



# **ARTIFICIAL INTELLIGENCE - SUMMER OF CODE NAVTTC**

**[Course]**

**Week 1**

**[See examples / code in GitHub code repository]**

**It is not about Theory, it is 20% Theory and 80% Practical –  
Technical/Development/Programming [Mostly Python based]**

# Development Environment Setup

- ☐ **Install Python [ Version 3.12.10 ]**
- ☐ **Install – IDE - Visual Studio Code**
- ☐ **Install – extension for Python by Microsoft**
- ☐ **Visual Studio Code – Debugging - process**
- ☐ **Python – executable – find version**
- ☐ **Python File run by command prompt**
- ☐ **Python File run by IDE – visual studio code**
- ☐ **Python has no command for declaring a variable.**
- ☐ **Create a free ac of GitHub. Install Desktop client. Check-in code- as per name**

25



# Development Task

## Task 1:

Print – Hello World First program

## Task 2:

Print – Current version of Python programming language

## Task 3:

Add comments to code

## Task 4:

Create a Int variable and print

Then create a string variable and print

## Task 5:

Type casting – Get a type

25



python

# Development Task

## Data Types

Python has the following data types built-in by default, in these categories:

Text Type:	<code>str</code>
Numeric Types:	<code>int</code> , <code>float</code> , <code>complex</code>
Sequence Types:	<code>list</code> , <code>tuple</code> , <code>range</code>
Mapping Type:	<code>dict</code>
Set Types:	<code>set</code> , <code>frozenset</code>
Boolean Type:	<code>bool</code>
Binary Types:	<code>bytes</code> , <code>bytearray</code> , <code>memoryview</code>
None Type:	<code>NoneType</code>

Reference:

[https://www.w3schools.com/python/python\\_datatypes.asp](https://www.w3schools.com/python/python_datatypes.asp)

<https://www.geeksforgeeks.org/python-data-types/>

<https://www.digitalocean.com/community/tutorials/python-data-types>

<https://www.programiz.com/python-programming/variables-datatypes>

## Exercises



# python

# Development Task

## Operators

Operator	Name	Example
+	Addition	$x + y$
-	Subtraction	$x - y$
*	Multiplication	$x * y$
/	Division	$x / y$
%	Modulus	$x \% y$
**	Exponentiation	$x ** y$
//	Floor division	$x // y$

Reference:

[https://www.w3schools.com/python/python\\_operators.asp](https://www.w3schools.com/python/python_operators.asp)

<https://www.programiz.com/python-programming/operators>

<https://www.programiz.com/python-programming/operators>

<https://www.scholarhat.com/tutorial/python/operators-of-python>

25

## Exercises



# python

# Development Task

## String Function

Method	Description
<code>capitalize()</code>	Converts the first character to upper case
<code>casefold()</code>	Converts string into lower case
<code>center()</code>	Returns a centered string
<code>count()</code>	Returns the number of times a specified value occurs in a string
<code>encode()</code>	Returns an encoded version of the string
<code>endswith()</code>	Returns true if the string ends with the specified value
<code>expandtabs()</code>	Sets the tab size of the string
<code>find()</code>	Searches the string for a specified value and returns the position of where it was found
<code>format()</code>	Formats specified values in a string
<code>format_map()</code>	Formats specified values in a string
<code>index()</code>	Searches the string for a specified value and returns the position of where it was found
<code>isalnum()</code>	Returns True if all characters in the string are alphanumeric

Reference:

[https://www.w3schools.com/python/python\\_strings\\_methods.asp](https://www.w3schools.com/python/python_strings_methods.asp)

<https://www.geeksforgeeks.org/python-string-methods/>

<https://www.wscubetech.com/resources/python/strings>

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## Exercises



# python



# Development Task

## Take Input

```
username = input("Enter username:")  
print("Username is: " + username)
```

## Exercises

Reference:

<https://www.geeksforgeeks.org/taking-input-in-python/>

<https://www.digitalocean.com/community/tutorials/how-to-receive-user-input-python>

[https://www.w3schools.com/python/python\\_user\\_input.asp](https://www.w3schools.com/python/python_user_input.asp)

