

```
"""
```

Sets:

A Set is a collection of unique elements.

Characteristics:

1. Sets are mutable.
2. Sets allow different data types.
3. Sets only allow immutable data types as members.
4. Sets only allow unique values.
5. Sets are unordered.

```
"""
```

```
# Creation of Sets
```

```
# Empty Set
```

```
a = set()
```

```
print(type(a))
```

```
# Set with Elements
```

```
a = {1, 2, 3, 4, 5}
```

```
print(type(a))
```

```
a = {1, 2, 3, 4, 5, 1, 2, 3, 4, 5}
```

```
print(a)
```

```
a = {1, "Two", 3.0}
```

```
print(a)
```

```
a = {1, "Two", 3.0}
```

```
print(a)
```

```
# a = {[1, 2, 3], 4, 5, 6}
```

```
# a = {[1, 2, 3], 4, 5, 6}
```

```
# Set Methods
```

```
"""
```

```
1. add() - Add new members to a set
```

```
2. remove() - remove existing elements from a set if the element is present.  
               If the element is not present, raises a KeyError.
```

```
3. pop() - removes an arbitrary element from a set if the set is non empty.  
           if the set is empty, raises error.
```

```
3. discard() - removes if the element exists and  
               ignores if the element doesn't exist in the set.
```

```
4. clear() - removes all the elements and makes the set empty.
```

```
4. union() - Performs Union of two sets. (A U B)
```

```
5. intersection() - Performs the intersection of two sets. (A ∩ B)
```

```
6. intersection_update() - Performs the intersection of two sets and  
                           updates the original set. (A ∩ B)
```

```
7. difference() - Performs the set difference between two sets. (A - B)
```

```
8. difference_update() - Performs the set difference between two sets and  
                           updates the original set. (A - B)
```

```
9. symmetric_difference() - Performs the symmetric difference between  
                           two sets. (A U B) - (A ∩ B)
```

```
10. symmetric_difference_update() - Performs the symmetric difference  
                                    between two sets and  
                                    updates the original set.  
                                    (A U B) - (A ∩ B)
```

```
11. update() - adds the elements from an iterable
```

```
12. isdisjoint() -
```

```
13. issuperset() -
```

14. issubset() -

Subset and superset - If all the elements in the set a are members of set b, then set a is called sub set of b.
set b is called super set of a.

disjoint - If there are no common elements between both the sets, then the sets are disjoint.

"""

```
a = {1, 2, 3, 4}
a.add(5)
print(a)
```

```
a.add(1)
print(a)
```

```
a.remove(5)
print(a)
```

```
x = 100
if x in a:
    a.remove(100)
print(a)
```

```
b = a.discard(4)
a.discard(100)
print(a)
```

```
removed_element = a.pop()
print("Removed Element is ", removed_element)
print(a)
```

```
a.clear()
print(a)
```

```
# a.pop()
```

```
a = {1, 2, 3, 4, 5}
b = {6, 7, 8, 9, 10}
c = a.union(b)
print(c)
```

```
a = {1, 2, 3, 4, 5}
b = {4, 5, 6, 7, 8, 9, 10}
c = a.union(b)
print(c)
print(a)
```

```
c = a.intersection(b)
print(c)
```

```
c = a.difference(b)
print(c)
```

```
c = a.symmetric_difference(b)
print(c)
```

```
print(a)
print(b)
```

```
a = {1, 2, 3, 4, 5}
b = {4, 5, 6, 7, 8, 9, 10}
a.intersection_update(b)
print(a)
```

```
a = {1, 2, 3, 4, 5}
b = {4, 5, 6, 7, 8, 9, 10}
a.difference_update(b)
print(a)
```

```
a = {1, 2, 3, 4, 5}
b = {4, 5, 6, 7, 8, 9, 10}
a.symmetric_difference_update(b)
print(a)
```

```
a = {1, 2, 3, 4, 5}
b = {4, 5, 6, 7, 8, 9, 10}
a.update(b)
print(a)
```

```
a = {1, 2, 3, 4, 5}
b = [4, 5, 6, 7, 8]
a.update(b)
print(a)
```

```
a = {1, 2, 3}
b = {1, 2, 3, 4, 5}
c = a.issubset(b)
print(c)
```

```
a = {1, 2, 3, 10}
b = {1, 2, 3, 4, 5}
c = a.issubset(b)
print(c)
```

```
a = {1, 2, 3}
b = {1, 2, 3, 4, 5}
c = b.issuperset(a)
print(c)
```

```
a = {1, 2, 3, 10}
b = {1, 2, 3, 4, 5}
c = b.issuperset(a)
print(c)
```

```
a = {1, 2, 3, 4}
b = {5, 6, 7, 8}
c = a.isdisjoint(b)
print(c)
```

```
a = {1, 2, 3, 4, 5}
b = {5, 6, 7, 8}
c = a.isdisjoint(b)
```

```

print(c)

a = {1, 2, 3, 4}
b = a
b.add(5)
print("a = ", a) # {1, 2, 3, 4, 5}
print("b = ", b) # {1, 2, 3, 4, 5}
print(id(a))
print(id(b))
print(a is b) # True

a = {1, 2, 3, 4}
b = a.copy()
b.add(5)
print(id(a))
print(id(b))
print(a is b) # False
# print(a == b)
print("a = ", a) # {1, 2, 3, 4}
print("b = ", b) # {1, 2, 3, 4, 5}

# Iterating over a set
a = {1, 2, 3, 4, 5}
for item in a:
    print(item, end=' ')
print()

"""
Operators that can be used with sets
| => Union,
& - Intersection
- => difference
^ => symmetric difference,
> => proper superset
< => proper subset
>= => superset
<= => subset
== => Equality
!= => Not Equality
"""

a = {1, 2, 3, 4, 5}
b = {4, 5, 6, 7, 8}
c = a | b
print(c) # {1, 2, 3, 4, 5, 6, 7, 8}
c = a & b
print(c) # {4, 5}
c = a - b
print(c) # {1, 2, 3}
c = a ^ b
print(c) # {1, 2, 3, 6, 7, 8}
a = {1, 2, 3}
b = {1, 2, 3}
c = (b <= a)
print(c) # True
c = (a <= b)
print(c) # True
c = (b < a)

