:-6]
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Lists - Slicing

To retrieve a specific **subset of elements from a list**, one can **slice the list by index**

The format for list slicing is as follows:

```
<list_name>[Start Index : End Index : Index-Jump]
```

Consider a list `my_list = ['a', 'b', 'c', 'd']`

Negative Index	-4	-3	-2	-1
Elements	a	b	c	d
Index	0	1	2	3

Python Fundamentals Quiz

Which statement accurately describes the behavior of the "elif" construct in Python?

A. "elif" is used to define a block of code to be executed if the preceding "if" or "elif" condition(s) evaluate to False.

B. "elif" is mandatory and must be included after every "if" statement.

C. "elif" is used only when there are multiple conditions and no "else" block is present.

D. "elif" is equivalent to "else if" and can be used interchangeably with the "else" statement.

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Conditional Statements

Used to **make decisions based on specified rules**

A **single decision** can be made using **`if-else` construct**

```
if (test expression):
    <Body of if> this is executed if the expression is True
else:
    <Body of else> this is executed if the expression is False
```

More than one decision can be made using the **`if-elif-else` construct**

```
if (test expression 1):
    <Body of if> run this if test expression 1 is True
elif (test expression 2):
    <Body of elif> run this if test expression 2 is True
else:
    <Body of else> run this if none of the above expressions are True
```

Python Fundamentals Quiz

Which of the following statements is true regarding loops in Python?

A. The "for" loop requires a condition to be evaluated before execution

B. The "for" loop iterates through a sequence, executing on each element

C. The "while" loop requires a condition to be evaluated before execution

D. The "while" loop iterates through a sequence, executing on each element

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Looping Statements

Used to **repeat a single statement or a set of statements**

Looping statement	Syntax	Example	Output
for	`for iter var in seq:` `  statements(s)`	`for i in range(1, 5):` `  print(i)`	Prints all integers from 1 till 5 (excluded)

while	`while condition:`
	`  statement(s)`
		`i = 1`
		`while i < 5:`
		`  print(i)`
		`  i += 1`
			Prints all integers from 1 till 5 (excluded)

Python Fundamentals Quiz

What is the purpose of functions in Python?

A. To execute a specific task only once in a program

B. To combine multiple variables into a single variable

C. To break code into modular chunks for reusability and organization

D. To declare built-in variables that are predefined in Python

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Functions

Block of instructions that performs a specific task

Break code into **modular chunks** which can be **reused later**

Makes the code more organized and manageable

There are two types of functions in Python

Built-in Functions: Pre-defined in Python (`print()`, `len()`, `sum()`, etc)

User-defined Functions: Defined by users to perform a specific task

Python Fundamentals Quiz

Which of the following statements about the `return` statement in Python is/are true?

A. A function can have multiple return statements.

B. A function can return multiple values in a single return statement

C. It returns a value or an expression computed by the function.

D. A function must always include a return statement.

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User-defined Functions

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Syntax for a user defined function:

```
def function_name(parameters):
    statement(s)
    return statement
```

The **`return` statement is optional** and can be used when one or more values have to be returned by the function

Example: Create a function called `squared_sum` to add the square of two numbers

```
def squared_sum(num1, num2):
    sq_sum = (num1*num1) + (num2*num2)
    return sq_sum
```

Happy Learning !