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# Development Task

## Type-Casting

Casting in python is therefore done using constructor functions:

- `int()` - constructs an integer number from an integer literal, a float literal (by removing all decimals), or a string literal (providing the string represents a whole number)
- `float()` - constructs a float number from an integer literal, a float literal or a string literal (providing the string represents a float or an integer)
- `str()` - constructs a string from a wide variety of data types, including strings, integer literals and float literals

## Exercises

Reference:

[https://www.w3schools.com/python/python\\_casting.asp](https://www.w3schools.com/python/python_casting.asp)

<https://www.geeksforgeeks.org/type-casting-in-python/>

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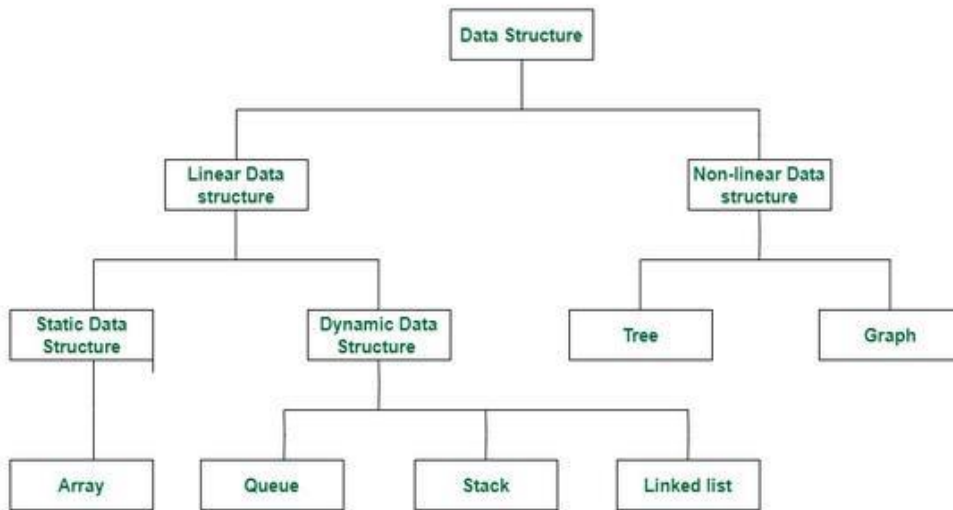




# Data Structure

**Data structures** are the fundamental building blocks of computer programming. They define how data is organized, stored, and manipulated within a program. Understanding data structures is very important for developing efficient and effective algorithms.

## Classification of Data Structure



## References:

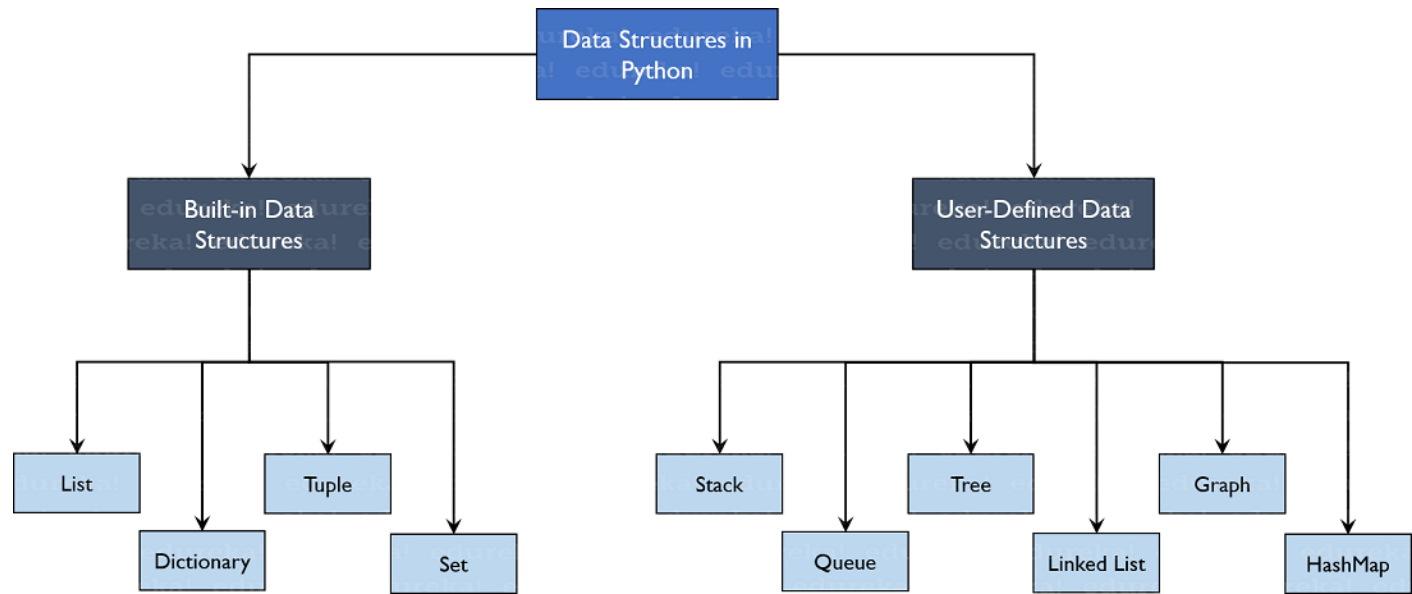
<https://www.geeksforgeeks.org/data-structures/>

