Indexing

```
In [ ]: # Make a string
        a = "Samosa Pakora"
        a
Out[ ]: 'Samosa Pakora'

In [ ]: # Length of indices
        len(a)
Out[ ]: 13

In [ ]: a[0]
Out[ ]: 'S'

In [ ]: a[1]
Out[ ]: 'a'

In [ ]: a[3]
Out[ ]: 'o'

In [ ]: a[12]
Out[ ]: 'a'

In [ ]: a[0:5]
Out[ ]: 'Samos'

In [ ]: a[0:6]
Out[ ]: 'Samosa'

In [ ]: # Last index is exclusive
        a[0:13]
Out[ ]: 'Samosa Pakora'

In [ ]: a[-6:13]
Out[ ]: 'Pakora'

In [ ]: food = "biryani"
        food
Out[ ]: 'biryani'
```

String methods

```
In [ ]: food
Out[ ]: 'biryani'

In [ ]: len(food)
Out[ ]: 7

In [ ]: # Captialize first element
        food.capitalize()
Out[ ]: 'Biryani'

In [ ]: # Uppercase letters
        food.upper()
Out[ ]: 'BIRYANI'

In [ ]: # Lowercase letters
        food.lower()
Out[ ]: 'biryani'

In [ ]: # Replace letters
        food.replace("b", "Sh")
Out[ ]: 'Shiryani'

In [ ]: # Counting a specific alphabet in a string
        name = "40_days of Python with Dr Aammar Tufail"
        name
Out[ ]: '40_days of Python with Dr Aammar Tufail'

In [ ]: name.count("t")
Out[ ]: 2
```

Finding an index number in string

```
In [ ]: name = "40_days of Python with Dr Aammar Tufail"
        name
Out[ ]: '40_days of Python with Dr Aammar Tufail'

In [ ]: name.find("Dr")
Out[ ]: 23
```

How to split a string

```
In [ ]: food = "I love samosa, pakora, raita biryani and karahi"
        food
Out[ ]: 'I love samosa, pakora, raita biryani and karahi'

In [ ]: food.split(",")
Out[ ]: ['I love samosa', ' pakora', ' raita biryani and karahi']
```

Basic data structure in Python

1. Tuple
2. List
3. Dictionaries
4. Set

1. Tuple

- Ordered collection of elements
- Enclosed in () round braces/parentheses
- Different kind of elements can be stored
- Once elements are stored you can not change them (immutable)

```
In [ ]: tup1 = (1, "python", True, 2.5)
        tup1
Out[ ]: (1, 'python', True, 2.5)

In [ ]: # Type of a tuple
        type(tup1)
Out[ ]: tuple
```

Indexing in tuple

```
In [ ]: tup1[1]
Out[ ]: 'python'

In [ ]: tup1[2]
Out[ ]: True

In [ ]: # Last element is exclusive
        tup1[:3]
Out[ ]: (1, 'python', True)

In [ ]: # Count of elements in tuple
        len(tup1)
Out[ ]: 4

In [ ]: tup2 = (2, "pythonLearner", 3.5, False)
        tup2
Out[ ]: (2, 'pythonLearner', 3.5, False)

In [ ]: # Concatenate (to add two or more tuples)
        tup1 + tup2
Out[ ]: (1, 'python', True, 2.5, 2, 'pythonLearner', 3.5, False)

In [ ]: # Concatenate and repeat
        tup1*2 + tup2
Out[ ]: (1,
         'python',
         True,
         2.5,
         1,
         'python',
         True,
         2.5,
         2,
         'pythonLearner',
         3.5,
         False)

In [ ]: tup3 = (40, 57, 98, 45, 36, 55)
        tup3
Out[ ]: (40, 57, 98, 45, 36, 55)

In [ ]: # Minimum
        min(tup3)
Out[ ]: 36

In [ ]: max(tup3)
Out[ ]: 98

In [ ]: tup4 = tup3*2
        tup4
Out[ ]: (40, 57, 98, 45, 36, 55, 40, 57, 98, 45, 36, 55)

In [ ]: tup4.count(57)
Out[ ]: 2

In [ ]: tup3
Out[ ]: (40, 57, 98, 45, 36, 55)

In [ ]: tup3.index(45)
Out[ ]: 3
```

