

Introduction to Python (Part I)

Variables and data types

Week1

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Plan

Python Basics:

- Variables
- Comments
- Basic Data Types:
 - String
 - Integer
 - Float
 - Boolean
 - List
 - Dictionary

Variables

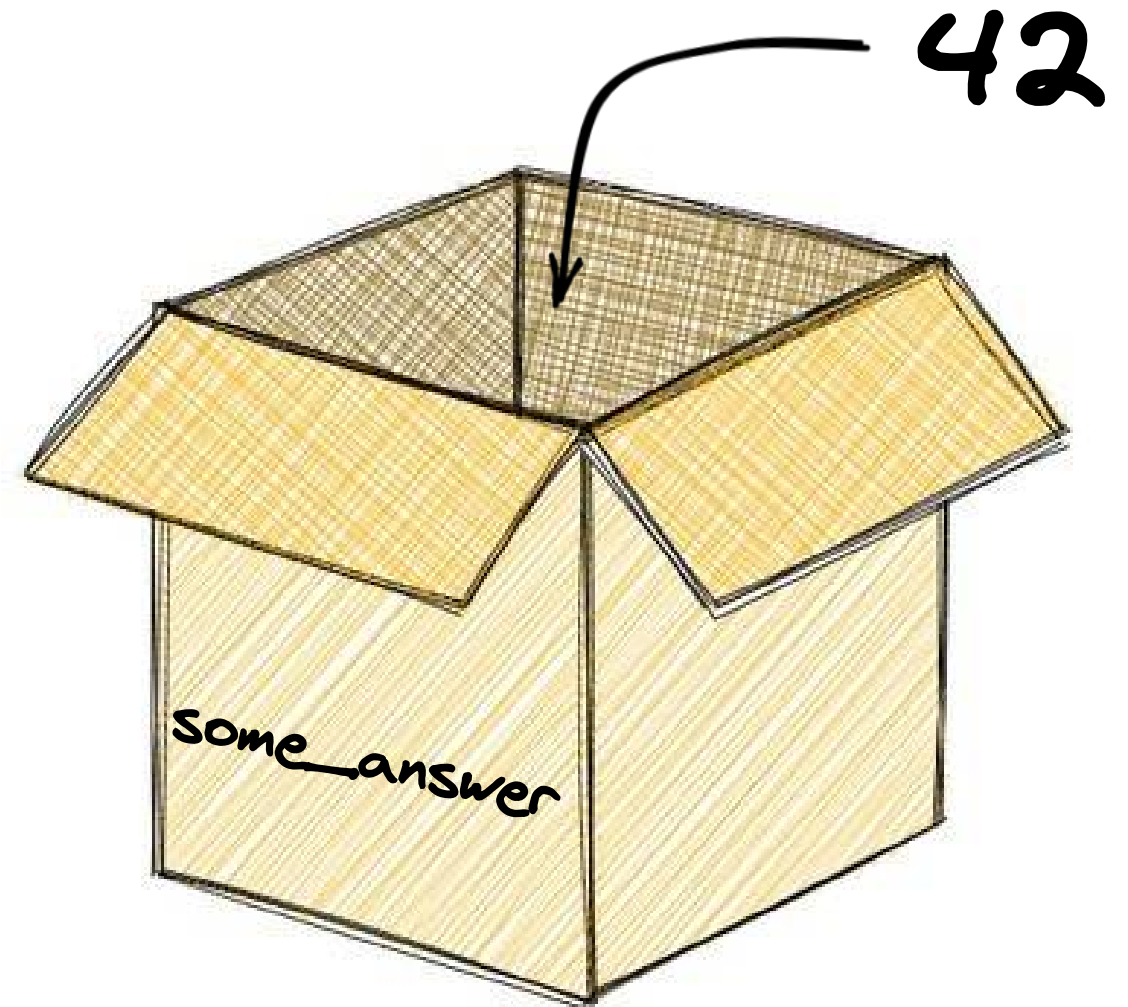
```
some_answer = 42
```

```
print(some_answer)
```

```
>>>42
```