<https://www.simplilearn.com/tutorials/data-structure-tutorial/what-is-data-structure>



# python

# Data Structure in Python



## References:

<https://www.geeksforgeeks.org/python-data-structures/>

<https://docs.python.org/3/tutorial/datastructures.html>

<https://corporatefinanceinstitute.com/resources/data-science/python-data-structures/>

<https://www.edureka.co/blog/data-structures-in-python/>



# Difference between mutable and immutable

VS	
MUTABLE DATA TYPES	IMMUTABLE DATA TYPES
1. Value assigned to a variable is modifiable	1. Value assigned to a variable is not modifiable
2. They are not quicker to access	2. They are quicker to access
3. Mutable Data types in Python <ol style="list-style-type: none"><li>1. List</li><li>2. Dictionary</li><li>3. Set</li><li>4. Bytearray</li></ol> Exception: Dictionary key	3. Immutable Data types in Python <ol style="list-style-type: none"><li>1. Numeric</li><li>2. String</li><li>3. Tuple</li><li>4. Boolean</li><li>5. Frozenset</li><li>6. Range</li><li>7. Bytes</li></ol>

## References:

<https://www.geeksforgeeks.org/mutable-vs-immutable-objects-in-python/>

<https://realpython.com/python-mutable-vs-immutable-types/>

<https://www.shiksha.com/online-courses/articles/difference-between-mutable-and-immutable-in-python/>



# Python Lists

PYnative.com

## List in Python

```
L = [ 20, 'Jessa', 35.75, [30, 60, 90] ]
```

$\uparrow$        $\uparrow$        $\uparrow$        $\uparrow$

L[0]    L[1]    L[2]    L[3]

- ✓ **Ordered:** Maintain the order of the data insertion.
- ✓ **Changeable:** List is mutable and we can modify items.
- ✓ **Heterogeneous:** List can contain data of different types
- ✓ **Contains duplicate:** Allows duplicates data

References:

[https://www.w3schools.com/python/python\\_lists.asp](https://www.w3schools.com/python/python_lists.asp)

<https://www.programiz.com/python-programming/list>

<https://www.geeksforgeeks.org/python-lists/>

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## Exercises



# python



# Python Tuples

PYnative.com

## Tuples in Python

```
T = ( 20, 'Jessa', 35.75, [30, 60, 90] )
```

↑  
T[0]

↑  
T[1]

↑  
T[2]

↑  
T[3]

- ✓ **Ordered:** Maintain the order of the data insertion.
- ✓ **Unchangeable:** Tuples are immutable and we can't modify items.
- ✓ **Heterogeneous:** Tuples can contains data of types
- ✓ **Contains duplicate:** Allows duplicates data

References:

[https://www.w3schools.com/python/python\\_tuples.asp](https://www.w3schools.com/python/python_tuples.asp)