2. List

- Ordered collection of elements
- Enclosed in [] Square-braces/brackets
- Mutable, you can change the values

```
In [ ]: list1 = [2, "pythonLearner", False]
        list1
Out[ ]: [2, 'pythonLearner', False]

In [ ]: type(list1)
Out[ ]: list

In [ ]: len(list1)
Out[ ]: 3

In [ ]: list1[2]
Out[ ]: False

In [ ]: list2 = [5, 7, "Aammar", "Codanics", 785, 4.23, False]
        list2
Out[ ]: [5, 7, 'Aammar', 'Codanics', 785, 4.23, False]

In [ ]: list1 + list2
Out[ ]: [2, 'pythonLearner', False, 5, 7, 'Aammar', 'Codanics', 785, 4.23, False]

In [ ]: list1*2
Out[ ]: [2, 'pythonLearner', False, 2, 'pythonLearner', False]

In [ ]: list1
Out[ ]: [2, 'pythonLearner', False]

In [ ]: list1.reverse()
        list1
Out[ ]: [False, 'pythonLearner', 2]

In [ ]: list1.append("Codanics YouTube Channel")
        list1
Out[ ]: [False, 'pythonLearner', 2, 'Codanics YouTube Channel']

In [ ]: list1.count("pythonLearner") # how many times specified element is appeared
Out[ ]: 1

In [ ]: list3 = [47, 58, 32, 47, 85, 69, 84, 65, 98, 47, 25, 32]
        list3
Out[ ]: [47, 58, 32, 47, 85, 69, 84, 65, 98, 47, 25, 32]

In [ ]: len(list3)
Out[ ]: 12

In [ ]: # Sorting a list
        list3.sort()
        list3
Out[ ]: [25, 32, 32, 47, 47, 47, 58, 65, 69, 84, 85, 98]

In [ ]: list3*2
Out[ ]: [25,
         32,
         32,
         47,
         47,
         47,
         58,
         65,
         69,
         84,
         85,
         98,
         25,
         32,
         32,
         47,
         47,
         47,
         58,
         65,
         69,
         84,
         85,
         98]

In [ ]: lists = list1 + list2
        lists
Out[ ]: [False,
         'pythonLearner',
         2,
         'Codanics YouTube Channel',
         5,
         7,
         'Aammar',
         'Codanics',
         785,
         4.23,
         False]

In [ ]: sports = ['snooker', 'cricket', 'basketball', 'football']
        sports
Out[ ]: ['snooker', 'cricket', 'basketball', 'football']

In [ ]: # Copy list
        copy_sports = sports.copy()
        copy_sports
Out[ ]: ['snooker', 'cricket', 'basketball', 'football']

In [ ]: # Extend list
        copy_sports.extend(['volleyball']) # takes list of element(s)
        copy_sports
Out[ ]: ['snooker', 'cricket', 'basketball', 'football', 'volleyball']

In [ ]: # Remove all elements from the list
        copy_sports.clear()
        copy_sports
Out[ ]: []

In [ ]: # Find position of the element
        sports.index("basketball")
Out[ ]: 2

In [ ]: # Insert new element
        sports.insert(1, "baseball")
        sports
Out[ ]: ['snooker', 'baseball', 'cricket', 'basketball', 'football']

In [ ]: # Remove an element at the specified position
        sports.pop(2)
Out[ ]: 'cricket'

In [ ]: # Remove an element at the specified value
        sports.remove("baseball")
        sports
Out[ ]: ['snooker', 'basketball', 'football']
```