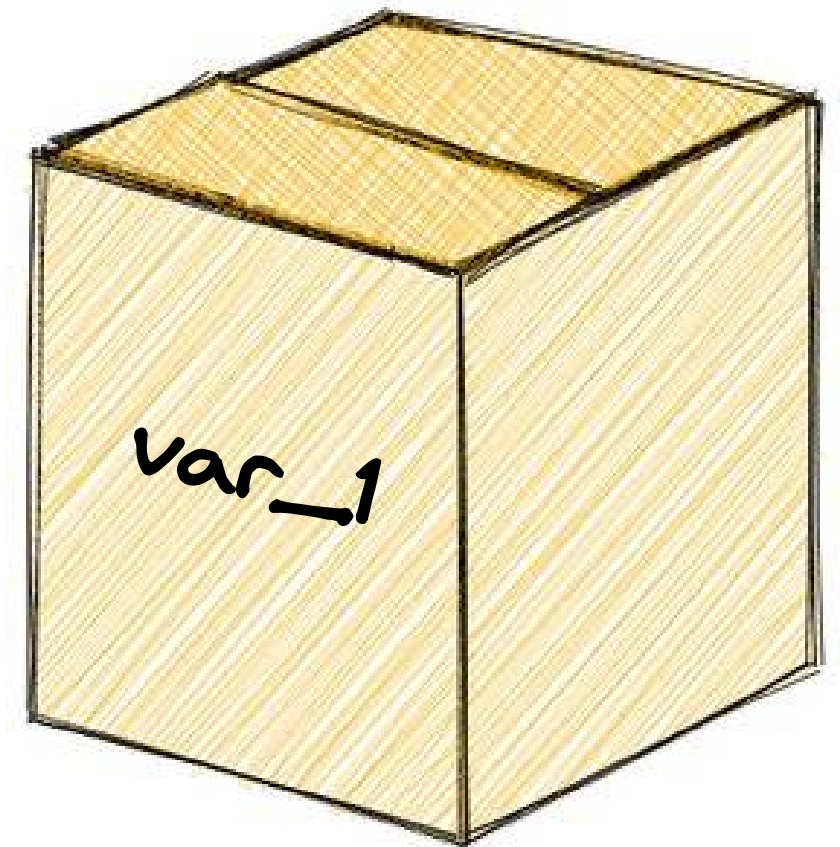
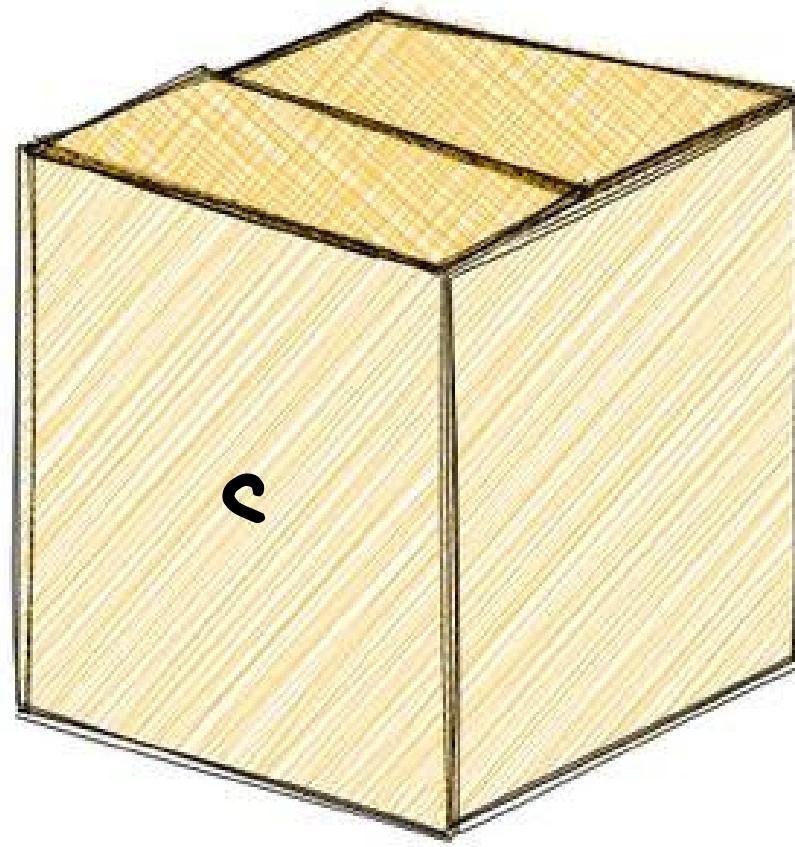