<https://www.geeksforgeeks.org/tuples-in-python/>

<https://www.programiz.com/python-programming/tuple>

## Exercises



# python

# Python Sets

## Set in Python

PYnative.com

$S = \{ 20, 'Jessa', 35.75 \}$

- ✓ **Unordered:** Set doesn't maintain the order of the data insertion.
- ✓ **.changeable:** Set are immutable and we can't modify items.
- ✓ **Heterogeneous:** Set can contains data of all types
- ✓ **Unique:** Set doesn't allows duplicates items

References:

[https://www.w3schools.com/python/python\\_sets.asp](https://www.w3schools.com/python/python_sets.asp)

<https://www.programiz.com/python-programming/set>

<https://www.geeksforgeeks.org/sets-in-python/>

## Exercises



python



# Python Dictionaries

## Dictionary in Python PYnative.com

Unordered collections of unique values stored in (Key-Value) pairs.

```
d = {'a': 10, 'b': 20, 'c': 30}
```



d['a']



d['b']



d['c']

- ✓ **Unordered:** The items in dict are stored without any index value
- ✓ **Unique:** Keys in dictionaries should be Unique
- ✓ **Mutable:** We can add/Modify/Remove key-value after the creation

### References:

[https://www.w3schools.com/python/python\\_dictionaries.asp](https://www.w3schools.com/python/python_dictionaries.asp)

<https://www.programiz.com/python-programming/dictionary>

<https://www.geeksforgeeks.org/python-dictionary/>

## Exercises



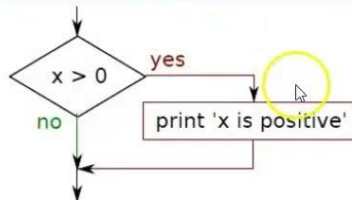
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# Conditional Execution

## If Statement

- An **if statement** consists of a boolean expression followed by one or more statements.
- The Boolean expression after the if statement is called the condition. We end the if statement with a colon character (:) and the line(s) after the if statement are indented.

```
if x > 0:  
    print ("x is positive")
```



## References:

<https://www.geeksforgeeks.org/conditional-statements-in-python/>

[https://www.w3schools.com/python/python\\_conditions.asp](https://www.w3schools.com/python/python_conditions.asp)

<https://realpython.com/python-conditional-statements/>

## Exercises

25



# Break, continue, and pass statements



## References:

[https://www.digitalocean.com/community/tutorials/how-to-use-break-](https://www.digitalocean.com/community/tutorials/how-to-use-break-continue-and-pass-statements-in-python)

[https://www.geeksforgeeks.org/loops-and-control-statements-continue-](https://www.geeksforgeeks.org/loops-and-control-statements-continue-and-pass-statements-in-python/)

<https://pynative.com/python-break-continue-pass/>

## Exercises

25



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# For - While - Loop



## References:

<https://www.geeksforgeeks.org/loops-in-python/>

<https://www.geeksforgeeks.org/difference-between-for-loop-and-while>

[https://www.w3schools.com/python/python\\_while\\_loops.asp](https://www.w3schools.com/python/python_while_loops.asp)

## Exercises

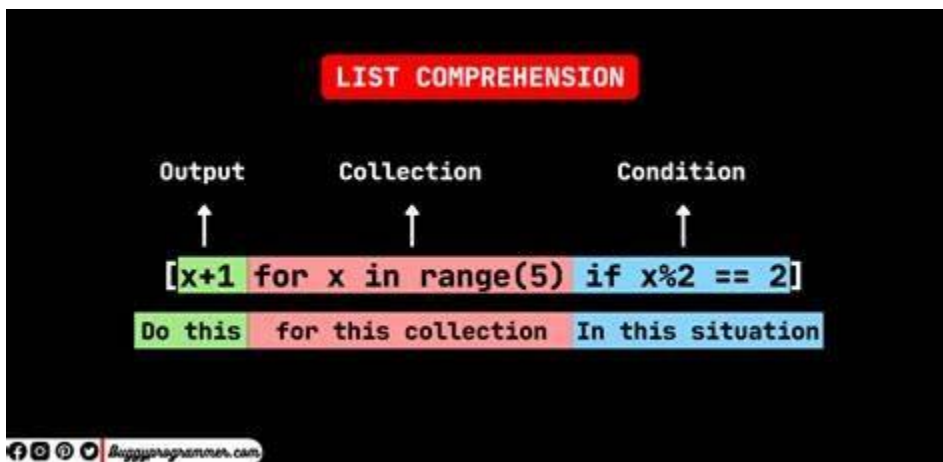
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# List comprehension



