

Complex Data Structures in Python

1) Lists

- **Definition:** Ordered, mutable collections of items.
- **Common Methods:**
 - `append()`: Adds an element to the end of the list.
 - `extend()`: Adds elements from an iterable to the end of the list.
 - `insert()`: Inserts an element at a specified position.
 - `remove()`: Removes the first occurrence of a value.
 - `pop()`: Removes and returns an element at a specified position.
 - `sort()`: Sorts the list in place.
 - `reverse()`: Reverses the elements of the list in place.

2) Sets

- **Definition:** Unordered collections of unique elements.
- **Common Methods:**
 - `add()`: Adds an element to the set.
 - `update()`: Adds elements from an iterable to the set.
 - `remove()`: Removes a specified element (raises an error if the element does not exist).
 - `discard()`: Removes a specified element (does not raise an error if the element does not exist).
 - `pop()`: Removes and returns an arbitrary set element.
 - `union()`: Returns a new set with elements from the set and all others.
 - `intersection()`: Returns a set that contains all elements common to both sets.
 - `difference()`: Returns a set with elements in the set that are not in the others.

3) Dictionaries

- **Definition:** Collections of key-value pairs, where keys are unique.
- **Common Methods:**

- `get()`: Returns the value for a specified key.
- `keys()`: Returns a view object of all the keys.
- `values()`: Returns a view object of all the values.
- `items()`: Returns a view object of all the key-value pairs.
- `update()`: Updates the dictionary with elements from another dictionary or an iterable of key-value pairs.
- `pop()`: Removes and returns an element specified by the key.
- `popitem()`: Removes and returns the last inserted key-value pair.

4) Tuples

- **Definition:** Ordered, immutable collections of items.
- **Common Methods:**
 - `count()`: Returns the number of times a specified value appears in the tuple.
 - `index()`: Returns the index of the first occurrence of a specified value.