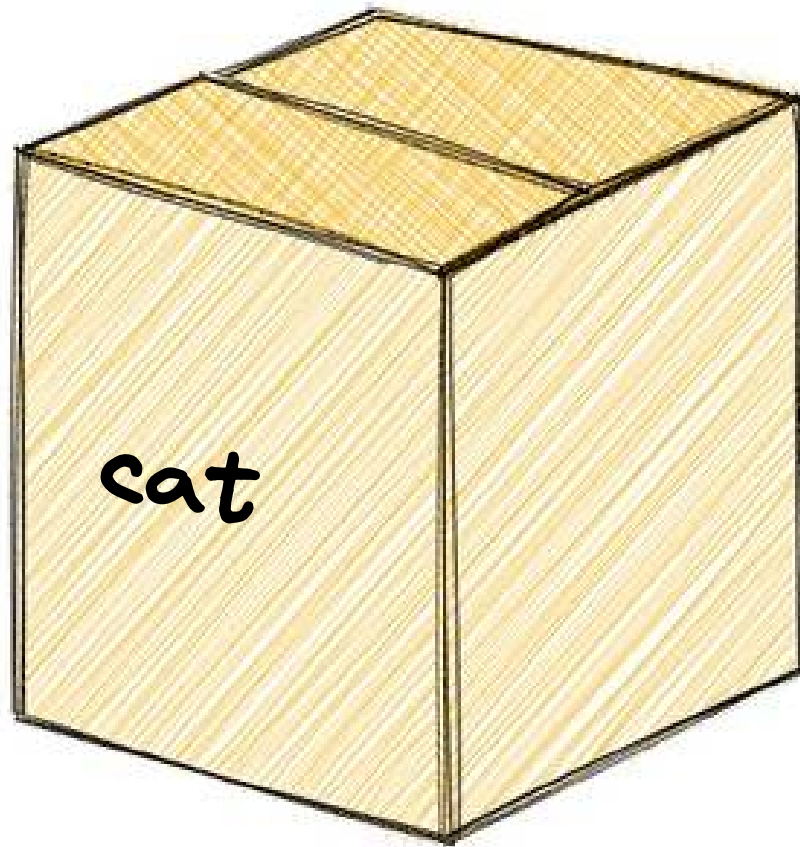
```
print(type(some_answer))
```

```
>>>int
```