## References:

[https://www.w3schools.com/python/python\\_lists\\_comprehension.asp](https://www.w3schools.com/python/python_lists_comprehension.asp)

<https://www.geeksforgeeks.org/python-list-comprehension/>

<https://realpython.com/list-comprehension-python/>

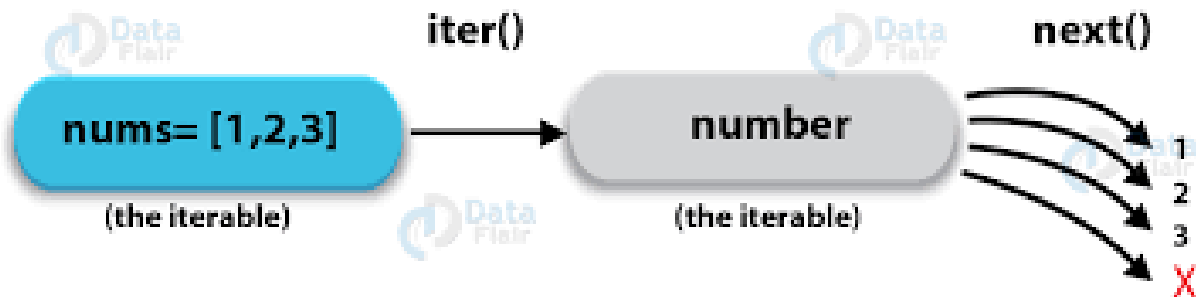
## Exercises

25



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# Iterators and Iterables



## References:

<https://www.geeksforgeeks.org/python-difference-iterable-iterator/>

<https://realpython.com/python-iterators-iterables/>

[https://www.w3schools.com/python/python\\_iterators.asp](https://www.w3schools.com/python/python_iterators.asp)

## Exercises

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# Linux commands

Don't have a Linux machine prepared. But there is a word round – semi-partial working. There are some linux commands – simulator. Few examples here:

## Reference:

<https://itsfoss.com/online-linux-terminals/>

Try: <https://copy.sh/v86/?profile=linux26&ref=itsfoss.com>

## How to get help of command

<https://www.linuxfordevices.com/tutorials/linux/help-command-in-linux>

## References:

<https://www.hostinger.com/tutorials/linux-commands>

<https://www.dreamhost.com/blog/linux-commands/>

<https://phoenixnap.com/kb/wp-content/uploads/2022/11/linuxCommandsAllUsersShouldKnow.pdf>

## Exercises

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# Important commands



## Top 50 Linux Commands you must know

- |           |            |             |                      |                           |
|-----------|------------|-------------|----------------------|---------------------------|
| 1. ls     | 11. cat    | 21. diff    | 31. kill and killall | 41. apt, pacman, yum, rpm |
| 2. pwd    | 12. echo   | 22. cmp     | 32. df               | 42. sudo                  |
| 3. cd     | 13. less   | 23. comm    | 33. mount            | 43. cal                   |
| 4. mkdir  | 14. man    | 24. sort    | 34. chmod            | 44. alias                 |
| 5. mv     | 15. uname  | 25. export  | 35. chown            | 45. dd                    |
| 6. cp     | 16. whoami | 26. zip     | 36. ifconfig         | 46. wheris                |
| 7. rm     | 17. tar    | 27. unzip   | 37. traceroute       | 47. whatis                |
| 8. touch  | 18. grep   | 28. ssh     | 38. wget             | 48. top                   |
| 9. ln     | 19. head   | 29. service | 39. ufw              | 49. useradd               |
| 10. clear | 20. tail   | 20. ps      | 40. iptables         | 50. passwd                |

## Exercises

25



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Thank you - for listening and participating

- ☐ Questions / Queries
- ☐ Suggestions/Recommendation
- ☐ Ideas.....?

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