3. Dictionaries

- An unordered collection of elements
- Key and Value
- Curly braces or brackets {}
- Mutable/Change the values

```
In [ ]: # Food and their prices
        food1 = {"Samosa": 30, "Raita": 20, "Pakora": 100, "Salad": 50, "Chicken Rolls": 30}
        food1
Out[ ]: {'Samosa': 30, 'Raita': 20, 'Pakora': 100, 'Salad': 50, 'Chicken Rolls': 30}

In [ ]: type(food1)
Out[ ]: dict

In [ ]: # Extract data
        keys1 = food1.keys()
        keys1
Out[ ]: dict_keys(['Samosa', 'Raita', 'Pakora', 'Salad', 'Chicken Rolls'])

In [ ]: values = food1.values()
        values
Out[ ]: dict_values([30, 20, 100, 50, 30])

In [ ]: # Adding new elemnt
        food1["Tikki"] = 10
        food1
Out[ ]: {'Samosa': 30,
         'Raita': 20,
         'Pakora': 100,
         'Salad': 50,
         'Chicken Rolls': 30,
         'Tikki': 10}

In [ ]: # Update the values
        food1["Tikki"] = 15
        food1
Out[ ]: {'Samosa': 30,
         'Raita': 20,
         'Pakora': 100,
         'Salad': 50,
         'Chicken Rolls': 30,
         'Tikki': 15}

In [ ]: food2 = {"Dates": 50, "Chocolates": 200, "Swayyan": 1000}
        food2
Out[ ]: {'Dates': 50, 'Chocolates': 200, 'Swayyan': 1000}

In [ ]: # Concatenate
        food1.update(food2)

In [ ]: food1
Out[ ]: {'Samosa': 30,
         'Raita': 20,
         'Pakora': 100,
         'Salad': 50,
         'Chicken Rolls': 30,
         'Tikki': 15,
         'Dates': 50,
         'Chocolates': 200,
         'Swayyan': 1000}

In [ ]: # Copy dictionary
        copy_food1 = food1.copy()
        copy_food1
Out[ ]: {'Samosa': 30,
         'Raita': 20,
         'Pakora': 100,
         'Salad': 50,
         'Chicken Rolls': 30,
         'Tikki': 15,
         'Dates': 50,
         'Chocolates': 200,
         'Swayyan': 1000}

In [ ]: # Remove all elements
        copy_food1.clear()
        copy_food1
Out[ ]: {}

In [ ]: # Create different keys with same values
        food = ("Ice cream", "Milk shake", "Cold drinks")
        price = 75

        rates = dict.fromkeys(food, price)
        rates
Out[ ]: {'Ice cream': 75, 'Milk shake': 75, 'Cold drinks': 75}

In [ ]: # Get value from dict
        food1.get("Samosa")
Out[ ]: 30

In [ ]: # Get key-value pairs
        food1.items()
Out[ ]: dict_items([('Samosa', 30), ('Raita', 20), ('Pakora', 100), ('Salad', 50), ('Chicken Rolls', 30), ('Tikki', 15), ('Da
        tes', 50), ('Chocolates', 200), ('Swayyan', 1000)])

In [ ]: # Remove an item from the dict
        food1.pop("Swayyan")
        food1
Out[ ]: {'Samosa': 30,
         'Raita': 20,
         'Pakora': 100,
         'Salad': 50,
         'Chicken Rolls': 30,
         'Tikki': 15,
         'Dates': 50,
         'Chocolates': 200}

In [ ]: # Remove last item from the dict
        food1.popitem()
        food1
Out[ ]: {'Samosa': 30,
         'Raita': 20,
         'Pakora': 100,
         'Salad': 50,
         'Chicken Rolls': 30,
         'Tikki': 15,
         'Dates': 50}

In [ ]: # Set the default value of a key
        food1.setdefault("Chicken Rolls", 3000)
Out[ ]: 30
```