Naming variables

Can you guess what is in each box?



Variables: Naming convention

Bad examples

'l' (lowercase letter “el”),
'O' (uppercase letter “oh”)
'I' (uppercase letter “eye”)

'some_variable'
'NOT_GLOBAL_VAR'
'Averagecamelsizeindesert'
'number-of-cans-in-a-sixpack'
'xxrstaqwe'

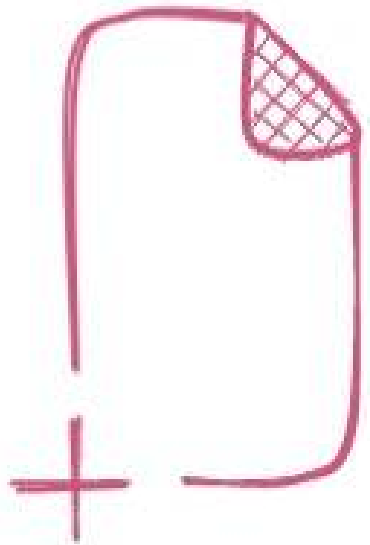
Good examples

temp_celsius
station_id
current_timestamp

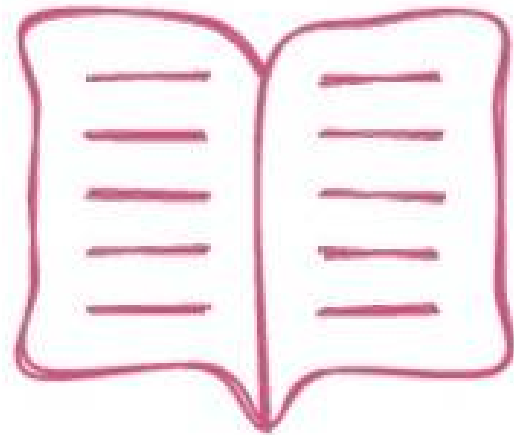
tempCelsius
stationID
currentTimestamp

Basic operations with variables

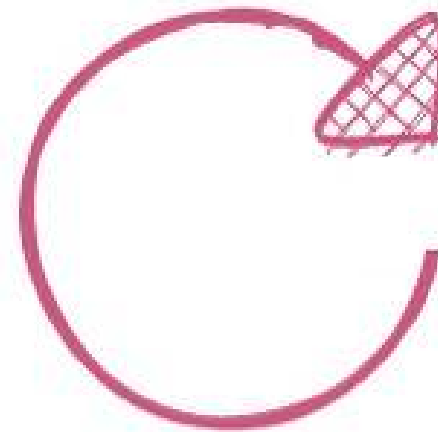
Create



Read



Update



Delete



Comments

```
# This is a comment before some code  
print("Hello Python!")
```

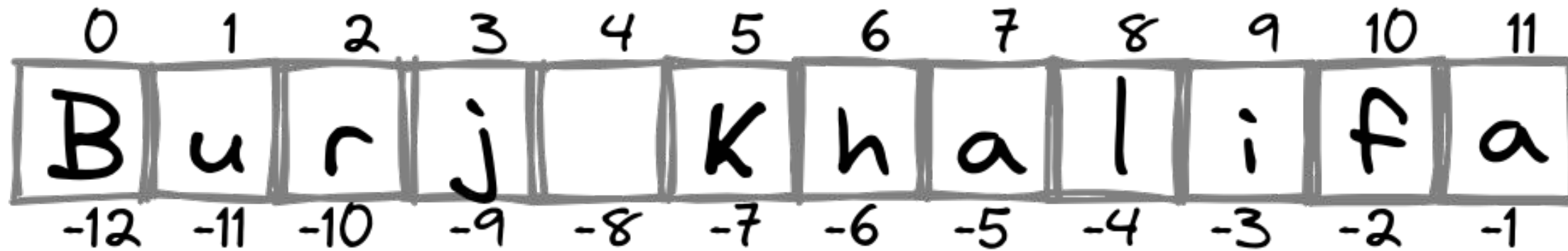
```
"""  
multi-row  
comment  
"""
```

```
print("Winter is coming!") # this is an in-line comment
```

Comments are left to increase the understandability of ones code.
Very often to later version of yourself.

Data Type: String

```
my_string = "Burj Khalifa"
```



`my_string[xstart:xend:step]`

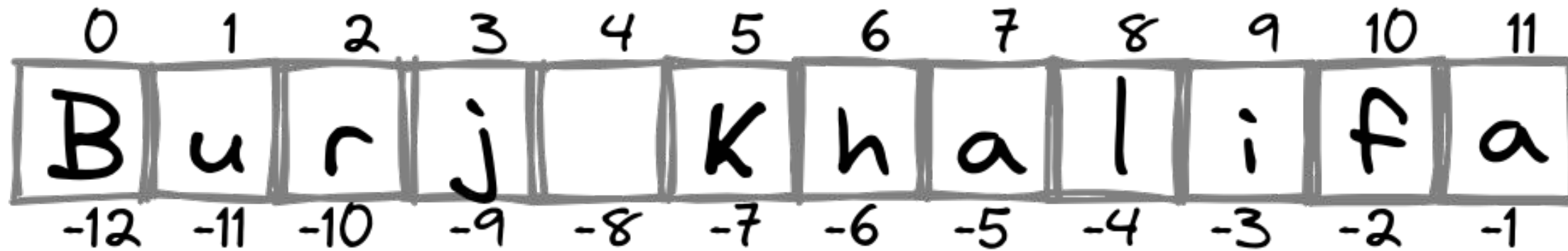
```
my_string[0:4]      >>> "Burj"
my_string[2]        >>> "r"
my_string[-1]       >>> "a"
my_string[2:-5]     >>> "rj Kh"
my_string[::-3]     >>> "Bjhi"
```