```

```

print(c) # False
c = (a < b)
print(c) # False
c = (a >= b)
print(c) # True
c = (b >= a)
print(c) # True
c = (a > b)
print(c) # False
c = (b > a)
print(c) # False
a = {1, 2, 3, 4}
b = {1, 2, 3}
c = (b <= a)
print(c) # True
c = (b < a)
print(c) # True
c = (a >= b)
print(c) # True
c = (a > b)
print(c) # True
a = {1, 2, 3, 4}
b = {1, 2, 3, 4}
c = (a == b)
print(c) # True
c = (a != b)
print(c) # False
a = {1, 2, 3, 4, 5}
b = {4, 5, 6, 7, 8}
c = {1, 2, 3, 7, 8, 9, 10, 11}
d = a | b & c
print(d) # {1, 2, 3, 4, 5, 7, 8}

```

"""

Frozen Sets:

1. Frozen sets are immutable.

Uses:

1. Since they are immutable, they can be included as members in a set.
 2. Since they are immutable, they can be used as keys for a dictionary.

"""

Creation:

Empty frozen set

<set_variable_name> = frozenset()

a = frozenset()

print(type(a))

print(a)

<set_variable_name> = frozenset(<iterable>)

a = frozenset([1, 2, 3, 4, 5])

print(type(a))

print(a)

a = frozenset((1, 2, 3, 4, 5))

print(type(a))

print(a)

```
a = frozenset({1, 2, 3, 4, 5})
print(type(a))
print(a)
```

```
a = frozenset({1: "One", 2: "Two", 3: "Three", 4: "Four", 5: "Five"})
print(type(a))
print(a)
```

```
"""
```

```
Methods for a frozen set
```

```
1. union() - Performs Union of two sets. ( $A \cup B$ )
2. intersection() - Performs the intersection of two sets. ( $A \cap B$ )
3. difference() - Performs the set difference between two sets. ( $A - B$ )
4. symmetric_difference() - Performs the symmetric difference between
                           two sets. ( $A \cup B$ ) - ( $A \cap B$ )
```

```
5. isdisjoint() -
```

```
6. issuperset() -
```

```
7. issubset() -
```

```
"""
```

```
a = frozenset({1, 2, 3, 4, 5})
b = frozenset({4, 5, 6, 7, 8})
c = a.union(b) # frozenset({1, 2, 3, 4, 5, 6, 7, 8})
print(c)
c = a.intersection(b)
print(c)
```

```
a = frozenset([1, 2, 3])
b = {1, 2, a, 3, 4, 5}
print(b)
```

```
a = [1, 2, 3]
b = frozenset(a)
```

```
c = (1, 2, 3)
d = frozenset(c)
```

```
print(b)
print(d)
print(id(b))
print(id(d))
print(b is d) #
```