4. Set

- Unordered and unindexed
- Curly braces are used {}
- No duplicates allowed

```
In [ ]: s1 = {2, 2.5, 78.25, "Aammar", "Codanics", "Faisalabad", True}
        s1
Out[ ]: {2, 2.5, 78.25, 'Aammar', 'Codanics', 'Faisalabad', True}

In [ ]: s1.add("Aammar1")

In [ ]: s1
Out[ ]: {2, 2.5, 78.25, 'Aammar', 'Aammar1', 'Codanics', 'Faisalabad', True}

In [ ]: s1.remove("Aammar1")
        s1
Out[ ]: {2, 2.5, 78.25, 'Aammar', 'Codanics', 'Faisalabad', True}

In [ ]: # Copy set
        copy_s1 = s1.copy()
        copy_s1
Out[ ]: {2, 2.5, 78.25, 'Aammar', 'Codanics', 'Faisalabad', True}

In [ ]: # Remove set
        copy_s1.clear()
        copy_s1
Out[ ]: set()

In [ ]: food1
Out[ ]: {'Samosa': 30,
         'Raita': 20,
         'Pakora': 100,
         'Salad': 50,
         'Chicken Rolls': 30,
         'Tikki': 15,
         'Dates': 50}

In [ ]: # Find the difference between two sets
        items1 = {"Samosa", "Raita", "Pakora"}
        items2 = {"Salad", "Samosa", "Dates"}

        items3 = items1.difference(items2)
        items3
Out[ ]: {'Pakora', 'Raita'}

In [ ]: # Remove items that exist in both sets (Samosa)
        items1.difference_update(items2)
        items1
Out[ ]: {'Pakora', 'Raita'}

In [ ]: items2
Out[ ]: {'Dates', 'Salad', 'Samosa'}

In [ ]: # Remove an element from the set
        items2.discard("Salad")
        items2
Out[ ]: {'Dates', 'Samosa'}

In [ ]: food1
Out[ ]: {'Samosa': 30,
         'Raita': 20,
         'Pakora': 100,
         'Salad': 50,
         'Chicken Rolls': 30,
         'Tikki': 15,
         'Dates': 50}

In [ ]: # Find the same elements in both sets
        old_items = {"Samosa", "Raita", "Pakora", "Salad", "Chicken Rolls", "Tikki", "Dates", "Biryani", "Mutton"}
        new_items = {"Salad", "Chicken Rolls", "Tikki", "Biryani"}

        combo_items = old_items.intersection(new_items)
        combo_items
Out[ ]: {'Biryani', 'Chicken Rolls', 'Salad', 'Tikki'}

In [ ]: # Find if no item in old_items is present in new_items
        old_items.isdisjoint(new_items)
Out[ ]: False

In [ ]: # Find if all items of old_items are present in new_items
        old_items.issubset(new_items)
Out[ ]: False

In [ ]: # Find if all items of new_items are present in old_items
        old_items.issuperset(new_items)
Out[ ]: True

In [ ]: # Find items from both sets except the common ones
        old_items.symmetric_difference(new_items)
Out[ ]: {'Dates', 'Mutton', 'Pakora', 'Raita', 'Samosa'}

In [ ]: # Add few items into new_items
        new_items.add("Sweets")
        new_items.add("Kabab")
        new_items
Out[ ]: {'Biryani', 'Chicken Rolls', 'Kabab', 'Salad', 'Sweets', 'Tikki'}

In [ ]: # Remove items present in both sets
        # and insert items that is not present in both sets
        old_items.symmetric_difference_update(new_items)
        old_items
Out[ ]: {'Dates', 'Kabab', 'Mutton', 'Pakora', 'Raita', 'Samosa', 'Sweets'}

In [ ]: # Remove items that is not present in both sets
        old_items.intersection_update(new_items)
        old_items
Out[ ]: {'Kabab', 'Sweets'}

In [ ]: # Return a set that contains all items from both sets
        fresh_items = old_items.union(new_items)
        fresh_items
Out[ ]: {'Biryani', 'Chicken Rolls', 'Kabab', 'Salad', 'Sweets', 'Tikki'}

In [ ]: # Insert items from new_items into old_items
        old_items
Out[ ]: {'Kabab', 'Sweets'}

In [ ]: new_items
Out[ ]: {'Biryani', 'Chicken Rolls', 'Kabab', 'Salad', 'Sweets', 'Tikki'}

In [ ]: old_items.update(new_items)
        old_items
Out[ ]: {'Biryani', 'Chicken Rolls', 'Kabab', 'Salad', 'Sweets', 'Tikki'}

In [ ]: # Remove a random item
        old_items.pop()
Out[ ]: 'Biryani'

In [ ]: old_items
Out[ ]: {'Chicken Rolls', 'Kabab', 'Salad', 'Sweets', 'Tikki'}
```