Speed Task:

```
my_string[5:]       >>>
my_string[4]        >>>
my_string[-0]       >>>
my_string[3:9:2]    >>>
my_string[::-1]     >>>
```


Data Type: String

```
my_string = "Burj Khalifa"
```



`my_string[xstart:xend:step]`

```
my_string[0:4]      >>> "Burj"
my_string[2]        >>> "r"
my_string[-1]       >>> "a"
my_string[2:-5]     >>> "rj Kh"
my_string[::-3]     >>> "Bjhi"
```

Speed Task:

```
my_string[5:]       >>> "Khalifa"
my_string[4]        >>> " "
my_string[-0]       >>> "B"
my_string[3:9:2]    >>> "jKa"
my_string[::-1]     >>> "afilahK jruB"
```

Data Type: Updating Strings

String concatenation:

```
string_one = "Expo2020 took"  
string_two = "place in 2021"  
string_three = string_one + string_two  
>>>Expo2020 tookplace in 2021
```

```
string_three = string_three + " " + "in Dubai"  
>>>Expo2020 tookplace in 2021 in Dubai
```

```
string_three += "!"  
>>>Expo2020 tookplace in 2021 in Dubai!
```


String methods

dir(my_string)

```
>>>['_add_', '__class__', '__contains__', '__delattr__', '__doc__', '__eq__', '__format__',  
    '__ge__', '__getattr__', '__getitem__', '__getnewargs__', '__getslice__', '__gt__',  
    '__hash__', '__init__', '__le__', '__len__', '__lt__', '__mod__', '__mul__', '__ne__', '__new__',  
    '__reduce__', '__reduce_ex__', '__repr__', '__rmod__', '__rmul__', '__setattr__',  
    '__sizeof__', '__str__', '__subclasshook__', '_formatter_field_name_split',  
    '_formatter_parser', 'capitalize', 'center', 'count', 'decode', 'encode', 'endswith',  
    'expandtabs', 'find', 'format', 'index', 'isalnum', 'isalpha', 'isdigit', 'islower', 'isspace',  
    'istitle', 'isupper', 'join', 'ljust', 'lower', 'lstrip', 'partition', 'replace', 'rfind', 'rindex',  
    'rjust', 'rpartition', 'rsplit', 'rstrip', 'split', 'splitlines', 'startswith', 'strip', 'swapcase',  
    'title', 'translate', 'upper', 'zfill']
```

Data Type: Integers and Floats

Integer: Whole numbers

```
my_number = 5
type(my_number)
>>><class 'int'>
int(5.0)
>>><class 'int'>
my_number += 1
>>>6
```

Float: Fraction numbers

```
my_number = 5.0
type(my_number)
>>><class 'float'>
float(5)
>>><class 'float'>
del my_number
>>>
```

Data Type: Boolean

Boolean values represent **True/False** statements.

Often used to check for None, empty strings, list, objects, etc.

```
my_bool = 2 + 2 == 5  
my_bool, type(my_bool)  
>>>False, <class 'bool'>
```

```
bool(False), bool(None), bool(0), bool(""), bool(()), bool([]), bool({})  
>>>False, False, False, False, False, False, False
```

```
bool(True), bool(1), bool("a"), bool((b)), bool([c]), bool({"d":"e"})  
>>>True, True, True, True, True, True
```


Data Type: List

0	1	2	3	4	5
4	8	15	16	23	42
-6	-5	-4	-3	-2	-1

```
my_string = [4,8,15,16,23,42]
```

`my_list[xstart:xend:step]`

```
my_list[0]      >>> 4
my_list[-1]     >>> 42
my_list[1:4]    >>> [8, 15, 16]
my_list[3:]     >>> [16, 23, 42]
my_list[::-1]   >>> [42, 23, 16, 15, 8, 4]
my_list[:]      >>> [4, 8, 15, 16, 23, 42]
```

```
my_list[0] = 1
```

```
>>> [1, 8, 15, 16, 23, 42]
```

```
my_list = my_list + [100]
```

```
>>> [1, 8, 15, 16, 23, 42, 100]
```

```
del my_list[-2]
```

```
>>> [1, 8, 15, 16, 23, 100]
```

List methods

```
dir(my_list)
```

```
>>>['_add_', '__class__', '__contains__', '__delattr__', '__delitem__', '__dir__',  
    '__doc__', '__eq__', '__format__', '__ge__', '__getattr__', '__getitem__',  
    '__gt__', '__hash__', '__iadd__', '__imul__', '__init__', '__init_subclass__', '__iter__',  
    '__le__', '__len__', '__lt__', '__mul__', '__ne__', '__new__', '__reduce__',  
    '__reduce_ex__', '__repr__', '__reversed__', '__rmul__', '__setattr__', '__setitem__',  
    '__sizeof__', '__str__', '__subclasshook__', 'append', 'clear', 'copy', 'count',  
    'extend', 'index', 'insert', 'pop', 'remove', 'reverse', 'sort']
```

Data Type: Tuple

```
my_tuple = (16,2,4,8)
```

```
my_tuple[0] = 0  
>>> TypeError: 'tuple' object  
does not support item assignment
```

```
my_tuple.append(0)  
>>> AttributeError: 'tuple'  
object has no attribute 'append'
```

```
my_tuple[-1] >>> 8  
my_tuple[1:3] >>> (2, 4)
```

Tuples are **immutable**.
Neither they, nor their elements
can be changed.

Tuples are **ordered**. Their order
won't change. They maintain
the order of data insertion.

Data Type: Set

```
my_set = {1, 2, 4, 8, 16, 32}
```

```
my_set = {16, 1, 2, 32, 2, 2, 4, 8, 16, 1, 1}
>>> {1, 2, 4, 8, 16, 32}
```

```
my_set.add(5.0)
my_set.add(False)
>>> {False, 1, 2, 4, 5.0, 8, 16}
```

```
my_list = [8, 2, 2, 3, 1, 1, 4, 5, 5, 7, 8]
my_set = set(my_list)
>>> {1, 2, 3, 4, 5, 7, 8}
```

Sets contain **unique** values.
Duplicate values are not allowed.

Sets are **immutable**.
Their elements cannot be changed.

Sets are **unordered**. They don't maintain the order of data insertion.

Data Type: Dictionary

```
my_dictionary["name"]  
>>>"Burj Khalifa"
```

```
my_dictionary.keys()  
>>>dict_keys(['name', 'height_m',  
'completed'])
```

```
my_dictionary.values()  
>>>dict_values(['Burj Khalifa', 830, True])
```

```
my_dictionary = {  
    "name": "Burj Khalifa",  
    "height_m": 830,  
    "completed": True  
}
```

```
{  
    "key": "value"  
}
```

Keys are **unique** within a dictionary

Dictionaries are **ordered** by key, not maintaining initial order

Data Type: Dictionary

```
my_dictionary['height_m'] = 829.8
```

```
my_dictionary['hashtags'] = ["#burjkhalifa",  
                             "#dubai", "#uae", "#dubaimall"]
```

```
del my_dictionary['completed']
```

```
>>>{  
    "name": "Burj Khalifa",  
    "height_m": 829.8,  
    "hashtags": ["#burjkhalifa",  
                 "#dubai", "#uae", "#dubaimall"]  
}
```

```
my_dictionary = {  
    "name": "Burj Khalifa",  
    "height_m": 830,  
    "completed": True  
}
```

Dictionary methods

```
dir(my_dictionary)
```

```
>>>['_class_', '__contains__', '__delattr__', '__delitem__', '__dir__', '__doc__',  
    '__eq__', '__format__', '__ge__', '__getattribute__', '__getitem__', '__gt__',  
    '__hash__', '__init__', '__init_subclass__', '__iter__', '__le__', '__len__', '__lt__',  
    '__ne__', '__new__', '__reduce__', '__reduce_ex__', '__repr__', '__reversed__',  
    '__setattr__', '__setitem__', '__sizeof__', '__str__', '__subclasshook__', 'clear',  
    'copy', 'fromkeys', 'get', 'items', 'keys', 'pop', 'popitem', 'setdefault', 'update',  
    'values']
```

Data Type comparison

	preserved order	changeable elements	duplicated elements	can be indexed
List	✓	✓	✓	✓
Tuple	✓	✗	✓	✓
Set	✗	✗	✗	✗
Dict	✗	✓	✗	✓